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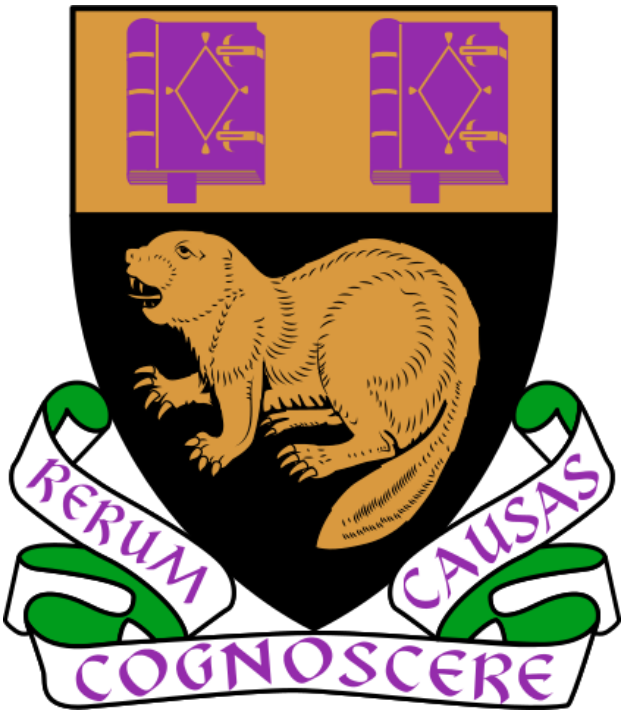

From Bretton Woods to the Great Moderation: Essays in British Post-War Macroeconomic History

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Declaration

I certify that the thesis I have presented for examination for the PhD degree of the London School of Economics and Political Science is solely my own work other than where I have clearly indicated that it is the work of others (in which case the extent of any work carried out jointly by me and any other person is clearly identified in it).

I declare that my thesis consists of 62,822 words.

Abstract

This thesis contributes to our understanding of British macroeconomic history in the decades following World War II until the eve of the Global Financial Crisis. It visits pivotal historical episodes, analyses pre-eminent policy issues, and examines some of the most contentious academic debates of the day. Particular focus is given to macroeconomic fluctuations in the short and medium-run, in contrast to the extant economic history literature centred largely on economic growth and comparative performance at the long-run horizon. The first chapter investigates the impact of fiscal policy on the current account balance under the Bretton Woods system of fixed exchange rates. Contrary to established opinion, econometric modelling reveals that fiscal laxity was not responsible for driving the UK's chronic imbalances and rather said imbalances must be understood with reference to a broader menu of economic shocks. The second chapter analyses the controversial issue of North Sea oil's impact on the exchange rate, terms of trade, and performance of the traded manufactures sector. Results from vector autoregressive models indicate that oil did exert a considerable impact, although it was not uniquely responsible for the difficulties bedevilling the manufacturing sector. Furthermore, it is argued that government policy towards management of the windfall revenues missed key opportunities therein. Finally, the third chapter takes up the question of aggregate cyclical dynamics, with specific reference to a debate between leading Keynesian economists regarding the true autonomous source of demand in an open-economy. Evidence from frequency domain analysis suggests that both sides of the debate overstated their positions and that a synthesis view appears perfectly reasonable in light of evidence obtained across varying frequency scales. Taken as a whole, the thesis reveals substantive differences between how contemporaneous actors and policy makers understood open-economy macroeconomic policy, versus the insights revealed by more recent econometric techniques and theoretical developments. The potential policy failures resulting from this disparity are considerable.

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Chapter 1

Introduction

A famous epitaph for Britain post-1945 is that she 'won the war but lost the peace'. This statement reflects in no small part the huge costs incurred fighting the Axis powers, but also the way in which other combatant countries staged seemingly miraculous economic comebacks despite suffering greater war-induced destruction and losses. In strikingly short periods of time, these countries caught up to Britain in terms of economic stature and living standards, and several went on to forge ahead, leaving Britain languishing behind with the unfavourable moniker of the 'sick man of Europe'. This can be juxtaposed, however, with the somewhat self-aggrandizing (though in many ways truthful) claim by Prime Minister Harold MacMillan in the late-1950s that 'Britons have never had it so good'. Herein lies the historical enigma that is the post-war fortunes of the UK economy: an enigma that aroused much spirited debate as events unfolded, and has elicited an equally contested academic literature in the long decades since.

But the importance and intellectual appeal of long-run economic growth notwithstanding, there is another facet of post-war British history that has received considerably less attention from economic historians, which is of marked significance to the country's post-war economic travails. This relates to the concept of economic fluctuations; the shocks and dynamics that

characterized the often-turbulent motion of the economy about its equilibrium growth path, and conduct and practise of macroeconomic stabilization undertaken by successive generations of politicians and public officials. Indeed, some of the most dramatic and historically salient moments in the post-war period have been the product of disequilibrium phenomena, coupled with high stakes policy interventions, rather than the slow and piecemeal evolution of the economy's trend growth rate.

Why then does the economics of fluctuations, and the resulting attempts at stabilization policy matter for our understanding of post-war Britain? On a historical level, there is a serious argument to be made that for several decades the exigencies of short-term macroeconomic management consumed far more political oxygen of the day than matters pertaining to the economy's long-run growth trajectory. Whilst this is certainly not to say that contemporaneous actors were unaware or opted to ignore matters of long-term growth, the zeitgeist was nonetheless one in which discretionary short-run policy interventions were seen as desirable and necessary for cultivating a post-war society that was both egalitarian and efficient.

Establishing a deeper historical and economic understanding of the UK's varied experiences over the course of the post-war decades bears relevance, and some might argue salutary lessons, for policy makers in more recent times. Indeed, the audacious claims by one-time Chancellor of the Exchequer (and later Prime Minister) Gordon Brown, who claimed to have successfully 'abolished boom and bust', would have appeared at best misguided to earlier generations of policy makers, or at worst even farcical [1]. Likewise, the apparently ineluctable myriad of self-imposed rules and constraints by politicians, which were conceived with a view to improving the government's credibility in a particular policy area, have a rather chequered

[1]It is important to recognise that the "death of the business cycle" was a shibboleth indulged by some US economists and policy makers during the late-1960s, who needless to say were left somewhat red-faced when the OPEC oil shock of the 1970s unleashed a volatile decade of economic turmoil. A similar volte face had to be performed as a new generation of policy makers in the United Kingdom and elsewhere were forced to fight the catastrophic fallout of the Global Financial Crisis, following the seeming tranquility of the Great Moderation.

record in economic terms – whilst costing more than a few ounces of flesh in terms of political reputation and standing.

The specific period under study, Bretton Woods to the Great Moderation, is taken to comprise the early 1950s until the eve of the Global Financial Crisis, c.2007. A particularly interesting feature of these decades from an academic standpoint are the striking differences between the contemporaneous assessments of those living through the events versus the ex-post analyses emerging in later years. During the 1960s for instance, it seemed to those at the heart of economic policy that the UK was walking a near constant tightrope in its battles to defend sterling's parity against the dollar, and any meaningful attempts by officials to implement long-term policies designed to raise the trend growth rate growth were blown off course by storm clouds of the next impending crisis . More contemporary assessments, however, firmly locate the decade of the 1960s as falling within the halcyon era of the 'Golden Age' of capitalism, which produced solid rates of growth and increases in living standards; low unemployment and a narrowing of the regional disparities; whilst the bitter social discord that came to typify later decades remained relatively subdued. In this vein, we see how the struggles of policy makers during the 1960s, and the rather lugubrious assessments of their stewardship of the economy by contemporaneous commentators, diverges significantly from much subsequent historical scholarship on this period.

It is a particular goal of this thesis to harness modern economic and econometric insights to shed light on issues that are genuinely rooted in the historical process, and to do justice to the nature of the trials, tribulations and debates that took place at the time. The prolific Cambridge economist Joan Robinson once spoke disparagingly of a 'have model, will travel' mindset, which she believed typified mainstream economists in their approach to investigating economic and social issues. To this extent, the current study seeks to ground its subject matter in authentic and historically well-grounded phenomena, which would not have

looked too out of place were the research to be presented to those grappling with the issues first hand. Of course, the methods employed are well beyond those that were available to the historical actors, indeed, the ability to harness decades of progress in both economic theory and econometric modelling can – when used correctly- reveal insights that were shrouded to those in earlier times.

1.1 Twin Deficits, or Distant Relatives?

The first substantive chapter takes up the thorny issue of chronic external adjustment problems under the Bretton Woods fixed exchange rate system, and the particular role played by fiscal policy in this delicate balancing act that lasted the best part of a generation. Indeed, despite economic theory and practical experience suggesting a multitude of potential shocks affecting the current account balance, a cloud of suspicion has long since hung over fiscal policy – amongst both policy makers and academics alike. There is no a priori reason, however, why fiscal policy should be more or less culpable than other factors in accounting for the UK's travails with current account deficits under the Bretton Woods fixed exchange rate system, and to this end we take up the question empirically. By estimating a small macro-econometric model, which avoids some of the more contentious identifying restrictions necessitated by other methods of analysis, we seek to break down the dynamics of the current account into its constituent drivers and assess whether the weight of opinion amongst policy makers was indeed correct to afford such heavy emphasis to fiscal policy when seeking to keep the current account out of the red.

The analysis also speaks to other intriguing facets of the longstanding debate on how to achieve the holy grail of simultaneous internal and external balance during the Bretton Woods era. In particular, we speak to the unresolved debates regarding the appropriate role – and efficacy- of the exchange rate as a driver of movements in the current account

balance: this was an issue that split officialdom down the middle historically, and subsequent discussion in academic literature has been similarly agnostic in reaching a consensus view on the matter. Care is taken to stress the more unorthodox nature of macro-economic policy that prevailed in Britain during this period (at least relative to modern standards), and this is perhaps no more visible than in the conceptualization and conduct of monetary policy. The 'Radcliffian' approach to monetary matters was arguably out of step with the grain of mainstream economic thinking at the time, and has not fared particularly well in light of subsequent developments. Special attention is given to reflecting historical nuances of this kind in the design of the empirical analysis.

Finally, having provided an empirical investigation to probe key facets of the debate, we engage in a probing and analytical discussion of the key overarching policy issues of the day, such as the inevitability (or not) of the infamous 1967 devaluation; the degree to which policy-makers truly possessed meaningful target-controllability over the current account balance, and whether oft' cited shibboleths regarding the impact of 'stop-go' cycles in economic activity are concordant with the insights revealed by the data. The paper concludes with an assessment that challenges many existing facets of the debates from this period, but remains circumspect as to whether the prevailing policy regime could or indeed should have continued in the absence of key reforms.

1.2 Black Gold, or Fool's Gold?

Moving forward from the Bretton Woods era into the tumultuous decade of the 1970s, it felt for many that the UK had gone out of the proverbial frying pan and straight into the fire: soaring inflation, rising unemployment, and maelstrom of industrial unrest contributed to a sense of both economic and social breakdown in the United Kingdom. Perhaps even more bitterly, despite moving from a fixed exchange rate system to a floating one, the UK's

troubles with chronic external imbalances still continued to plague the country, and the perception that an external constraint on economic growth was still very much alive and well extinguished hopes that the UK's longstanding structural problems could be remedied by a change of exchange regime alone. Amidst the mounting sense of alarm and concern, however, something of a silver lining was to emerge that held the promise of Britain uniquely perhaps emerging from the economic troubles of the 1970s in a position that would see her enhanced for a generation.

The "black gold" of the North Sea oil fields was the potential ace up the sleeve of UK policy makers, which despite having been discovered in the 1960s, had previously been left untapped until the massive OPEC oil shock of 1973 ushered in a new era of greatly increased oil prices. This rapidly transformed the UK into a viable and substantive exporter of highly sought-after Brent crude oil. The sense of relief and excitement at this development was palpable on all sides of the political divide, however, feelings of hope and optimism soon started to give way to a new set of concerns that rather than acting as a conduit for economic renewal, the notion that oil might in fact catalyse the decline of the UK economy in new and untold ways.

In this spirit, the chapter sets out to econometrically investigate the ostensibly pernicious effects of so-called 'Dutch Disease': the idea that a booming commodity sector sets in motion adverse structural changes within an economy, which could leave the country significantly exposed once the resource is depleted (or if the price crashes), alongside the possibility that it ultimately reduces the trend growth rate by undermining those sectors with the greatest potential for increasing returns effects. We draw upon the most recent insights from the economics and applied econometrics literature regarding how best to model the effects of oil shocks, and gather together a rich dataset of high frequency monthly data in order to establish whether concerns regarding the supposedly malign impact of oil in driving a hard

de-industrialization were justified.

Significant attention is also afforded to the contentious issue of how the UK's windfall revenues were managed. We begin by addressing the rather opaque way in which the funds were collected and disbursed, before considering two of the leading alternate ways in which they might have been harnessed so as to maximize societal wellbeing. Our analysis and critical discussion incorporates some of the latest theoretical insights from the resource economics literature, but drives home the unavoidable realities of each potential approach to harnessing the fruits of the oil windfall. Both involved a degree of conjecture regarding the persistent (or even permanent) effects arising from economic shocks, as well as presenting challenging value judgements regarding an equity-efficiency trade-off. The study concludes with the suggestion that North Sea oil deserves recognition as a proximate cause in the history of the UK's deindustrialization but cannot be considered as the only or even the dominant factor in this process, hence it is more appropriate to speak of an "oil-aggravated" rather than oil-induced de-industrialization. Better management of the fiscal windfall, however, would almost surely have been able to cushion the landing for the UK economy and left an economic structure better diversified in terms of both sectoral structure and the regional distribution of economic activity.

1.3 A Keynesian Controversy Over Business Cycle Dynamics

There has been no shortage of theories or hypotheses advanced over the years seeking to provide an answer to the deceptively simple question of what drives the cyclical dynamics in economic activity within a capitalist economy? Much ink has been spilled by some of the foremost minds in the economics discipline (as well as others) proffering the answer to this very question, and it is probably fair to say that some of the most fierce and ongoing debates

in macroeconomics center on this very issue . Aside from the enduring intellectual appeal presented by this topic, it has a profound and direct link to the welfare of vast swathes of people whose livelihoods, whether as a worker or as an entrepreneur, are intimately tied to the ebb-and-flow of economic activity.

Questions linger over whether the volatility of output, as embodied by cyclical fluctuations, are a positive or negative feature of a market economy. At one time a majority of economists would have supported the notion that pronounced and persistent adverse deviations of output from trend constitute an economic and social inefficiency, requiring corrective action. However, a not insubstantial number have advanced views along the lines that cyclical fluctuations are a necessary mechanism for ensuring the dynamic re-allocation of scarce resources between competing uses, and actually represent an integral part of the economy's proper functioning, which if impeded could result in a diminution to its long-run growth potential. A more intermediate position might concede that some adverse fluctuations in output are both necessary and tolerable, but beyond a particular point they represent an intolerable net reduction in economic welfare and open the door to detrimental path-dependent dynamics, thereby compromising long-term economic performance.

Unsurprisingly, questions surrounding the fundamental drivers of business cycles have wide ranging and profound ramifications for economic policy, which include but are by no means restricted to: the choice of exchange rate regime; the optimal degree of diversification in productive structure; the appropriate frequency and magnitude of discretionary stabilization policies; the nature of regulatory regime for the financial sector, and the design and remit of the social security/welfare system.

A quintessentially British debate took place during the post-war era concerning the relative importance of two distinct drivers of fluctuations in economic activity: investments and

exports. The emphasis on investment will come as no surprise, since it was immortalized within Keynes' General Theory, whereby investment shocks were responsible for driving the fluctuations in output, which in turn were underpinned by entrepreneurs' 'animal spirits', an inherently unpredictable psychological factor governing optimism and pessimism, which was fundamentally distinct from all the usual notions of rationality and calculable risk. On the other side of the debate, drawing substantially on the deeply insightful but considerably overlooked contribution of Roy Harrod (1933), was the putative role of exports as the key driver of cyclical fluctuations, on account of their importance as a share of national income for small and medium sized open economies. Furthermore, protagonists of the export hypothesis also argued that exports uniquely represented the only genuinely autonomous source of demand to the economy, such that investment, consumption and government spending were all to some extent endogenous: the subsequent fusion of Harrod's idea with the 'supermultiplier' of John Hicks (1950) birthed a powerful alternate vision about the nature of cyclical fluctuations to the one so famously promulgated by Keynes.

But the traditional conception of the business cycle as being some sort of sinusoidal fluctuation in economic activity about a well-defined trend growth rate could arguably prove limiting to a more encompassing understanding of the nature of cyclical fluctuations in an economy. Indeed, the business cycle itself traditionally focuses only on those fluctuations occurring within a 7–10-year window, give or take a little. Whilst time series methods have been used to reasonable effect in studying a range of questions associated with business cycle fluctuations, they are less effective when one decides to expand the windows within which cyclical phenomena occur. And to this end, the researcher must enter into the realm of frequency domain-analysis.

The present study employs techniques from the signal analysis literature, allowing for an analysis of cyclical phenomena across a much wider range of frequency scales than are typ-

ically feasible when analysing data in the time domain (which are largely restricted to the traditional business cycle window). Utilizing nearly 200 years of data, we are able to offer hitherto unseen perspectives into this unique Keynesian debate by examining the frequency domain properties of the series and ultimately drawing causal inferences about the evolving nature of the investment-export relationship. The analysis also contextualizes the debate through the evolving prism of economic theory, highlighting some internal tensions within what was supposedly a demand-oriented framework, whilst revealing the tensions that arising between key protagonists - ostensibly on the same side of the debate- when considering the practical implications for economic policy.

Overall the study produces some intriguing findings, not least that the evolving nature of the investment-export relationship between broad sub-periods (as posited in the historical ruminations of Nicholas Kaldor) turned out to be quite accurate. With that said, the theoretical considerations do point to a significant schism within the export-led camp, in which the boundary between economic fluctuations versus economic growth becomes increasingly obfuscated. Similarly, notwithstanding some of the successes of the export-led hypothesis in terms of external consistency with the data, the analysis highlights that in terms of tangible policy implications for improving UK economic performance, the export-led camp had apparently little to offer beyond a reheated version a particular set of policies that had already been tried in the post-war British economy, but had failed to catalyze the sort of uptick in performance envisaged by its proponents. In this sense, one could argue that the heretical export-led Keynesian doctrine may have won an academic victory against its canonical investment-oriented counterpart, but to any practical ends it lost the war in quite conclusive fashion.

1.4 Macroeconomic Policy in the Open-Economy

A unifying theme of the topics investigated within this thesis is that they fall squarely within the 'open-economy' camp of macroeconomic analysis. Indeed, the esteemed economist Harry Johnson once opined that 'perhaps the greatest disservice that Keynes rendered to the development of economics in Britain was to develop the theory of macroeconomics and money on the assumption of a closed economy'. Now regardless of whether one regards Johnson's comments towards Keynes as being somewhat uncharitable (some would argue that the economic malaise of the 1930s was a world away from the challenges prevailing in the decades after WWII), he is certainly correct in his broad contention that the General Theory was a mainly closed-economy affair. Indeed, the grave concern of the 1930s and latterly the fear of what might transpire following the end of WWII, was a situation in which subdued economic activity, falling wages and prices, and searingly high rates of unemployment would consign the Western economies to the doldrums, thus paving the way for marked social unrest and the possible (re)emergence of various forms of authoritarian politics.

As events transpired, however, the challenges of the post-war world were to prove very different to those of the 1930s, as the widely held fears of a secular stagnation never materialized. Indeed, the adoption of a much more interventionist form of economic policy - both macro and micro- saw government stepping in to act as the guarantor of full employment and the provider of an expanding social safety net that would eventually become the 'from cradle to grave' welfare state. This radically different economic landscape, however, brought its own new challenges that the pre-war stock of economic knowledge was not properly equipped to handle, and it is against this backdrop that some of the 20th century's great luminaries like James Meade, Nicholas Kaldor, and Roy Harrod set their minds to task.

The challenges of "opening up" the General Theory and equipping the system of economic

management for life in an open-economy arena characterized by the liberal movement of both goods, services, and eventually capital, was not a seamless process. Indeed, from its inception the Bretton Woods system had played battleground to a tempestuous disagreement between Keynes and his US counterpart, Harry Dexter White, which cut to the heart of the competing visions of what the post-war international economic order should look like and how it ought to function. This sense of discord regarding how best to manage the external balance requirement of macroeconomic equilibrium persisted throughout the entire span of post-war decades, arguably giving rise to greater contention than the issues associated with internal balance.

The vexing issues of open-economy macroeconomic management are not merely abstract or theoretical: during the 1990s when the UK Labour Party set about re-branding itself as 'New Labour' and sought to overhaul its modus operandi on economic policy, much attention was given to the failures of previous Labour governments in the sphere of macroeconomic management in an open-economy. Indeed, senior figures in the party were haunted by the fact that every Labour Prime Minster up until that point had been brought down by an economic or financial crisis that was essentially external in origin: the new generation of Labour politicians wanted to avoid the same fate that had befallen their predecessors who were ejected from office in the wake of the turmoil generated by such events.

It is hoped that the research undertaken in this thesis does justice to the history of British macroeconomic policy in the open-economy; to succeed in conveying the seemingly intractable difficulties confronting officials, and to bring to life the often bitter and heated disagreements that typified such debates in both policy circles as well as in the lofty citadels of academic discourse. The subsequent advances in both econometric modelling and economic theory since these events transpired present a unique opportunity to delve anew into these historical debates; to bring to light those features which remained obscured to actors

at the time, and to evaluate with the benefit of hindsight the decisions that were taken and their significance in the longer tale of the economic history of the United Kingdom.

Chapter 2

Fiscal Policy and the Current Account Balance Under Bretton Woods: Twin Deficits or Distant Relatives?

Abstract

The United Kingdom is typically regarded as the sine-qua-non case of an economy experiencing chronic external adjustment problems under the post-war Bretton Woods system; apparently unable to reconcile the seemingly divergent objectives of robust economic growth and current account equilibrium. This paper investigates the ubiquitous notion which ascribes responsibility for the UK's current account woes to an excessively lax fiscal policy. Calling on two distinct approaches to identifying fiscal shocks we find evidence decisively against the traditional 'twin deficits' view, and uncover serious shortcomings regarding the way in which both policy makers and academics conceptualised the transmission of fiscal policy to the current account. Our results demonstrate that factors other than fiscal policy are of far greater importance for understanding the UK's historical experience, and we elaborate on the need for a reappraisal of some classic policy debates concerning external adjustment under the Bretton Woods system.

2.1 Introduction

The efficacy of fiscal policy and its appropriate role has generated fierce contemporaneous debate down the years in British policy-making circles. It has proved equally contentious in the academic literature, with recent contributions by Cloyne et al. (2018), Crafts & Mills (2015), Cloyne (2013), and Crafts & Mills (2013) each wading into the provocative question of whether Keynesian fiscal policy succeeded in raising output. The impact of fiscal policy on the external balance, however, has not been studied as extensively during recent times, which begs the question of just how important fiscal policy was in driving fluctuations in the current account balance under the Bretton Woods fixed exchange rate system. Indeed, during the post-war decades of the 1950s and 1960s the main preoccupation of British policy makers was attempting to tweak fiscal policy so as to deliver the economic nirvana of simultaneous internal and external balance- namely high growth and low unemployment coupled with current account equilibrium and a defence of the fixed exchange rate. It would prove to be a dilemma that confounded officials, vexed policy makers, and even brought down governments.

Despite there being numerous potential drivers of external imbalance, fiscal policy has come under intense scrutiny for its putative impact during the Bretton Woods period, more so than any other facet of UK macroeconomic policy. Indeed, Chrystal and Hatton remark that 'there can be no doubt at all that fiscal policy received the most attention, both from policy-makers and from students of economic policy' (Chrystal & Hatton 1991, p52) and it has become common wisdom to attribute the UK's chronic current account imbalances to some alleged fiscal laxity. In later years the notion that there existed a causal relationship between the fiscal deficit and the current account deficit acquired the moniker of the 'twin deficits hypothesis', in which causation was seen as flowing from the fiscal balance to the current account balance. Comprehending the nature of the fiscal transmission mechanism is central to understanding the UK's macroeconomic history under Bretton Woods and it is

the purpose of this paper to probe more deeply into the nature of the interaction between these two key macroeconomic aggregates.

Analysing the interaction of the so-called twin deficits is also necessary for a different reason: whilst a large corpus of academic literature has taken to examining the important question of weaknesses in UK total factor productivity growth [1], considerably less analysis has been dedicated to macroeconomic phenomena at short to medium run horizons. In this regard there is an incongruity between the existing literature with its predominant emphasis on long-run economic performance, versus the quarterly demand-management and economic fine-tuning that tended to consume most of the political oxygen of its day. This is not to say that policy makers were totally unconcerned or ignorant of issues regarding long-run growth performance: the Labour governments of Prime Minister Harold Wilson in the 1960s had intended to make long-run structural reforms a key tenet of their policy agenda. But the inescapable realities of economic management under a fixed exchange rate, and all of its attendant constraints on domestic policy, meant that far too often governments were forced to sacrifice much needed structural reforms on the alter of an impending financial crisis.

Establishing causal relationships between key macroeconomic variables is far from straightforward as it is beset by a number of thorny empirical issues[2]. Given that policy makers would actively adjust the fiscal stance in light of perceived threats to the current account, disentangling the impact of fiscal policy changes from other economic forces acting on the current account is no easy task. The fact that the fiscal balance and current account balance are essentially general equilibrium phenomena means that there are other key variables that would surely warrant attention, such as the real exchange rate and monetary policy. What is called for is an empirical strategy that is capable of isolating cause and effect in such a

[1] For an overview of the debate surrounding long-run performance of total factor productivity growth, see Broadberry & Crafts (2003).

[2] A cogent discussion of these challenges and some of the responses to them is given by Nakamura & Steinsson (2018).

highly interdependent macroeconomic system. Our response to this challenge is to utilise two distinct vector autoregressive approaches that seek to isolate the interactions of fiscal policy and the current account. Such a strategy is capable of handling the multiplicity of core variables involved in macroeconomic relationships, as well as the inherent time lags between the occurrence of an economic shock and the time it takes for its impact to actually be felt. A particular hallmark of our investigation is the analysis of different types of fiscal shocks to provide a rounded assessment of the fiscal transmission mechanism, as well as utilising different metrics for modelling the monetary variables - owing to the historically unique manner in which UK monetary policy was conducted during the Bretton Woods era.

The United Kingdom is often regarded as the sine-qua-non case study for a country experiencing chronic external imbalances under the Bretton Woods system; yet the evidential basis for claims of fiscal policy's alleged role therein is surprisingly threadbare. This study probes the validity of the infamous twin deficits hypothesis by constructing a macroeconometric model and using it to shed light on a number of highly contentious historical debates regarding the appropriate conduct of economic policy. Our results overturn much of the established wisdom concerning the nature of the UK's current account woes, and help to inform a critique of the manner in which both policy makers and academics conceptualised the nature of the fiscal transmission mechanism in the open-economy. In this vein, we suggest that there has been a case of mistaken identity in which the fiscal balance and current account are in fact distant relatives, rather than the twin deficits.

2.2 The British Post-War Economic Landscape

2.2.1 Stop-Go Cycles in Economic Activity

Problems with external balance in the UK during the 1950s and 1960s followed a distinct pattern, which came to be known disparagingly as 'stop-go' cycles (Dow 1998). The basic

mechanics of a stop-go cycle began with the economy growing buoyantly when unemployment was low and with relatively little slack or spare capacity; inflationary pressures would often be manifesting. Given the absence of slack in an economy growing above trend (a positive output gap) the resulting constraints on aggregate supply would see excess aggregate demand spilling over into a higher level of imports. Clearly, if this increase in imports was unmatched by an offsetting rise in exports or earnings from overseas assets then the result would be a deterioration of the current account balance. Since the current account deficits resulted in an increased supply of sterling in the foreign exchange markets this generated downward pressure on the UK's exchange rate against the dollar. Therefore in order to maintain market confidence and demonstrate commitment to the fixed exchange rate, the government would be forced to enact contractionary policies designed to rapidly bring the current account back into balance. These measures were invariably deflationary, consisting of fiscal and monetary tightening and other miscellaneous measures designed to rapidly lower the UK's quantity of imports, thereby ensuring that external balance was restored and that the fixed exchange rate against the dollar was preserved.

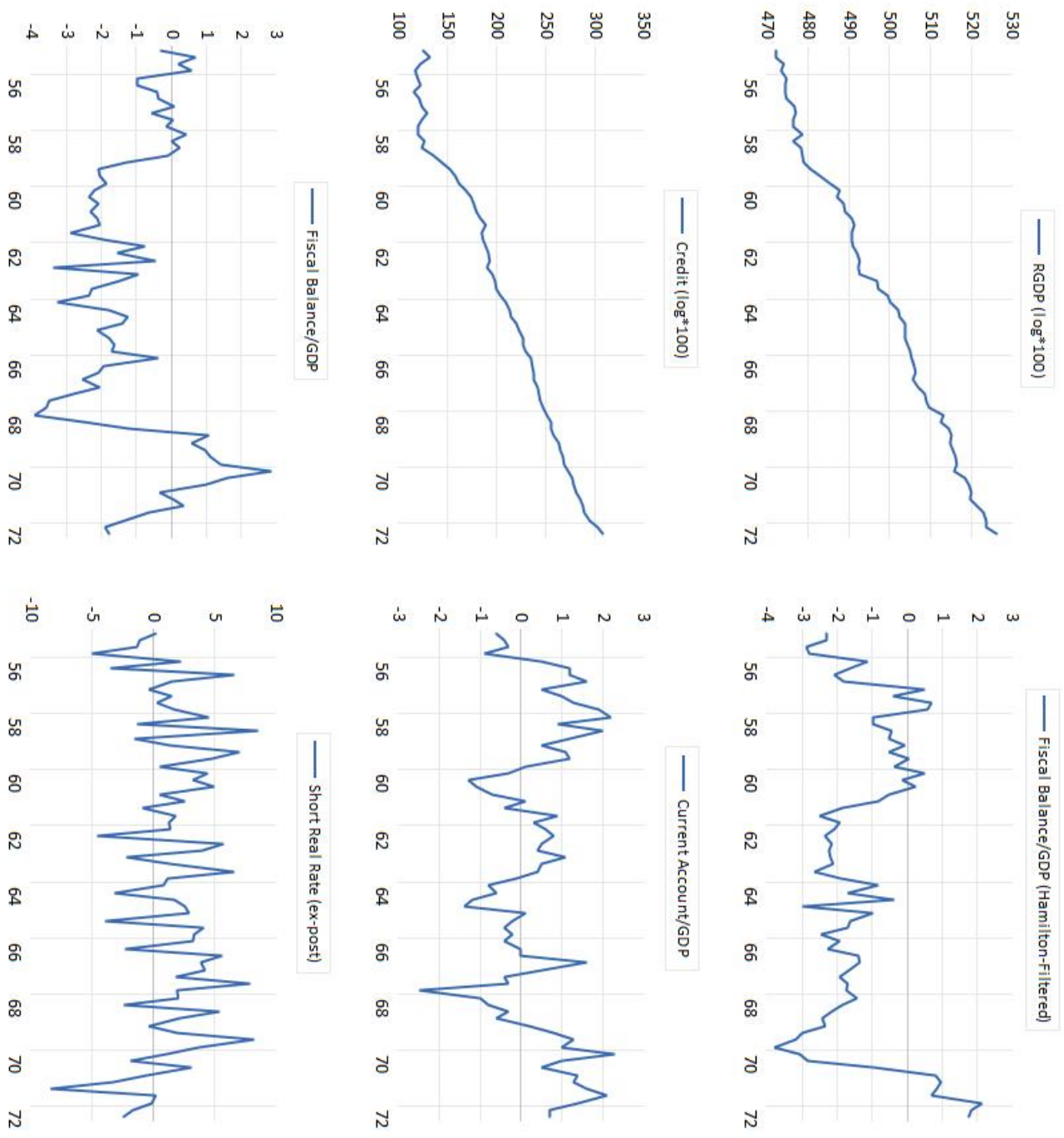
A particularly important instrument in the policy-mix was the taxation side of fiscal policy, which was directed to engineer reductions (or increases) in aggregate demand. It tended to be favoured over the government expenditure side of fiscal policy owing to the relative speed and ease with which tax rates could be adjusted in response to evolving economic circumstances (Clark & Dilnot 2004). Spending adjustments tended to be regarded as cumbersome to implement and prone to substantial administrative delays. Indeed, the notion of so-called 'inside lags' and 'outside lags' made tax policy the preferred option, with the former relating to the time taken for policy makers to respond to a given economic shock, and the latter being the time taken for a given policy response to actually make its effects felt in the economy. The particular focus on the tax side of fiscal policy came to be criticised by Kaldor (1971), who argued that the excessive emphasis on tax adjustments contributed to

an economy dependent on stimulating consumption-led growth, which came at the expense of both investment and exports.

Figure 2.1 plots graphs of a range of macroeconomic data for the period 1955Q1-1972Q2: RGDP (log*100); fiscal balance to GDP ratio; credit (log); current account to GDP ratio; Hamilton-filtered fiscal balance to GDP ratio; short real interest rate (ex-post). Full details of the variables and their sources can be found in the Appendix. The graphs highlight cyclical fluctuations in variables such as the current account, the fiscal balance and RGDP, whilst the short-real rate averages $\sim 1.4\%$ over the period, the low real rate being consistent with the findings of Chadha & Dimsdale (1999) who stress -amongst other things- the emphasis afforded to stabilizing output during this period rather than to controlling inflation. Although it is tempting to try infer causal relations from the images depicted, this approach is particularly unwise in the context of the twin deficits relationship. Indeed, the fiscal balance is understood to move pro-cyclically, i.e. when the economy is booming and RGDP is expanding above trend then the fiscal balance will improve (it rises), whilst in a recession the reverse happens. For the current account, however, its dynamics are the exact opposite since it moves contra-cyclically: a booming economy will result in a deterioration in the current account balance, whilst a slump or recession will tend to precipitate an improvement (that is to say, a rise in the current account).

The opposing cyclical-dynamics of the fiscal balance and the current account balance are particularly relevant in the case of the twin deficits, indeed, Corsetti & Müller (2006) argue that failing to account for these diverging patterns can lead to highly misleading conclusions. Given that the current account tends to be healthy when the fiscal balance is diminished (during a recession), or conversely the current account deteriorates when the fiscal balance is strong (during a boom), Corsetti and Muller suggest this negative covariance can lead to an erroneous rejection of the twin deficits hypothesis in favour of a twin divergence. Therefore,

Figure 2.1: Graphs of Assorted Macroeconomic Series, 1955Q1 - 1972Q2



in order to put empirical analysis of the (open-economy) fiscal transmission mechanism back on a sound footing, it is necessary to isolate the movements in fiscal policy that are unrelated to the ebb-and-flow of the economic cycle, hence the authors recommend working

with the cyclically-adjusted fiscal balance - typically obtained through a filter. This is seen in the graph with the Hamilton-filtered fiscal balance series, see Hamilton (2018) for further discussion regarding the desirable statistical properties of this approach to cyclical-adjustment.

2.2.2 Existing Views on UK Fiscal Policy and External Balance Under Bretton Woods

Opinions on whether fiscal laxity was indeed responsible for the UK's balance of payments difficulties tends to favour the traditional twin deficits view. The 'New Cambridge School' produced a remarkably singular analysis, arguing that fiscal deficits were to all intents and purposes the sole driver of the UK's current account imbalance. The chief proponent of the New Cambridge approach, the economist Wynne Godley, would later remark that 'it came as a shock to discover that if only one knows what the budget deficit and private net saving are, it follows from that information alone, without any qualification whatever, exactly what the balance of payments must be' (Godley & Lavoie 2006, preface - xxxvii). Central to the New Cambridge position was the use of identities derived from the national accounts - in particular the so-called three balances approach- which they believed demonstrated the inescapable logic that the UK's current account woes were the result of fiscal intransigence by government. Their position, and the resulting policy prescriptions, are neatly summed up by New Cambridge economist Robert Neild in a letter to The Times newspaper:

'I do not repeat the Keynesian orthodoxy that the Budget should be used to determine the level of employment and the exchange rate to regulate the foreign balance. I said the opposite: the Budget should be used to determine the foreign balance and the exchange rate to determine the level of activity' (Neild 1974).

Both the analytical underpinnings as well as practical policy prescriptions that stemmed from

the New Cambridge position attracted substantive criticism. Whilst the emphasis on the logical relations linking the different sectoral financial balances was well made, the extent to which causal relations could reliably be inferred from these accounting identities was always highly suspect. Furthermore, the New Cambridge diagnosis aroused significant discord, not so much for what it included in its scope, but rather what it excluded: it eschewed a significant role for monetary policy as well as shifts in entrepreneurs' animal spirits and investment intentions [3] as important catalysts of external imbalance. Furthermore, their assignment of the exchange rate to be the instrument responsible for internal balance, with fiscal policy to be targeted on external balance, flew in the face of the workhorse open-economy model - namely the famous Mundell-Fleming (MF) model. The MF model by contrast, ascribed a role for a set of core macroeconomic variables, which interacted in a general equilibrium framework to produce sharp predictions concerning internal and external balance, as well as the appropriate manner in which to assign specific instruments to corresponding targets depending on the nature of the exchange rate regime. The New Cambridge justification for its unorthodox instruments-targets assignment never really surmounted the critique that it was not predicated on theoretically firm foundations; the assignment of fiscal policy to external balance appeared to be predicated on the ad-hoc observation that devaluation was ineffective in promoting external adjustment, which doubtless to say was (and still is) a contentious proposition that is open to substantive empirical critique (Maloney 2012).

Throughout the years a number of other prominent authors in the literature have espoused views that are sympathetic or even supportive of the twin deficits notion that UK fiscal policy was paramount in driving its current account imbalances under Bretton Woods. Bean (1991) highlights the role of expansionary budgets in driving external imbalances, as well as precipitating cost-push pressures that undermined the competitive position of UK tradables. De Grauwe (1997) cites the British experience during the 1960s as an example of a country

[3] As mentioned in Dow (1964, p.387) this covers investment in stocks/stockbuilding, which were a noteworthy factor behind current account fluctuations

suffering from adjustment problems and emphasizes the role of expansionary fiscal policy in driving up import demand. He characterises the British experience as one of fiscally-induced current account deficits, which were eventually rectified by a programme of fiscal consolidation in the wake of devaluation that helped lead to a 'spectacular improvement in the current account'. Cairncross & Eichengreen (2003) note the role played by a weak fiscal balance in making it difficult to correct external imbalances. They also highlight the opinion of contemporaneous European observers who were puzzled by the fiscal stance of the UK government, believing that countries with big fiscal deficits ended up with big current account deficits, and that the cure for the latter was a reduction in the former.

Christopher Dow, an influential economist who in his later career would become the Bank of England's Chief Economist, produced an assessment in which active fiscal policy was largely exonerated of crimes against the current account balance. To be clear, Dow was no defender of stop-go type policies, but this had less to do with any purported consequences for the external balance and was instead focused on the deleterious impact on entrepreneurs' animal spirits and investment - a view corroborated by the more recent empirical analysis of consumer durables industries during the 1950s and 1960s (Scott & Walker 2017). He argued that much of the variation in the UK's current account was driven by factors that were essentially exogenous to the UK economy, and for the most part lay outside the purview of UK policy-makers. Dow (1964, p.384-391) highlights several factors including movements in the terms of trade (particularly movements in global commodity prices); fluctuations in net income on overseas assets; changes in grants and transfer payments from foreign governments; and fluctuations in the rate of demand growth in the UK's trading partners as being vital factors behind the emergence of current account imbalances. Given the UK's status as a relatively small economy with a high share of exports and imports in GDP, Dow calls into question the role of domestic policy as the major factor behind the UK's current account variability and the succession of mini-crises therein. It would also be worth noting the later

assessment of Gibson & Thirlwall (1992), in addition to McCombie & Thirlwall (1994): essentially, Thirlwall ascribes much of the UK's troubles with external imbalance as being down to secular weaknesses in the performance of the export sector, as well as an unhealthy predilection towards excessive imports of consumption goods[4]. And whilst active fiscal policy per-se is not held to be the culprit, the essence of Thirlwall's analysis is that government policy was inadequate in helping to boost the competitiveness of the manufacturing sector and allowed rampant import penetration to imperil the external balance.

2.2.3 Conflicts in Macroeconomic Policy

Thus far the discussion has centred mainly on the fiscal balance and the current account balance, however, officials had other policy instruments at their disposal. This raises questions concerning the degree to which these other instruments were utilised; and how (if at all) these other tools of macroeconomic policy might confound our analysis of the twin deficits relationship. Indeed, throughout the Bretton Woods period UK policy makers and economists were deeply divided over key facets of macroeconomic policy, which made it difficult to implement a consistent policy response that was capable of ensuring both internal and external balance. Anxieties abounded regarding the efficacy of exchange rate devaluation as a tool for rectifying external imbalance, whilst doubt and confusion regarding the workings and transmission of monetary policy undermined its relative importance in the policy mix. Anguish over how best to conduct policy against a backdrop of high national debt also imposed constraints, whilst serious disputes emerged over the desirability of demand-management as the modus operandi of macroeconomic policy. So considerable in fact were the divisions regarding core elements of macroeconomic policy that they transcended the usual party-political allegiances, as well as provoking significant discord between the key policy making institutions of state.

[4]This line of argumentation is formalized within the abundant literature on balance of payments constrained growth models, in which the home country's income elasticity of demand for imports is contrasted with the world's income elasticity of demand for the home country's exports. See McCombie and Thirlwall (1994) for extensive treatment of this topic.

A seemingly obvious route out of the chronic current account imbalances was to devalue the currency, however, this was a fraught topic that aroused fierce passions and stirred great controversy. One of the simplest cases against devaluation was political: the Labour Prime Minister Harold Wilson was notoriously fearful of Labour's reputation as the 'party of devaluation' owing to its historic roles in the devaluations of 1931 and 1949; he did not want to reaffirm this negative perception once again by devaluing (Obstfeld 1993). The Labour Chancellor of the Exchequer (and later Prime Minister) James Callaghan registered a different kind of political opposition, namely that the UK played the role of banker to many developing economies that were former British colonies and part of the Commonwealth: it would be grossly iniquitous he argued, to unilaterally devalue the currency and thus diminish the value of the sterling foreign exchange reserves of these countries. Others, however, such as the Treasury advisor and Cambridge academic Nicholas Kaldor, took the view that persistent economic decline relative to other advanced economies would exact a greater political toll on the UK's standing and hence supported devaluation in spite of the short-run fallout [5].

The reservations against devaluing were also rooted in economic reasoning: pessimists argued that devaluation would initially exacerbate the external imbalance problem as import costs rose; before the improved price competitiveness of UK tradeables finally translated into higher export volumes (Cairncross 1995). Further still, considerable doubt existed over the extent to which improved export performance would even materialize following a devaluation: so-called 'elasticity pessimism' suggested that the improvement in relative price competitiveness might elicit little or no in export performance, on account of the world's weak income elasticity of demand for UK tradeables coupled with the UK economy's apparently insatiable appetite for absorbing imports (Houthakker & Magee 1969). In other words, for every percentage increase in UK GDP, the attendant increase in import demand would outstrip corresponding change in the demand for UK exports following a percentage

[5]For a deeply insightful account of life inside the Treasury during the 1960s, including perspectives on devaluation and a host of of other matters, see Cairncross (1996).

increase in world GDP [6]. Another line of argument was that even if the devaluation worked, insofar as it materially improved the trade balance, the very act of devaluing could set off a chain of cost-push inflationary pressures on the back of higher import costs, which in the face of insufficient wage-discipline would quickly see UK relative prices rise again to their old levels, and thus the beneficial effects devaluation would be lost in short order. This strand of thought counted on the support of of the distinguished international macroeconomist and policy maker Roy Harrod, who opposed the UK's devaluations in both 1949 and 1967, who at any rate was also an elasticity pessimist for the most part, in addition to his fears of devaluation generating imported-inflation and real-wage resistance [7].

Monetary policy was an area in which agnosticism or even outright apathy hindered attempts at deploying monetary instruments to their fullest extent. On the one hand, the UK was heavily burdened by the national debt accrued during the Second World War, which stood at a colossal 250% of GDP in 1946 [8]. The cost of servicing this debt represented a substantial fiscal outlay to the government, and as a result there was a high price attached to ensuring debt sustainability and the basic need to prioritize national solvency. This inculcated a considerable reluctance to enact measures that would increase the government's debt servicing costs, and as a result the central bank's policy rate was used only sparingly as an instrument of macroeconomic policy (Goodhart 2012). However, the aversion towards conventional monetary policy ran significantly deeper than concerns surrounding the national debt alone.

In addition to the constraints imposed by the national debt, there was a strong ambivalence

[6]There is no universally agreed upon explanation as to what determined these elasticities, but collectively factors such as the reputation and brand strength of UK tradeables vis-a-vis their competitors; commercial policy and the economic structure and level of development of the UK's trading partners; deep parameters of the UK economy - such as the dispensation of households to engage in high or low net saving.

[7]For a concise but highly informative overview of Harrod's views on key matters of international macroeconomics, see Caldentey (2019, Ch.6).

[8]A lively and well-considered account of the history of the UK's national debt can be found in Slater (2018).

in both British academia and policy making circles regarding the efficacy of monetary policy in comparison to fiscal policy - with the strength of opinion being decidedly in favour of the latter. The general climate of cynicism towards monetary policy saw its role in managing aggregate demand diminished, whilst incomes policies were the go-to instrument for keeping a check on inflation. Indeed, this led the prominent US Keynesian Alan Blinder to caustically refer to 'the bad old days in which Neanderthal Keynesians roamed the land, spreading the false word that money does not matter' (Blinder 1984, p. 118). To the extent that monetary policy was regarded as having some bearing on the macroeconomic outlook it tended to take the form of so-called 'credit policy', which centered on the volume of lending to both consumers and businesses, rather than adjusting the bank rate (Aikman, Bush & Taylor 2016). The intricacies of monetary policy and the nature of the transmission mechanism were examined more closely in the so-called Radcliffe Review of the late 1950s, which at best afforded a second-rate role to monetary policy in the conduct of macroeconomic policy, and at worst embodied a collective instinct that ascribed a disproportionate importance to real economic variables at the expense of monetary ones.

Finally, it is important to recognise that serious doubts had been raised on a fundamental level as to whether the macroeconomic regime of fiscal fine-tuning was effective and viable. On the one hand, were those who believed that the use of discretionary fiscal policy to stabilize the level of aggregate demand was a fundamentally sound premise, but was being hampered by inadequacies with regards implementation. On the other hand, there existed those with a more pessimistic view regarding the efficacy of fiscal policy in regulating the level of demand, believing that it actually did more harm than good (Dow 1964). A particularly interesting facet of these disagreements were that they did not fall cleanly along the typical partisan political lines in which the leftist or social democratic party favoured active fiscal policy whereas the right wing or Conservative party opposed state macroeconomic interventionism. Indeed, a key plank of the critique put forward by Labour politician

(and subsequent Prime Minister) Harold Wilson, was that that stop-go policies were at the heart of 'thirteen wasted years' of Conservative economic mismanagement, and that Labour would bring a radically new approach to the table. Labour's proposed new approach was a state-led rejuvenation of private sector industry under the auspices of a newly minted Ministry of Economic Affairs, which would oversee the strategic direction and practical planning involved in the proposed overhaul, as well as allowing for hefty public investment budgets (Kirby 1991). Without wading into the separate issue concerning the merits and de-merits of such an approach, Labour's stance was an explicit rejection of what they perceived as the failure demand-side management (manifest by stop-go cycles) and an enthusiastic embrace of state-led supply-side policies.

Needless to say that rejection of fiscal-fine tuning was by no means a universally held premise, and many influential figures and organizations lined up to defend the prevailing orthodoxy. Granted, most would not have disputed that reform and improvement was required, particularly with regard to short and medium-term forecasting so as to ensure that the fiscal injection (withdrawal) was enacted at the correct point in the business cycle [9]. Nonetheless, in terms of the core theoretical premise, namely that market economies were subject to destabilizing fluctuations in aggregate demand which should be ironed out by government so as to preserve full employment, demand management (in its widest sense) continued to attract a significant following even by the early 1970s. There was no shortage of senior figures within the mainstream of the Conservative party who subscribed to this position, and it should be kept in mind that many of the post-war period's most prolific expansionary budgets were in fact enacted by Conservative ministers. It was politicians of this ideological bent who were famously dubbed 'wets' by Margaret Thatcher in the furore surrounding the bitterly controversial 1981 budget [10]. Such was the perceived congruence between Labour and the

[9] A detailed exposition of the history and evolution of UK macroeconometric modelling as it pertains to policy is beyond the scope of this paper, but the interested reader is directed to Kenway (1994).

[10] A stellar line-up of economists were assembled to conduct a post mortem of the 1981 budget in a gripping edited works - see various authors in (Booth 2006).

Conservatives throughout much of the 1950s at least, the phrase 'Bustkellism' became a pejorative for the implicit consensus approach to macroeconomic policy - so named on account of the Conservative Chancellor of the Exchequer Richard Austin ("RAB") Butler and his opposite number in the Labour Party, Hugh Gaitskill (Dimsdale & Thomas 2019, Ch.6).

It must be said, however, that Conservatives were less supportive of state involvement in other aspects of economic life: indeed, they were much less relaxed than Labour for instance about the use of direct controls as a policy instrument, and tended to be more suspicious of state direction of economic activity at the expense of the market mechanism. But so far as the main thrust of macroeconomic policy was concerned, large numbers both within the Conservative party as well as outside it kept the faith with the core tenets of the status quo, and sought to rehabilitate rather than replace the demand-side zeitgeist. Interestingly, the "death of fiscal policy" (or "active" fiscal policy to be more precise), which occurred in the immediate post-Bretton Woods years, was largely spearheaded by Labour, as the the governments of both Harold Wilson and James Callaghan wrestled with skyrocketing inflation and balance of payments deficits in the wake of the OPEC oil shock, with fiscal policy being a casualty of the unhappy episode [11].

[11] James Callaghan's 1976 speech to the Labour Party Conference summed matters up: 'We used to think that you could spend your way out of a recession and increase employment by cutting taxes and boosting government spending. I tell you in all candour that that option no longer exists, and in so far as it ever did exist, it only worked on each occasion since the war by injecting a bigger dose of inflation into the economy, followed by a higher level of unemployment as the next step' (Callaghan 1976).

2.3 Methodological Issues in the Analysis of the Twin Deficits

2.3.1 The Endogeneity Problem

Roberto Perotti identifies several different components of the government's fiscal stance that are of relevance to an econometric analysis of the fiscal transmission mechanism, namely: (i) endogenous; (ii) systematic-discretionary and (iii) random components (Perotti 2007, pp. 7-8). The endogenous component refers to the automatic response of the fiscal balance to innovations in other macroeconomic variables such as output, inflation and the interest rate. Essentially the budget position passively adjusts to these innovations without any prompting, such as a decrease in tax revenues when output declines due to reduced economic activity, and the increased outlays for unemployment benefits etc. By contrast, the systematic discretionary component refers to changes in fiscal policy owing to policy makers' actions in response to proximate economic phenomena: for example, the decision to increase taxes in response to an overheating economy – this was particularly prevalent during the Bretton Woods era when policy makers were actively seeking to manage the level of demand in the economy, thus making systematic-discretionary responses highly prevalent . Thirdly, the random component refers to discretionary spending decisions that are very much unrelated to the present or expected state of the economy, that is to say they are *exogenous*. They include things like preparation for war; or fiscal transfers for reasons of ideology, such as a tax break for married couples. It is these random components that play a crucial role in allowing meaningful causal relations to be drawn in macroeconomic analysis, since they offer an insight into the causal effect of the fiscal variable on other variables, but in such a way that it is unrelated to the existing or impending state of the economy and therefore will not plagued by endogeneity bias. Identifying these random (i.e. exogenous) fiscal shocks will constitute a key focus of our empirical strategy.

2.3.2 The Structural Vector Autoregression

The analysis of macroeconomic relationships, and fiscal policy in particular, is beset by endogeneity issues caused by the multiplicity of feedback loops and bi-directional causation between variables. In earlier discussion, we highlighted the warning of Corsetti and Muller (2006) regarding the potential for spurious inferences of a 'twin divergence' between the fiscal and current account balances, on account of the fact that the true relationship between the two is obfuscated by aggregate cyclical fluctuations in real GDP, which in turn drives (divergent) cyclical behaviour in the twin deficits. And on a related note, benchmark economic theory would suggest that controlling for other core macroeconomic variables such as monetary policy and the exchange rate will be essential, since both the fiscal and current account balances are essentially general equilibrium phenomena that need to be modelled in tandem with the other key macroeconomic forces at play. A tractable empirical framework that is capable of handling a system of endogenous variables and allowing for meaningful causal inferences to be derived is the structural vector autoregression (SVAR):

Following Kim & Roubini (2000), assume that the economy is described by a structural equation:

$$G(L)y_t = e_t \tag{2.1}$$

Whereby $G(L)$ is a matrix polynomial in the lag operator (L); y_t is an $n \times 1$ data vector; and e_t is an $n \times 1$ structural disturbance vector [12]. e_t is serially uncorrelated and $\text{var}(e_t) = \Lambda$, where Λ is a diagonal matrix in which the diagonal elements are the variances of structural disturbances, and hence the structural disturbances are taken to be mutually uncorrelated.

[12] For ease of exposition the model is presented without the vector of constants.

We can estimate a reduced-form equation, such that:

$$y_t = B(L)y_{t-1} + u_t \tag{2.2}$$

Whereby $B(L)$ is a matrix polynomial in the lag operator L, and $\text{var}(u_t) = \Sigma$.

In order to recover the parameters in the structural equation from the estimated parameters in the reduced-form equation, we utilise short-run identifying restrictions that affect only the contemporaneous structural parameters:

$$G(L) = G_0 + G^0(L) \tag{2.3}$$

In which G_0 is the contemporaneous coefficient matrix in the structural form, and $G_0(L)$ is the coefficient matrix in $G(L)$ without the contemporaneous coefficient G_0

The parameters in the reduced-form and structural equations respectively are related by:

$$B(L) = -G_0^{-1}G^0(L) \tag{2.4}$$

.

Furthermore, the structural disturbances and the reduced-form errors are related by:

$$e_t = G_0 u_t \tag{2.5}$$

,

Implying that:

$$\Sigma = G_0^{-1}\Lambda G_0^{-1} \tag{2.6}$$

.

A canonical method for achieving identification is the so-called recursive approach popularised by Sims (1980): undertaking a Choleski decomposition of the reduced-form errors, Σ; in this instance G_0 becomes triangular and assumes a Wold-causal chain. The right hand side of Equation (6) has $n(n+1)$ free parameters to be estimated. Given that Σ contains $n(n+1)/2$ parameters, by normalizing n diagonal elements of G_0 to 1's we require at least $n(n-1)/2$ restrictions on G_0 in order to achieve identification. It is incumbent on the researcher to select those contemporaneous restrictions which have a sound basis in both economic theory as well as the institutional particulars of the macro-economy under analysis (Stock and Watson, 2001).

2.3.3 Model Specification

We employ two distinct approaches to identifying fiscal shocks in our analysis: in the baseline model we recover exogenous shocks to the budget balance from a carefully specified structural VAR, which allows us to isolate those shocks to the budget balance that are unrelated to the wider state of the economy. In a second and alternate approach, we utilise 'narrative' tax shocks constructed by Cloyne (2013): these shocks are identified via a detailed study of historical budget and financial records, seeking to pin down those tax changes made for reasons unrelated to the current or expected state of the economy. In this respect the identified tax shocks should be orthogonal to the shocks of other macroeconomic variables. An advantage of our rounded approach is that we are able to provide insights into different dimensions of fiscal policy (i.e. both the budget balance and tax policy) and their resulting impact on the current account, whilst the two distinct methods for identifying the fiscal shocks provides the best possible guarantee that the resulting structural shocks are genuinely exogenous [13].

[13]It tends to be argued within the literature that the narrative approach is better than the SVAR for identifying tax shocks, whilst shocks to the budget balance are best recovered from an SVAR framework in which one can control for cyclical fluctuations in demand and incorporate some forward-looking indicators

In order to ensure that we isolate the exogenous component of fiscal policy we follow the approach of Ali Abbas et al. (2011) in computing the structural fiscal balance, which represents the fiscal balance adjusted for the impact of cyclical fluctuations in the economy, thus helping to ensure that our model recovers shocks to the budget balance that are orthogonal to variation in other macroeconomic variables. The cyclical components of both the real budget balance and real GDP are extracted using the Hamilton filter, and from the resulting trend series we construct the structural budget balance to GDP ratio [14].

Our baseline model is inspired by Kim & Roubini (2008) and comprises a 5*1 data vector containing: **{RGDP, Fiscal Balance, SRR, REER, CA/GDP}**, representing: real GDP, the structural fiscal balance, short real interest rate, real effective exchange rate, current account to GDP ratio. The analysis runs from 1955Q1 to 1972Q2, thus capturing the majority of the Bretton Woods period in which the UK experienced so-called stop-go cycles in economic activity[15]. The model is estimated with 4 lags and a constant, and is unrestricted in its reduced-form: we follow convention by working broadly in log-levels since even when variables might have stochastic trends and/or be cointegrated, the log-level specification will yield consistent estimates (Ramey 2016) [16]. The real effective exchange rate was constructed against a basket of 16 key trading partners on a trade-weighted basis with time-varying weights; see Appendix for further information on the construction of variables. A dummy variable is also included in the exchange rate and current account equations in light of the balance of payments crisis and devaluation in late 1967 - see Appendix for further

such as interest rates.

[14]We use the Hamilton filter as it possesses a number of desirable statistical properties vis-a-vis alternate approaches to trend-cycle decomposition, see Hamilton (2018).

[15]Quarterly official current account data from the Office for National Statistics begins in 1955, meanwhile the UK maintained its fixed exchange rate for a short time after the cessation of Bretton Woods before finally floating in mid-1972.

[16]The fiscal balance and current account balance are expressed as percentages of GDP, and at any rate are unsuitable for log transformation since they can assume negative values. The real interest rate is expressed in percentage terms as is typical.

detail.

Short-run identification is achieved recursively via a Choleski decomposition in which the contemporaneously exogenous variables enter the data vector first: **{RGDP, Fiscal Balance, SRR, REER, CA/GDP}**. The variables are conditioned on RGDP since this allows us to control for the effects of fluctuations in aggregate economic activity, which is likely to exert significant influence over the dynamics of all other variables. In the first instance, we permit the current account to respond contemporaneously to all other variables in the model, although we will subsequently report some interesting findings arising from re-ordering the fiscal balance and current account balance variables.

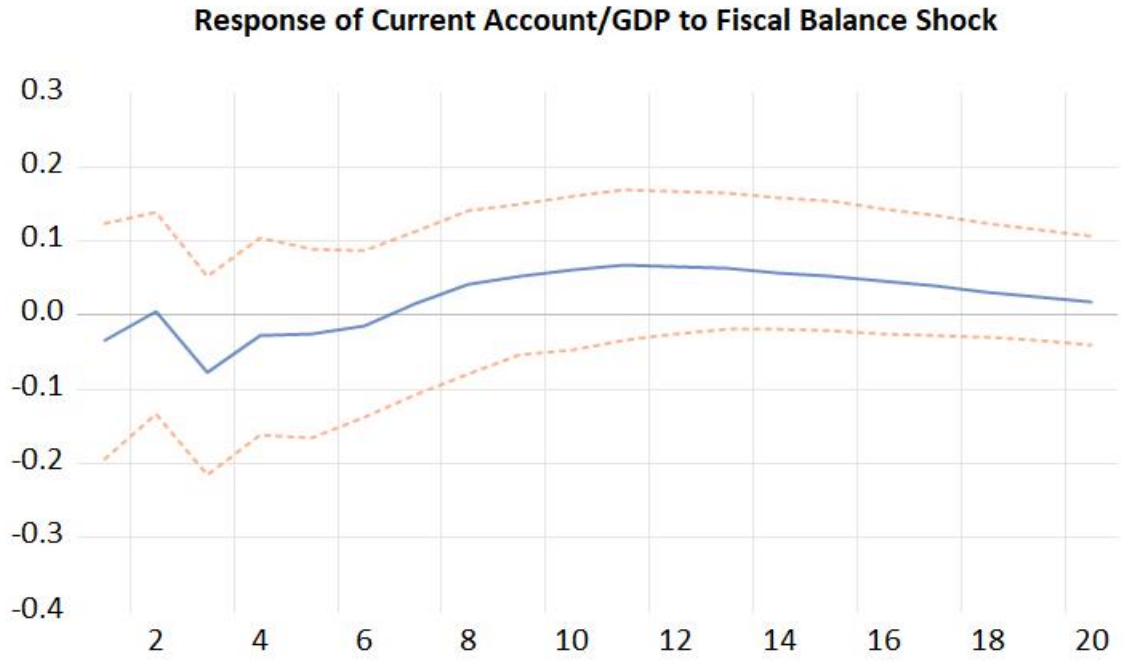
2.4 Empirical Output

2.4.1 Fiscal Balance Shocks

Figure 2.2 shows the impulse response function of the current account to a negative fiscal balance shock - i.e. a fiscal shock that is expansionary. The current account exhibits a modest decline over the first year or so, although the reduction in the current account to GDP ratio remains well below 0.1 over all horizons (quarters 1-20), and is statistically insignificant throughout. Furthermore, from around the two-year mark, the response of the current account becomes positive for a sustained period, although again this is not statistically significant. Relating this result to economic theory, it would seem to fall weakly in line with the prediction of simple income-expenditure models such as the Mundell-Fleming model (Mundell 1960, Fleming 1961), which posit a short term fall in the current account balance in response to the higher aggregate demand induced by the expansionary fiscal policy.

Whilst the impulse response analysis is useful for gauging the sign of the current account response, an obvious question to ask is how important the fiscal shocks are versus the shocks

Figure 2.2: Impulse Response Function of Current Account Balance to One Standard Deviation Fiscal Balance Shock



of other key macroeconomic variables, as well as being able to see how the relative importance of each variable increases (diminishes) through time. To this extent, Table 2.1 presents the forecast error variance decomposition (FEVD) of the current account balance, which decomposes the dynamics of the current account at particular horizons due to the respective shocks of each of the model variables: Stock & Watson (2001) liken the output from a FEVD to the easily recognizable partial R^2 in a typical regression. The ability to assess the relative contributions of different shocks in both the short-run (e.g. after 4 quarters) and the medium-run respectively (e.g. 12 quarters) provides powerful insights into the transmission mechanism of various shocks to the current account, and helps to disentangle the otherwise highly endogenous relationships between key macroeconomic variables.

At horizon 4 - that is the one year mark- just under 40% of current account perturbation is driven by RGDP shocks: the notion that IS shocks of this kind are a significant factor behind

Horizon	S.E.	RGDP	Fiscal	SRR	REER	CA/GDP
4	0.82	38	1	3	3	55
8	0.90	33	1	6	14	46
12	0.99	28	3	6	24	39
16	1.04	26	4	9	26	35
20	1.07	25	4	10	27	34

Table 2.1: Forecast Error Variance Decomposition of Current Account Balance

movements in the current account has long been recognised. Similarly, the importance of this RGDP shocks diminishes at longer horizons and instead the real effective exchange rate (REER) shocks account for an increasing share of current account variability, which is unsurprising given that relative price adjustments are most prescient in the long-run, once temporary frictions have been removed. The fiscal balance amounts for a paltry sub five percent of the current account's dynamics, and is in fact least salient out of all the variables in the model. Furthermore, the current account's peak influence at horizons 16 & 20 respectively is actually consistent with an *increase* in the current account balance - as evidenced by the impulse response function in Figure 2.2, which runs contrary to the spirit of the twin deficits hypothesis. Two final points to note relate to the short real interest rate (SRR) and the current account's own shocks: the relatively modest contribution of the SRR, whilst still greater than that of the fiscal shocks, suggests a fairly tangential role for monetary factors in the dynamics of the current account balance. This is a point we will return to shortly, since there are grounds for suspecting that the full impact of monetary forces are not being adequately captured here. Finally, the current account's own idiosyncratic shocks account for slightly more than half of its variation in the short-run, although this diminishes to around a third by horizon 16, indicating that the domestic macroeconomic variables collectively account for an increasing share of current account variation at longer horizons.

2.4.2 Credit as Monetary Variable

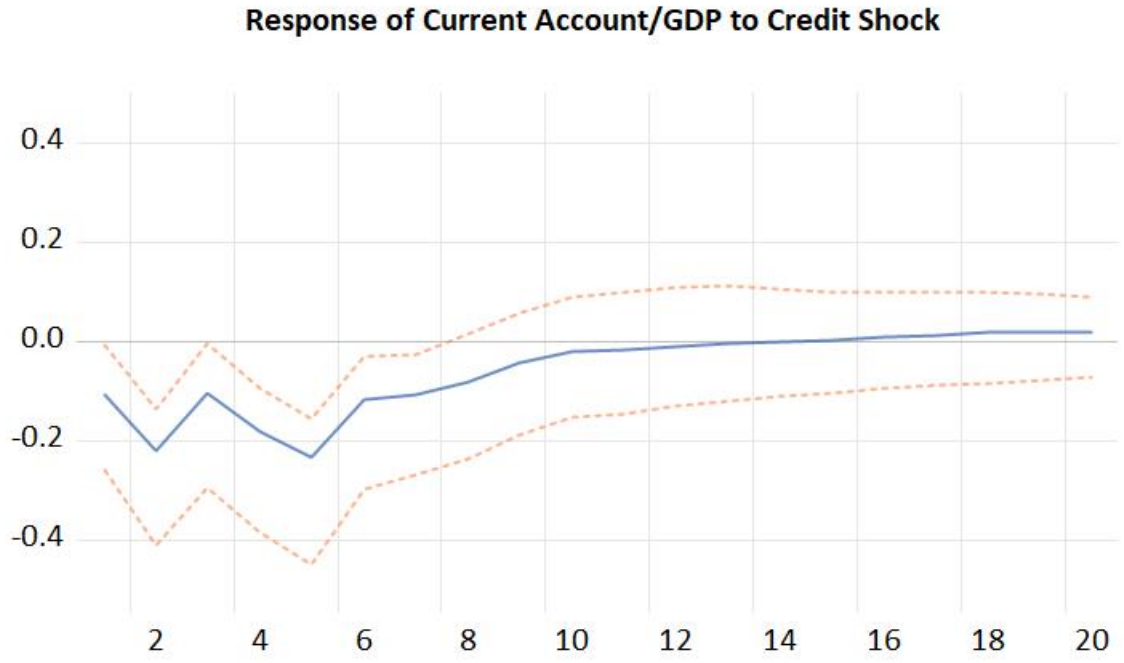
In our model specification thus far we have used the real interest rate as the monetary variable, which is consistent with key studies such as Roubini and Kim (2008) as well as benchmark open-economy models. However, in keeping with the earlier discussion regarding the historical constraints on UK economic policy under Bretton Woods, there are strong grounds to argue that the real interest rate might provide only a partial insight into monetary conditions (Goodhart 1999). Indeed, policy makers as well as academics at the time focused heavily on credit as a key conduit for monetary policy, and therefore it is desirable to see whether our results concerning fiscal policy and the current account are robust to changes in the way we control for monetary conditions [17]. In this vein, we estimate a model identical to the baseline but substituting credit for the real interest rate as the monetary variable:{RGDP; Fiscal; Credit; REER; CA/GDP}. See the Appendix for full model details.

Figure 2.3 shows the impulse response function of the current account to an expansionary credit shock: the current account to GDP ratio immediately falls quite substantially by around 0.2pp per-quarter, with the deterioration exhibiting marked persistence, lasting around 2.5 years before finally reverting to the pre-shock baseline. Furthermore, the result is statistically significant for around 8 horizons. Even a simple visual comparison with the impulse response function from the fiscal shock in Figure 2 suggests that the monetary (credit) shock is of far greater importance in understanding the drivers of current account imbalances.

The forecast error variance decomposition in Table 2.2 allows us to assess the importance of credit shocks in the context of other core variables. It is evident that at all horizons, credit plays a considerable role in accounting for the dynamics of the current account balance; particularly at the two-year mark when credit accounts for nearly a quarter of current account

[17]For an engaging discussion of credit policy in the UK under Bretton Woods, see Aikman et al. (2016).

Figure 2.3: Impulse Response Function of Current Account Balance to a One Standard Deviation Credit Shock.



perturbation. Some other relevant observations here include the fact that RGDP and REER have seen their relative shares decrease compared to the baseline analysis, which used the short real rate as the monetary variable. We believe this points to the importance of properly capturing the impact of monetary forces using credit, and that the relatively low importance of monetary shocks in the previous specification (i.e. the short real rate shocks) caused a comparatively higher share of the variance to be ascribed to RGDP and REER. The paltry role played by fiscal policy under the previous specification remains largely unchanged in the credit-augmented VAR model, with its share of current account variability rising by only a few percentage points from a very low base. Overall this modified specification suggests a substantial role for the shocks of RGDP, Credit and REER as key drivers of the current account dynamics, and underscores the importance of remaining attuned to the historical and institutional particulars of the economy in question when engaging in VAR modelling. The results in this modified specification suggest that the choice of monetary variable can

Table 2.2: Forecast Error Variance Decomposition of Current Account Balance (from Credit-augmented VAR)

Horizon	S.E.	RGDP	Fiscal	Credit	REER	CA/GDP
4	1.83	29	4	15	1	51
8	2.44	25	4	23	7	41
12	2.80	22	6	19	19	34
16	3.14	21	7	17	22	33
20	3.46	20	7	17	23	33

produce some interesting variations, although they do not seem to concern fiscal policy and the current account, but rather the role of the other variables and their relative importance for the current account. In particular, the role for monetary policy is considerably enhanced when modelling credit rather than the real interest rate, which largely comes about at the expense of the real effective exchange rate and RGDP - although both remain key drivers of current account variability. This alternate approach to modelling the monetary stance seems to provide some empirical ballast to the earlier discussion regarding the historically unique manner in which UK monetary policy was conducted during the 1950s and 1960s, and the need to engage with the historical specificities of the period when seeking to model macroeconomic phenomena.

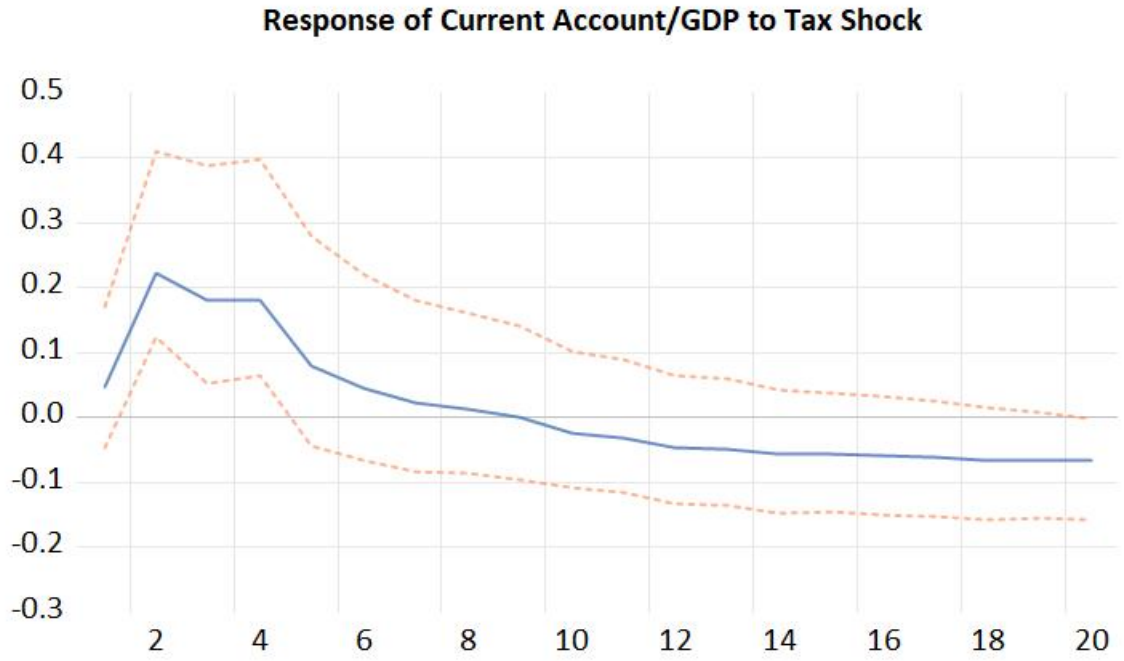
2.4.3 Tax Shocks

Figure 2.4 plots the impulse response function of the current account (IRF) to a negative one standard deviation tax shock (i.e. a reduction in tax) using the tax shock series from Cloyne (2013), which was identified using the well known 'narrative' approach based on an extensive reading of the UK's annual budget statements and other important fiscal events[18].

The response of the current account is striking indeed: following the tax cut, the current account balance immediately *increases* by around 0.2pp and remains elevated for around 8

[18]Cloyne indicates that the tax shocks were not balanced budget fiscal measures and this was not a case of 'starving the beast' where tax cuts are matched by corresponding reductions in government spending

Figure 2.4: Impulse Response Function of Current Account to a One Standard Deviation Tax Shock



quarters following the initial tax cut (with the result statistically significant for around a year or so). The forecast error variance decomposition (in Table 2.3) shows the tax shock account for 17% of current account perturbation at the one-year mark, before decreasing steadily thereafter. The other variables are similar to the FEVD results in the baseline analysis, with and RGDP and the real effective exchange rate assuming a prominent role. The relative importance of the tax shock is virtually the same when using credit as the monetary variable, and credit once again accounts for a little short of a quarter of current account variation by horizon 8. It is also worth mentioning the impulse response of the short real interest rate (shown in the Appendix), which *decreases* persistently in response to the tax shock for around two years; indeed, the average quarterly reduction in SRR is around 0.33% per quarter.

The results for the current account and short real interest rate are particularly eye catching

because they run opposite to the theoretical predictions of the traditional income-expenditure type macroeconomic models, such as the benchmark Mundell-Fleming framework. Under this approach an expansionary fiscal policy, typified by an outward shift of the IS curve, would elicit an increase in income; interest rates; and a worsening of the trade balance [19]. By contrast, our own results suggest an improvement in the current account and a reduction in the interest rate: how can we reconcile data and theory? The answer seems to lie in a newer vintage of open-economy macroeconomic models.

Table 2.3: Forecast Error Variance Decomposition of Current Account Balance (from Tax-augmented VAR)

Horizon	S.E.	Tax	RGDP	SRR	REER	CA/GDP
4	0.83	17	33	6	2	42
8	0.93	15	28	8	15	34
12	1.00	13	25	7	26	29
16	1.07	13	23	8	30	26
20	1.09	13	21	9	31	25

Baxter (1995) presents a theoretical framework in which consumers prefer to work harder whilst a tax cut is in effect and smooth consumption over the infinite future by saving in the periods following the tax cut, by purchasing bonds from foreigners (i.e. net acquisition of foreign assets). Similarly, the model posits that the response of business investment is likely to be minimal for all but the most highly persistent cut in tax rates, since there is no incentive to alter investment unless they perceive the time horizon for the tax cut to be extremely long lived, hence the money is either saved as retained earnings or possibly remitted to shareholders in the form of dividend payments [20]. The increase in the current

[19]This is based on the Mundell-Fleming model with imperfect capital mobility, which does justice to the nature of the partial restrictions on capital movements that existed during this period - see Schenk (2010, pp.215-224) for an overview.

[20]The first reason seems to resonate with the UK's experience, where it has long been acknowledged that the UK's investment-share of GDP was lower than that of other advanced economies, even when controlling for catching up effects. This excess tendency towards saving over investment on the part of the business sector could explain why the tax cut does not manifest in a current account deficit, if some or all of the

account balance following the tax cut shown in the impulse response function in Figure 2.4 is consistent with the this line of theoretical reasoning. Baxter's theoretical analysis also predicts a fall in the real interest rate in response to the increased saving (arising from the tax cut), so as to balance saving and investment, which is again consistent with the result from our impulse response analysis - see Appendix.

An important reflection on the evolving nature of macroeconomic theory is that Baxter's framework is an inter-temporal approach, unlike the older vintage of open-economy models such as the Mundell-Fleming model. The inter-temporal model formulates its theoretical predictions on the basis of forward-looking individuals and businesses who respond to shifts in relative prices not just in the present time period, but also those in the future. The approach finds strong support from Obstfeld & Rogoff (1995) who make the forceful case that in the same way efficient international trade tends to require unbalanced trade between different commodity groups, so too does efficient trade across *time*, which manifests itself in an unbalanced current account. In the same article Obstfeld and Rogoff highlight a number of analytical deficiencies in the Mundell-Fleming model, of which most pertinent to the current study is the fact that it is essentially a static model couched within a one-period framework, where future expectations do not play a role; agents merely respond passively to contemporaneous changes within the period. This leads to the very stylized result that expansionary fiscal policy causes a deterioration in the trade balance, whilst contractionary fiscal policy improves it. However, once expectations are incorporated a la Baxter (1995), an alternate set of economically plausible scenarios emerge regarding fiscal policy and the external balance; including a "twin divergence" between the two.

Another desirable feature of Baxter's treatment of the issue is the emphasis she places on the potentially different outcomes arising from temporary versus permanent tax cuts - i.e.

funds were channeled into overseas saving via the external account.

the persistence factor. For instance, her finding that business investment fails to respond to all but the most persistent tax cuts is hardly surprising when one considers the microeconomics of capital budgeting by firms, in particular the long time horizons involved. In a similar vein is the notion that households will seek to save transitory increases in income and only allow an outward shift in their budget constraint if the increase income is understood to be permanent. Historically this speaks to the nature of fiscal policy under Bretton Woods, indeed, arguably no country made greater use of discretionary fiscal fine-tuning (i.e. temporary adjustments) via taxes than the United Kingdom (Cloyne, 2013) and there is a longstanding literature arguing that fiscal policy actually became destabilizing to the expectations of private agents and hence the dynamics of the business cycle [21]. A relatively recent paper by Fogli & Perri (2015) helps to bridge the understanding of uncertainty and domestic economic instability with the balance of payments, by investigating the relationship between macroeconomic volatility and the external balance in advanced economies. They document that heightened macro-volatility is consistent with greater accumulation of foreign assets manifested by current account surpluses - both in theory and in the data. They suggest that the precautionary motive for saving is ultimately driven by aggregate uncertainty, with policy-induced uncertainty proffered as a key mechanism therein, which appears consistent with the stop-go macroeconomic zeitgeist that prevailed in the UK under Bretton Woods [22].

2.4.4 The Real Exchange Rate and External Adjustment

The empirical focus thus far has centred on the interaction of fiscal policy and the current account, however, for completeness it is desirable to examine the role played by the real effective exchange rate, which was a hotly debated topic throughout much of the UK's post-war history. Indeed, under Bretton Woods the defence of the sterling-dollar parity was

[21] Dow (1964) was arguably one of the earliest and most influential proponent of this thinking.

[22] Supporting evidence of this can be found in Rollings (2007, Ch.3) who discusses an unresolved tension between business and government, in which the Treasury in particular took a critical view of UK financial capital being too footloose and prone to investing overseas, thus forgoing domestic investment and impeding the formation of future export capacity.

the overarching focus of UK macroeconomic policy, which generated fraught disagreement: a deep-seated reluctance to devalue the nominal exchange rate, coupled with an inflation rate higher than that of competitor economies led to persistent anxieties that the UK's real exchange rate was increasingly overvalued. One of the most prolific exponents of the view that an uncompetitive real exchange exerted a baleful impact the British economy was the Conservative Chancellor of the Exchequer Peter Thorneycroft, who commented: 'Let no one be under any illusions as to what happens if we follow that [inflationary] line. At the end ... there is mass unemployment because we cease to be competitive as a ... trading nation' (Cooper 2011, p.234). Others, however, held a contrary view, and were altogether bleak about the prospect of improvements in relative prices leading to an improvement in export performance (the elasticity pessimism view). The debate was never satisfactorily solved and the same discord that gripped policy makers and academics during the 1950s and 1960s continued well into the late 1980s apropos of the exchange rate and external balance.

It follows therefore, that the important and largely unresolved question still stands: did a reduction in the real effective exchange rate help to improve the current account during the Bretton Woods period? Figure 2.5 shows the impulse response of a negative REER shock to the current account balance [23]. The response of the current account is textbook given that there is initially a decrease in the current account balance, since lower relative prices tend not to immediately affect the volume of exports but do, however, instantaneously reduce the terms of trade. Nonetheless after a few quarters the current account balance begins to improve robustly with a strikingly persistent impulse response profile, before finally reverting to the pre-shock baseline around the five year mark. This response is consistent with the classic J-Curve effect, and indicates that the Marshall-Lerner condition regarding relative price elasticities for exports and imports respectively has been met, thus indicating that the real effective exchange rate is a viable instrument for helping to facilitate external adjustment.

[23]Note that the empirical output in this section was generated using the baseline VAR specification from section 4.1.

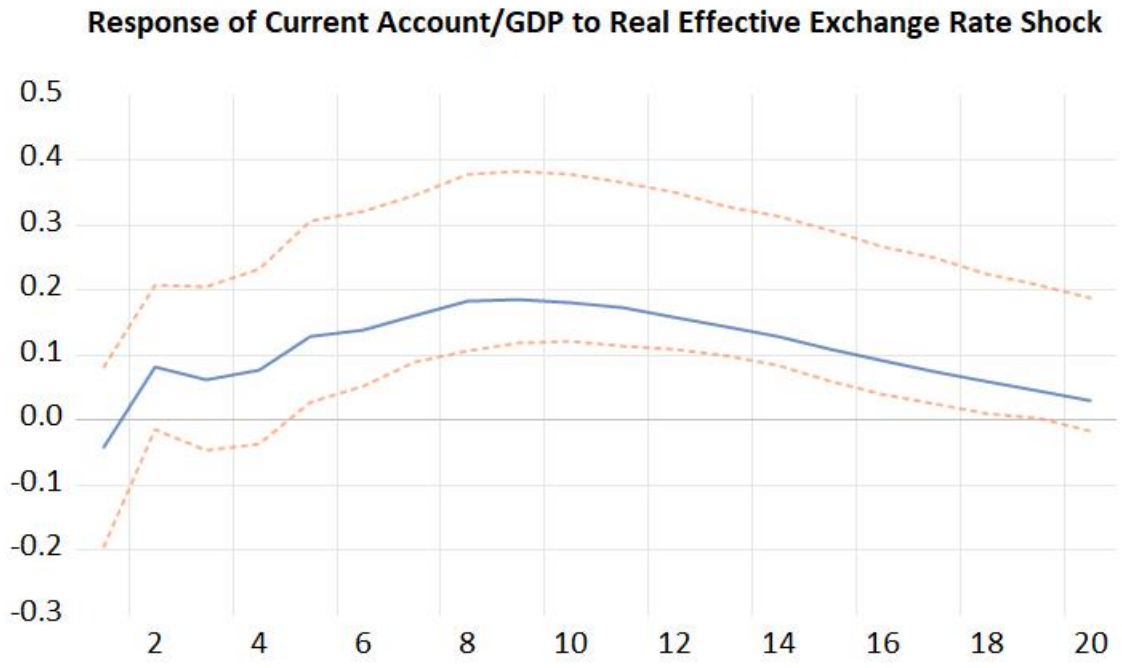


Figure 2.5: Impulse Response of Current Account to a (Negative) One Standard Deviation Real Effective Exchange Rate Shock.

A perpetual concern regarding reductions in the real exchange rate is whether an improvement in relative prices can be sustained for any meaningful length of time; or will the gains hastily vanish amidst a rise in wages and prices; as well as retaliatory action by other countries enacting their own devaluations in response. We can glean insights into this question by examining the response of the real effective exchange rate to one of its own negative shocks (shown in the Appendix) and assess the time it takes for the improvement in relative price competitiveness to eventually dissipate. From the impulse response function we can ascertain that the half-life of the shock is 13 quarters: i.e. it takes just over three years for half of the gains in relative price competitiveness to be lost. Indeed, it is only by the give year mark that the gains in competitiveness have just about dissipated and the variable reverts back to its pre-shock baseline. The historical implications of the empirical findings in relation to the exchange rate will be discussed more thoroughly later.

2.5 Extended Experiments and Robustness Checks

2.5.1 Crisis 1967: Disentangling the Causes of, and Recovery from the 1967 Sterling Devaluation

The collapse of sterling's parity against the dollar in November 1967, from $2.80 to the pound down to $2.40 represented a nominal devaluation of 14%, although the numbers arguably belie the true historical significance of the moment. Indeed, the sterling-dollar parity had stood since 1949, and despite successive UK Chancellors being forced to weather some fairly tempestuous storms, the commitment to defending the currency had remained (in public, at least) a steadfast undertaking of all governments. The collapse of the parity, which was unceremoniously forced onto the government of Prime Minister Harold Wilson, was perceived as being something of an economic "Suez moment". The parallel between the two occasions is an apt one: the Suez Crisis is widely held to have given rise to the dawning realisation that 'we are not not now that strength which in old days moved earth and heaven' [24], with the world now fully cognizant of Britain's vastly diminished capability to act as a major power and to impose its will via force of arms. Likewise, the 1967 Sterling Crisis epitomized the decline of sterling as a major reserve currency and embodied the relative decline of the world's first industrialized economy to one that had finally ceased to be an integral facet of the global economic system. Sterling's decline was synonymous with Britain's ostensible decline.

The consequences of the crisis were politically deleterious for the Labour government of Harold Wilson, who were ejected from office at the general election of 1970. Wilson's long-standing desire to avoiding reinforcing popular perceptions of Labour as being the 'party of devaluation' had come to naught. And matters weren't helped when in the immediate after-

[24] This is, of course, taken from the highly acclaimed final lines of Alfred, Lord Tennyson's poem 'Ulysses'

math of the devaluation Wilson took to the airwaves to declare 'that doesn't mean, of course, that the pound here in Britain, in your pocket or purse or in your bank, has been devalued'. The self-evidently incredulous claim went on to become the stuff of political infamy.

In economic terms, the devaluation was buttressed by an enormous fiscal tightening in the budget of March 1968, when the new Chancellor of the Exchequer Roy Jenkins passed one of the most contractionary macroeconomic policy packages of the entire post-war period up to that point. It is also necessary to recognise that the UK was far from out of the woods following the devaluation, and significant doubts continued to linger in both policy circles and financial markets as to whether the new parity would hold up or whether a further devaluation would occur. One thing that did happen, however, is that the current account balance underwent a remarkable turnaround from a trough in 1967-Q4 of -2.5% (as a percentage of GDP) to a peak of 2.3% in 1970-Q1.

Questions have abounded in relation to both the causes of the sterling crisis and the seemingly impressive recovery of the current account that occurred in its aftermath. Contemporaneous opinion in continental Europe was that countries like the United Kingdom with large budget deficits ended up with balance of payments deficits, and that the cure for the latter was a reduction in the former (Cairncross & Eichengreen 2003, p.177). In relatively more recent times, De Grauwe (1997) invokes a twin deficits line of reasoning and attaches a key role to fiscal policy in the entire episode:

'As a result of relatively expansionary fiscal policies, the government budget turned to large deficits during the middle of the decade. This also had the effect of increasing imports and led to the deterioration of the current account ... From 1962-67, the government budget deficit became larger and larger. As a result, during 1963-65 and later during 1967 the current account deteriorated significantly' (De Grauwe 1997, p.57).

De Grauwe explicitly posits that fiscal deficits and the ensuing current account deficits were responsible for the speculative attacks against the current that ultimately culminated the exchange rate crisis. He also goes on to note that the current account improved in spectacular fashion 1968-70, due to the subsequent fiscal tightening as well as the impact of the devaluation itself. Hence, fiscal policy was crucial to both the cause of the crisis as well as the ensuing recovery.

We investigate the nature of the 1967 sterling crisis by way of a historical decomposition, which allows one to unpack the constituent shocks that drive the dynamics of a variable over a specific window of time. In this case, we estimate a historical decomposition of the current account balance 1967Q1 - 1971Q4, which should enable us to probe the various assertions regarding the cause of the crisis as well as the subsequent recovery.

Figure 2.6 shows the role of the real effective exchange rate in helping to drive the recovery of the current account in the years 1968-1971. After an initial period of inertia in the first year or so since devaluation, we see the real exchange rate, as depicted by the black dashed line, contributing significantly to the upturn in the current account balance, with visual inspection suggesting it accounted for roughly half of the observed recovery in the current account. This certainly corroborates Paul De Grauwe's emphasis on devaluation in driving the turnaround in the current account balance. The result also speaks to those longstanding debates in British policy circles during the Bretton Woods era regarding the efficacy of relative price changes (as effected by changes in the nominal exchange rate): the devaluation seems to have contributed to a large and sustained increase in the current account balance, indicating that the exchange rate did constitute an effective policy instrument in promoting external adjustment.

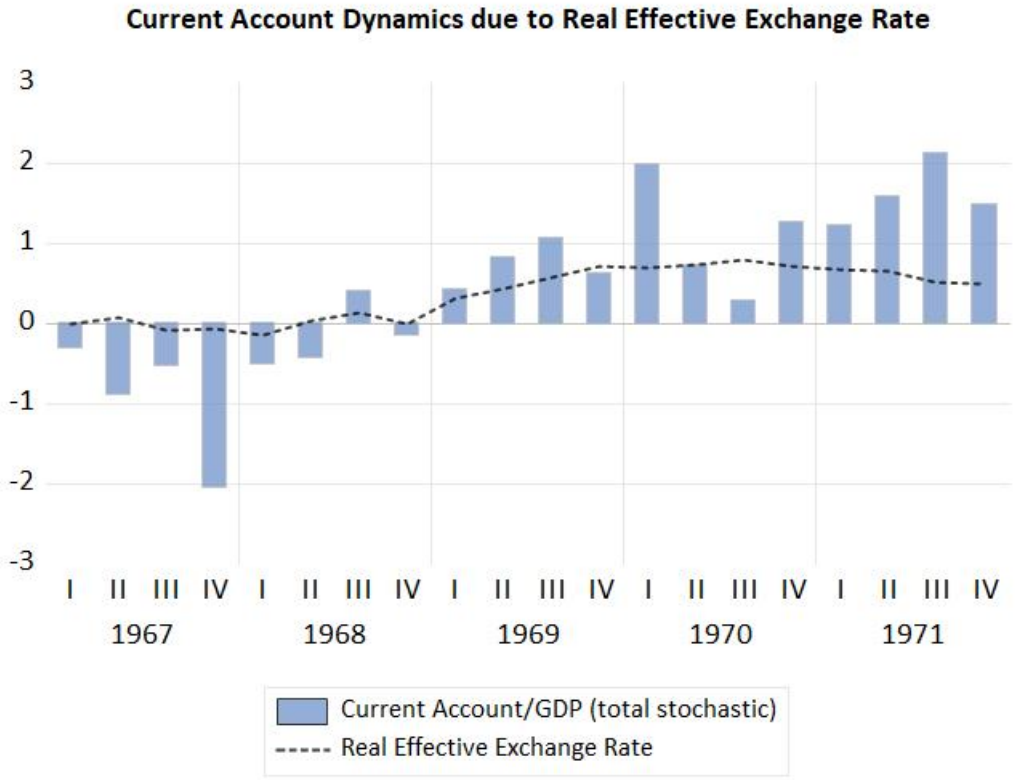


Figure 2.6: Historical Decomposition of Current Account due to REER.

What of fiscal policy in this story? Figure 2.7 shows the contribution of the fiscal balance in both the build up to the crisis and the subsequent recovery. It is readily apparent that fiscal policy appears to have played next to no role in the marked deterioration of the current account balance in 1967-Q4. Similarly, its part in the recovery over subsequent years can be described as very modest at best, with the fiscal balance's influence being felt fairly late in the day from around 1970-Q3. Overall the results suggest that whatever the causes of both the crisis itself and the subsequent recovery, the spotlight does not fall on fiscal policy.

The role of the current account balance's own idiosyncratic variation seems an important factor to assess in relation to the 1967 currency crisis, which Figure 2.8 certainly seems to vindicate. It is apparent that most of the deterioration in the current account that occurred in 1967-Q4 (the quarter in which the sterling crisis and devaluation occurred) was driven by

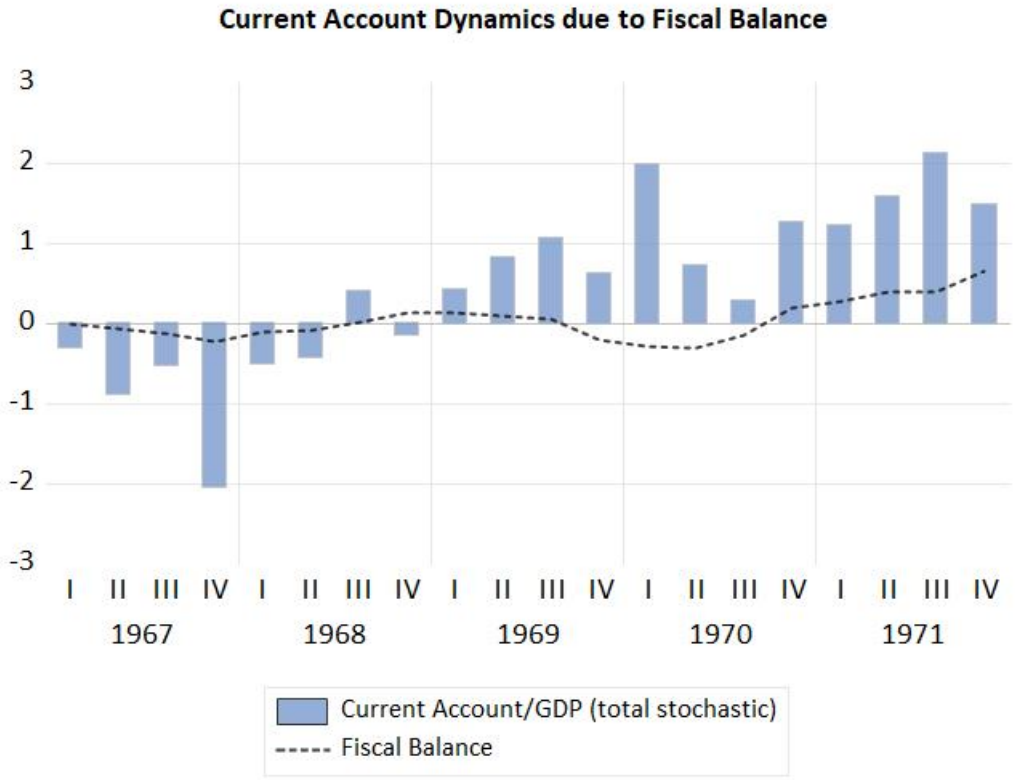


Figure 2.7: Historical Decomposition of Current Account due to Fiscal Balance

the current account's own idiosyncratic variation. Similarly, the particularly strong current account value for 1970-Q1 is attributable to one of the current account's own shocks, although this time a positive one. It is important to recall at this point that the structural VAR used to estimate the historical decomposition sees the current account conditioned on real GDP; the fiscal balance; credit; and the real exchange rate. This means that in terms of the short-run identifying restrictions, all the domestic macroeconomic variables have been controlled for, hence the current account shocks we recover will pertain mostly to influences that are exogenous to the UK economy, and to the extent that any domestic influences remain, they are likely to be random disturbances unrelated to the core macroeconomic variables in the system.

It is worth unpacking the current account's idiosyncratic shocks further, since they appear

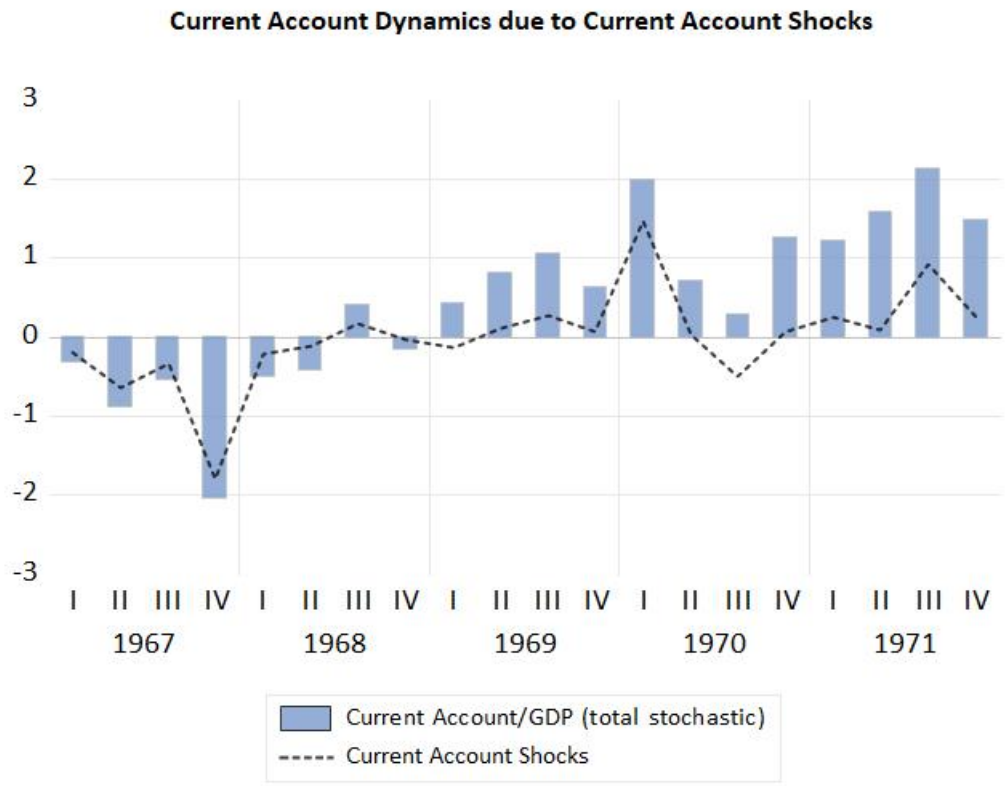


Figure 2.8: Historical Decomposition of Current Account due to Own Random Shocks.

to provide the smoking gun behind the aberrant current account performance in 1967-Q4. On the face of it, there would seem to be good economic reasons for suspecting that the current account's own random variation might explain some of its more pronounced swings. Dow (1964, p.385) highlights some of the autonomous factors that typically accounted for the ebb-and-flow of short-term movements in the UK's current account balance, including: movements in the terms of trade; fluctuations in net income on overseas assets; changes in grants and transfer payments from foreign governments; and changes in the rate of demand growth in the UK's trading partners. Taken collectively these factors seem plausible enough candidates, but are they alone capable of establishing the cause of the currency crisis?

Appealing to the historical record to see whether it substantiates the emphasis our analysis places on the current account's own shocks seems warranted. Indeed, Alec Cairncross was

a senior official in the UK Treasury during the 1960s and thus had a unique vantage point from which to construct a blow-by-blow account of the main factors leading to the sterling crisis and devaluation. (Cairncross 1996, Ch.10) documents several idiosyncratic, one-off, and essentially random factors that adversely affected the current account during the latter part of 1967. These included the closure of the Suez canal, as well as industrial unrest in the form of strikes by dockworkers, which meant that UK exports were unable to be shipped and therefore precipitated a loss of much needed foreign exchange. Cairncross also highlights that 1967 saw a slowdown in global economic growth, thus undermining the demand for UK exports, a point which finds support in the work of Dow (1998, p.241) who emphasises that fluctuations in world exports varied to a greater extent changes in world GDP. Cairncross sums up the picture aptly by noting 'these events could not fail to have a serious effect both on the balance of payments and on confidence in sterling' [25].

Our investigation of the 1967 sterling crisis, and the subsequent analysis has yielded a number of valuable findings. First, loose fiscal policy appears to play virtually no role in the cause of the devaluation, and its subsequent tightening contributes (at best) only very modestly to the subsequent recovery in the current account. Second, the real exchange rate makes a powerful contribution to the turnaround in the current account balance, accounting for around half of the observed improvement, particularly during the years 1969-71 inclusive. Finally, the current account's own idiosyncratic shock appears to explain virtually all of the current account's parlous performance in the crisis period 1967-Q4, We contextualize this finding in relation to the menu of autonomous shocks that can plausibly account for a pronounced short-term deterioration in the external balance, and corroborate this intuition by examining the historical record. It becomes abundantly clear that a series of largely random disturbances were responsible for undermining the current account balance in the lead up to the crisis, and the considerable turnaround in the current account balance once these factors abetted lends

[25]See Cairncross (1996, p180). See Chapter 10 of the same publication for a thrilling and informative account of the months leading up to devaluation.

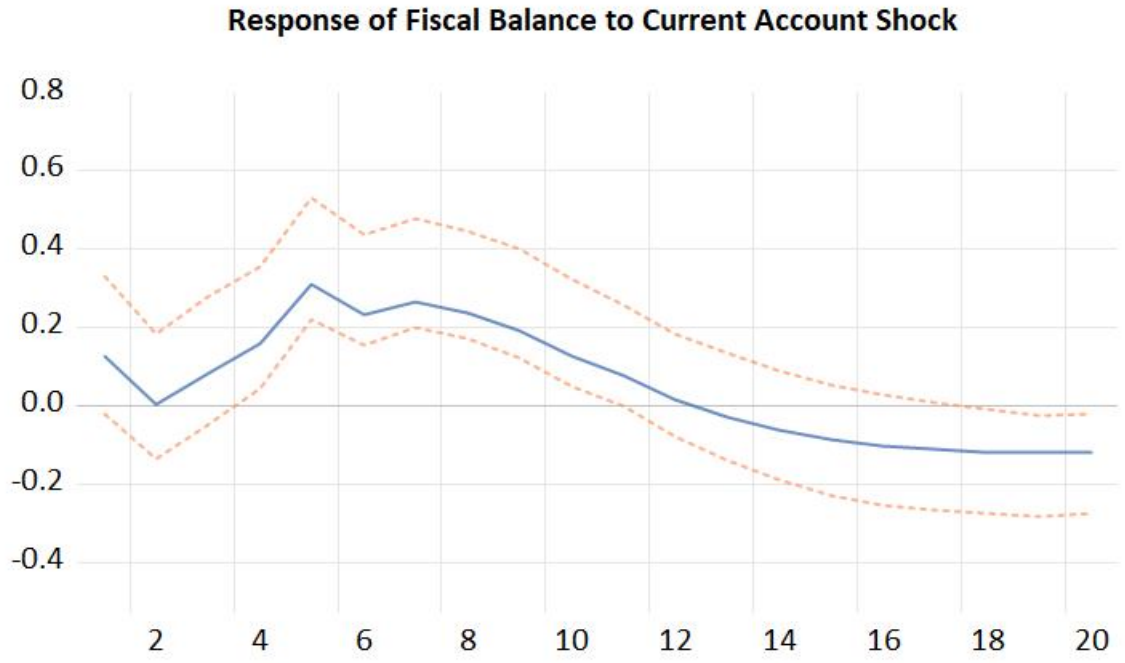
credence to these random disturbances as the overarching proximate cause of the sterling crisis and devaluation.

2.5.2 Twin Deficits Reversed: Current Account Shocks and the Fiscal Balance

Since so much of the discourse regarding twin deficits is predicated on the use of macroeconomic accounting identities, logic dictates that there is no reason to preclude causation flowing from autonomous changes in the current account to the fiscal balance. Indeed, the argument for current account shocks to the fiscal balance dominating the traditional twin deficits relationship is potentially enhanced under a fixed exchange rate, since it amplifies the impact of both common and idiosyncratic shocks, which are transmitted between countries via the balance of payments (Bordo 1993). In this case, the burden of equilibrium real exchange rate adjustment falls primarily on domestic nominal prices and wages, which can result in a costly and protracted adjustment process that will surely come to exert an impact on the fiscal balance. To investigate this further we estimate a VAR model comprising {RGDP, CA/GDP, Credit; REER; Fiscal Balance} - full model details are given in the Appendix.

The impulse response function of the fiscal balance to a current account shock in Figure 2.9 (as well as the accompanying forecast error variance decomposition shown in the Appendix) generate some striking insights: the current account shock - a rise in the current account balance- elicits pronounced and highly persistent increase in the fiscal balance, which peaks after 1.5 years, before remaining elevated until around the three year mark. The response is statistically significant for a substantial proportion of this period. The forecast error variance decomposition of the fiscal balance corroborates the importance of current account shocks, which attain a peak impact of 24% at horizon 9, and interestingly outperform all

Figure 2.9: Impulse Response Function of Fiscal Balance to a One Standard Deviation Current Account Balance Shock.



other variables (with the exception of the fiscal balance's own shocks) in accounting for the dynamics of the fiscal balance. How can we explain these empirical findings in economic terms?

Suppose there is a deterioration in the current account balance owing to an exogenous adverse movement in the terms of trade, or perhaps an increase in overseas expenditure on military outlays: this will cause national income to fall, thus lowering both corporate profits as well as workers wages (Blecker 1992, Ch.1). In turn, this will precipitate a reduction in private saving (i.e. the sum of household and business saving) as well as a fall in the government's tax revenues, which *ceteris paribus* leads to a deterioration in the fiscal balance. The reverse logic holds true for a positive shock to the current account, say an exogenous improvement in the terms of trade or an autonomous substitution towards domestic manufactures rather than foreign imports. There will be a rise in national income; increased savings by both households

and businesses, greater tax revenues for government and a commensurate improvement in the fiscal balance [26].

2.5.3 Alternate Short Run Identifying Restrictions

One of the striking features of the preceding empirical analysis is the resilience of the core findings concerning the fiscal balance and current account to alternate identifying restrictions in the structural VAR. Here we highlight some additional avenues which corroborate the headline results obtained in the earlier analysis.

In the earlier analysis we followed Roubini and Kim (2008) in conditioning the endogenous covariates on real GDP so as to control for the impact of aggregate cyclical fluctuations on the shocks of other variables. But how - if at all - do the results change if we decide to order GDP last in the Choleski decomposition and place the fiscal balance first? To this end we estimated a VAR identical to the baseline model in Section 2.4.1, but instead identified via Choleski decomposition based on the alternate data vector **{Fiscal Balance, CA/GDP SRR, REER, RGDP}**. In this approach we clearly break with the baseline identification scheme by placing the fiscal balance as most exogenous, followed by the current account to GDP variable, with RGDP exerting no contemporaneous impact on any other endogenous variables.

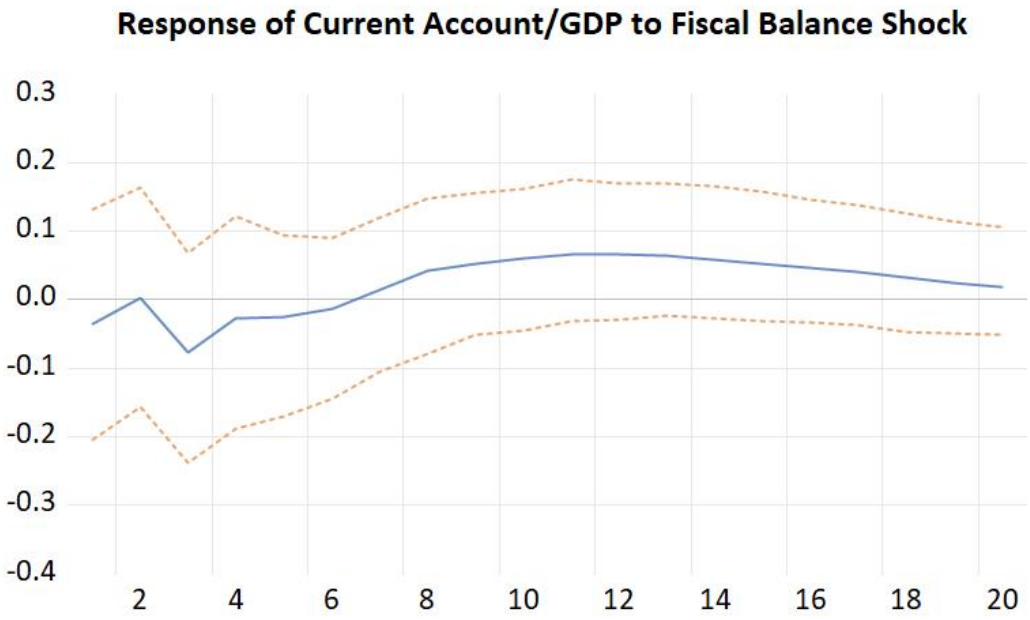
The forecast error variance decomposition of the current account balance shown in Table 2.4 above produces a few interesting comparisons. First, there is almost no change in the extremely small contribution of the fiscal balance to the dynamics of the current account: much like in the baseline identification scheme it does not exceed 5% at any horizon examined

[26] Blecker (1990) also points out that to the extent there is under-utilised capacity in the economy (unemployed workers or capital), the expansion of national income is likely to go hand-in-hand with a reduction in social security payments, thus reducing government outlays and bolstering the fiscal balance further.

Table 2.4: Forecast Error Variance Decomposition of Current Account Balance (from Alternate Identification Scheme VAR)

Horizon	S.E.	Fiscal	CA/GDP	SRR	REER	RGDP
4	0.82	1	63	6	0	30
8	0.90	1	53	8	9	29
12	0.99	3	45	9	19	25
16	1.04	4	41	12	21	22
20	1.07	4	39	14	21	22

Figure 2.10: Generalized Impulse Response of Current Account to Fiscal Balance Shock.



[27]. The only modest differences are a reduction in the variance shares of RGDP and REER by around 5pp respectively, and a corresponding increase in the variance shares of the short real rate and current account. All-in-all it is difficult to escape the conclusion that there are virtually no material changes as a result of the alternate short-run identifying restrictions.

Another way of probing the sensitivity of the results to given identifying restrictions is to estimate the impulse response functions proposed by Pesaran & Shin (1998), so-called

[27]In a similar vein, the impulse response function of a fiscal shock to the current account is very similar to the baseline output, and once again is not even statistically significant.

'generalized impulse responses', which are invariant to the ordering of the variables and are unique. In this vein, we use the baseline VAR in section 2.4.1 to estimate a generalized impulse response function of the current account to a (negative) one standard deviation fiscal balance shock [28]. We can see from Figure 2.10 that the impact of the fiscal balance shock is hardly different at all to the baseline output in the main analysis; this is strongly indicates that our results do not depend arbitrarily on the particulars of a recursive identification scheme.

2.5.4 Parsimonious specification

A vector autoregressive model tends to contain - by design- a substantial number of endogenous variables as well as lags of those variables. It is good practise to ascertain whether the empirical results obtained in the main analysis can be closely reproduced based on a less densely parameterized version that still remains true to the spirit of the original framework. Hendry (1995) offers a more in-depth treatment of the theory of reduction in econometrics, but in simple terms we are seeking to eliminate (or marginalize) information deemed unnecessary for the purposes of statistical analysis whilst minimizing the loss of relevant information. In this vein, we sought to assess whether we could obtain the same or very similar results based on a more parsimonious but still theoretically plausible and empirically-informed specification.

One route to producing a more compact model is to specify the structure of each equation piece-by-piece; adding or reducing variables and lags based on a combination of economic intuition and the modeller's own judgement. But such an approach is similar to what Sims (1980) famously decried as the 'incredible identifying restrictions' in pre-vector autoregressive models; we concur with Sims and reiterate that one of the hallmarks of the VAR approach is that it treats each of the endogenous variables equally and on the same theoretical footing,

[28] The complete set of 5×5 generalized impulse responses are shown in the Appendix.

rather than specifying each equation in an ad-hoc fashion.

We follow a straightforward but appealing approach taken, namely to conduct Wald-tests on the joint significance of a given lag within the system: that is to say, we examined the significance of each lag (1,2...N) across all variables jointly when looking for a potential lag-exclusion pathway. The Wald test indicated the third lag of each endogenous variable as a suitable candidate for exclusion, hence we re-estimated our baseline specification with lags 1,2 & 4 [29]. The results from the impulse response analysis and forecast error variance decomposition (shown in the Appendix) were remarkably similar to the original model, thereby leaving our conclusions unchanged but having successfully reduced the number of estimated parameters in the system by approximately one-quarter [30]. Respecting the unrestricted nature of the VAR in its reduced form appears to have allowed the reduction of a relatively more dense model without entailing any substantial information loss.

2.5.5 Serial Correlation Tests

VAR models assume that the reduced-form innovation process u_t is white noise - i.e. that the realizations of reduced form innovations exhibit no serial correlation. The lag order of the model is typically chosen with this in mind, and we check this via formal testing, the results of which are shown in the Appendix. A null hypothesis of no serial correlation is not rejected at the 5% level in any of the models.

2.6 Historical and Policy Implications

Having carefully analysed the causal impact of fiscal policy on the current account balance and found evidence decisively against the traditional twin deficits view, the next step is to

[29] Apart from the lag reduction, the model is otherwise the same as its baseline counterpart

[30] A similar story obtains when engaging in lag reduction across the different model specifications we estimated.

probe how our empirical findings can shed light on the historical conduct of economic policy. Clearly there is an inherent degree of subjectivity regarding the relative importance one attaches to competing policy objectives and the trade-offs involved: we remain circumspect in this regard and afford particular emphasis to allowing our empirical analysis to speak to key contemporaneous debates that existed regarding the conduct of macroeconomic policy.

2.6.1 The Fiscal Transmission Mechanism and the Twin Deficits

The preceding analysis has produced two key results of note concerning fiscal policy: firstly, expansionary (contractionary) tax shocks actually resulted in an improvement (decline) in the current account balance. And secondly, we find a striking reversal of the conventional twin deficits narrative since current account shocks exerted a substantially greater impact on the fiscal balance compared to the effect of fiscal balance shocks to the current account. Taken as a whole, our analysis suggests that the long held view ascribing the UK's chronic current account imbalances under Bretton Woods to fiscal laxity does not find support in the data. It further casts serious doubt on the proposed instrument-assignment of the New Cambridge School, who argued that fiscal policy should be targeted to achieving external balance whilst the exchange rate and commercial policy focused on internal balance. Fundamentally we find very limited evidence to corroborate a traditional interpretation of the fiscal transmission mechanism to the current account, and even in those cases where support is found (such as the impulse response function in section 4.1) the shocks from other variables in the model exerted much greater impact on the current account both individually and collectively, thus rendering untenable the notion that fiscal policy was primarily responsible for destabilizing the current account during this period.

Particular emphasis has to be afforded to tax policy: not only was it widely acknowledged as the weapon of choice for successive UK post-war governments in seeking to regulate the level of aggregate demand and preserve external balance, but within our analysis the tax

shocks revealed some deep-seated inadequacies about the way policy makers and academics conceptualised the fiscal transmission mechanism on a theoretical level. Contemporary opinion believed that tax rises would improve the current account via an income-expenditure effect (namely lower aggregate demand reducing imports), whilst tax cuts would achieve the opposite. In practise, however, this view fails to characterise the dynamics revealed by our modelling - a failure that can be ascribed to the theoretical underpinnings of the older income-expenditure type models (such as Mundell-Fleming) which are couched within a static one-period framework where expectations play no role. By contrast, the newer variants of open-economy models (e.g. Baxter, 1995) comprise a more theoretically explicit framework that succeeds in linking the allocation decisions of individuals and businesses to macro-level phenomena such as the current account. In this framework economic agents and businesses undertake their savings and investment decisions within a multi-period framework, which extends beyond the short-run horizon of macroeconomic stabilization policies, and hence the current account becomes a channel for engaging in inter-temporal savings and investment decisions. This key distinction is central to understanding why individuals and businesses do not simply reflexively increase or decrease their expenditures in tandem with the government's own preferred fiscal stance (as-per the older income-expenditure models); on the contrary, a "twin divergence" between the fiscal shock and the current account becomes the theoretically consistent outcome, and is the clear result manifest by the empirical output [31].

Regarding this important distinction between the Mundell-Fleming model versus the inter-temporal approach, Obstfeld & Rogoff (1995) go as far as to argue that the Mundell-Fleming model offers no valid benchmark for evaluating the differing range of circumstances that might warrant a current account deficit or surplus, such as a rise in domestic investment productivity or a transitory fall in output - not least because of its lack of a theory of in-

[31] An integrated -and highly illuminating- account of the evolution of open-economy macroeconomic theory since WWII, with commentary and insights from the author, can be found in Obstfeld (2001).

tertemporal allocation. With respect to the historically important tax side of fiscal policy, the dynamics exhibited by our model output seem to provide support for critique articulated by Obstfeld and Rogoff, since Baxter's intertemporal model exhibited greater external consistency with the data much compared to the older vintage of one-period income-expenditure models. Whether or not politicians and policy makers themselves bear culpability for misunderstanding the nature of the fiscal transmission mechanism is a thorny question, since the task of incorporating multi-period expectations in an inter-temporal open-economy model did not begin in earnest until well after the end of the Bretton Woods era. Therefore a more charitable judgement would be to suggest that culpability lay with the macroeconomic models that constituted the benchmark understanding of the day, and rather than positing government failure it would be more appropriate to speak of an intellectual failure in theoretical macroeconomics, which led to a fallacious conception of the fiscal transmission mechanism in the open-economy.

Regarding the fiscal balance shocks, no evidence is found to support the kind of one-for-one correspondence between the fiscal balance and the current account balance emphasized by the New Cambridge School and twin-deficits adherents. On the contrary, it seems that policy makers overlooked the capacity of current account shocks to cause a deterioration in the fiscal balance, such was the widespread presumption that causality ran from fiscal policy to the external balance. In reality, however, there is no reason why a negative current account shock -that is a deterioration in the current account balance due to say a decline in demand for UK exports- would not exert considerable impact on the fiscal balance: indeed, national income (or the growth of national income) will be reduced, and both corporate profits and workers' wages will be lower. This results in lower private saving and also hits the government's tax revenues. Crucially, the decline in the fiscal balance will occur hand-in-hand with the current account deficit which creates the illusion of a twin deficits effect, however, as we can see in this instance the direction of causality runs from the external balance to the fiscal balance.

The notion that current account shocks to the fiscal balance dominates the traditional twin deficits channel is not so surprising when one considers the role of a fixed exchange rate system in exposing a country to both common as well as idiosyncratic shocks, which are transmitted from the rest of the world via the balance of payments Bordo (1993).

2.6.2 The Efficacy of the Real Effective Exchange Rate in Facilitating External Adjustment

The real effective exchange rate has been shown to be of considerable importance for the current account balance at longer time horizons, seemingly corroborating fundamental notion that international relative prices matter for the external adjustment process. Whilst there were undoubtedly a range of political factors militating against devaluation historically, this fails to do justice the fraught disagreement that also existed regarding its efficacy on *economic* grounds - an area which our modelling can shed light on. The analysis strongly indicates that a reduction in the real effective exchange rate produced a long-lived improvement in the current account balance, which on a cumulative basis would equate to a substantive net increase in foreign exchange earnings[32]. This stands in stark contrast to the so-called 'elasticity pessimism' which existed contemporaneously, with cynics arguing that improvements in relative price competitiveness would do little to extricate the UK from its current account woes. Others argued that the UK's problems were deeper and more structural in nature, such that the gains from devaluation would quickly be lost, and that the inflationary consequences of devaluing would in fact prove to be the "cure" that made the patient worse. The empirical results suggest that both positions appear excessively fatalistic: improvements in the real exchange rate did help to improve the current account balance, whilst half-life analysis of real exchange rate shocks indicate that it took around five years for the beneficial impact of an improvement in competitiveness to dissipate entirely.

[32]Or analogously, to the extent that it prompted substitution away from foreign goods towards domestic ones then it helps to save scarce foreign exchange

Having dispelled some of the more fatalistic opinions regarding the efficacy of real exchange rate adjustment as a policy instrument, it is necessary to recognise that devaluation alone was not a sufficient condition for the UK to escape her chronic current account imbalances. Rather, devaluation could have bought the country some much needed breathing space by improving the current account balance for a time, and the resulting policy space would then have needed to focus relentlessly on tackling the deep-seated supply side constraints beguiling the economy - particularly the tendency towards under-investing. Such investments ought to have focused on improving the quality, diversification and other elements of non-price competitiveness governing the demand for British exports. We must also recognise, however, the stark reality captured by the absorption approach to the balance of payments: namely that if total domestic expenditure exceeds total income the corollary is a current account deficit. Hence a rise in household saving would surely have been a pre-requisite for vanquishing the external imbalance problems in their entirety, although whether such a shift was ever likely to prove forthcoming remains questionable.

Whilst much ink has been spilled regarding fears of the inflationary consequences of devaluation, a much overlooked though equally important risk pertains to devaluation's immediate aftermath, namely how to meet the increased external financing requirement in the months following day zero. The classic 'J-curve' effect elaborates how an initial decline in the terms of trade following devaluation will likely raise import costs, whilst the much anticipated rise in export volumes will typically take a few quarters to materialize depending on the speed of the pass-through effect. This would necessitate prior to any attempt at devaluing that policy makers were certain (i) they had sufficient foreign exchange reserves accrued; or (ii) loan guarantees from either the IMF or partner countries. In practise this was less than straightforward: Schenk (2010) highlights the fact that the UK's foreign exchange reserves were by-and-large perilously thin; whilst securing promises of loans from either the IMF or

United States would often prove to be fraught with conditionality. On the part of the IMF this would assume an economic guise, typically involving contractionary macroeconomic policies of both the fiscal and monetary variety, perhaps buttressed by some distasteful measures to restrict wages growth. Meanwhile, in terms of bilateral or even multilateral loans, there would often be a willful conflation of foreign policy objectives with any promises of economic assistance - thus confronting UK policy makers with some hard trade-offs to navigate. A prominent example of this was the wrangling between UK Prime Minister Harold Wilson and US President Lyndon B Johnson, with the latter demanding greater British support for US military action in Vietnam in return for a US-led loan (Schenk 2010). Therefore, whilst our analysis indicates that the current account balance was indeed receptive to improvements in the real effective exchange rate, ensuring sufficient foreign exchange reserves to ride out the aftermath of the storm would surely be a prerequisite to any orderly and successful devaluation. Absent this, the UK would have been far more vulnerable to impositions by the IMF (as was the case post-devaluation for Harold Wilson and the new Chancellor Roy Jenkins), or being forced into a politically unpalatable quid-pro-quo when negotiating assistance directly from foreign leaders.

2.6.3 The Current Account's own Idiosyncratic Shocks

Our empirical analysis revealed the current account's own shocks as being a particularly important driver of its dynamic in the short run (i.e. one year horizon), presenting some important ramifications for policy. It is important to recall that the current account shocks we recovered were from a structural VAR which explicitly controlled for the effects other core domestic macroeconomic variables within the identification scheme, such as RGDP; fiscal policy, monetary policy; the real effective exchange rate. This means that the shocks we recovered were largely expunged of the aforementioned factors, leaving the resulting current account shocks to pick up the influences of foreign-sector innovations.

Examining the half-life of one of the current account's own (negative) shocks to itself can reveal important insights into the nature and persistence of the disturbance. The impulse response function, shown in the Appendix, reveals an important insight: namely that over two-thirds of the reduction in the current account balance following one of its own (negative) shocks is dissipated in just a single quarter. In other words, the shock causes a pronounced and erratic fluctuation the current account that is extremely short lived, before the current account reverts to its pre-shock baseline shortly thereafter. In policy terms this means that an important driver of current account fluctuations are essentially exogenous and unpredictable, hence the government has very little target controllability. This is in keeping with the arguments advanced by Christopher Dow (1964) who emphasized the role of random variations within the world economy and global markets - such as jumps in commodity prices; variation on net income from overseas assets; and shocks to demand in the economies of key trading partners [33]. In light of these factors, it is difficult to envisage any systematic way in which the government had the capacity to limit the frequency or magnitude of shocks emanating from these sources.

All of this raises the uncomfortable prospect that the current account was to some degree at the mercy of unforeseeable contingencies in the short run, driven by events beyond the UK's borders. In the medium-term at least (i.e. the two year mark onward), shocks of domestic economic variables collectively start to account for a lion's share of current account variability, which presents the opportunity (in principle) for the implementation of a policy framework designed to limit external imbalances. The inescapable reality, however, was one in which officials were walking a something of a tightrope in which events largely outside their control would exert a substantive impact on the proximate health of the current account balance. Since recourse to the sudden imposition of defensive import controls was regarded as extremely objectionable on account of violating the spirit of post-war trade liberalization,

[33] One could potentially add taste and preference shocks for monopolistically differentiated tradables to these factors.

as well as the increasing attempts of policy makers to court membership of the European Economic Community, this left no other significant weapons in the arsenal to stave-off the adverse impact of short-term shocks to the current account. The only other solution was to set about ensuring that the country's foreign exchange reserves were adequately furnished, however, this would have required a discipline and a sustained commitment that seemed to elude governments of all political persuasions. The vacillating between expansionary and contractionary policies - i.e. 'stop-go'- was the UK's unsatisfactory attempt at squaring the circle in this respect, with a balance of payments constraint on economic growth as its inevitable consequence.

2.6.4 Meade's Dilemma Revisited

An overarching question that cuts to the core of the themes explored in this paper pertains to the sustainability and viability of the UK's post-war macroeconomic regime, an issue that was presciently considered by Meade (1951) during the earlier years of the Bretton Woods era. Indeed, in what has come to be regarded as something of a prophetical statement regarding the trials and tribulations that would come to define the UK's experience in the 1950s & '60s, Meade argued that the entire edifice of post-war policy was intrinsically flawed. The outcome he predicted was one in which trade-offs would emerge between competing objectives that would ultimately prove insurmountable to policy makers, and when caught between a rock and a hard place, policy makers would inevitably plump for devaluation. In that vein, the centerpiece of the post-war economic regime embodied in the fixed exchange rate against the dollar would ultimately prove a losing proposition. The reason for this, Meade argued, was that different economies would be subjected to asymmetric shocks that caused a disequilibrium position to emerge: some of these situations would be remediable, such as a domestic recession coupled with a current account surplus, or similarly a domestic boom paired with a current account deficit. In both these instances the levers of macroeconomic policy could ensure a return to simultaneous internal and external balance and overall

macroeconomic equilibrium [34].

The real problems identified by Meade were when an economy was confronted with what he called the 'intractable' scenarios - a current account deficit and a recession, or a current account surplus and booming growth. In both of these situations, an attempt to solve one of the issues (external or internal balance) would result in a worsening of the other [35]. There appeared to be no way out. Meade argued that a government faced with a chronic current account deficit and a recession could not reasonably expect, for any sustained period of time, to drive the domestic economy deeper and deeper into recession in order to bring the current account back into balance on account of the popular backlash against mounting unemployment [36]. He reasoned that policy makers would ultimately succumb to the temptation to use the "forbidden" instrument of economic policy: devaluation. Similarly, there was the age old issue from the inter-war period regarding adherence to the rules of the game - or lack thereof- in which booming economies with a current account surplus had little incentive to reduce down their own external surplus for the benefit of other economies, thus making for a case of "beggar thy neighbour" revisited [37].

But does our empirical analysis corroborate Meade's gloomy prognosis regarding the inevitability of a collapse of the parity? Potentially not. Indeed, to the extent that the tax shock actually generated a rise in the current account balance, this suggests that the UK had a domestic policy instrument that could be used to improve the current account bal-

[34]Essentially, in the first situation, an expansionary macroeconomic policy would increase growth whilst reducing the current account surplus, and in the second it would slow the expansion and burgeoning inflationary pressures whilst increasing the current account balance.

[35]For an insight into the broader workings of the Bretton Woods system, particularly when seeking to place the British experience in a wider international context, see Foreman Peck (1995, Ch.14).

[36]This underscores a key theoretical presupposition of Meade's analysis - inflexible wages and prices.

[37]Right from the inception of the Bretton Woods system, Keynes argued that this asymmetric incentive for external adjustment would seriously compromise the functioning of any international fixed exchange rate system and argued in favour of penalties for surplus countries who refused to play their part. Nonetheless, the diplomatic clout of an ailing Britain was unable to win out against the US, who ultimately came down against the proposal.

ance, whilst an alternate instrument, such as the credit lever of monetary policy, might be tasked with raising economic growth and lowering unemployment (internal balance). The key finding here is that the two instruments exert differing effects on the target variables, and hence it is possible to construct a feasible assignment leading to an ostensible restoration of macroeconomic equilibrium.

In practise of course, the reality might have been somewhat more complicated: the so-called 'Lucas critique' in macroeconomics suggests that trying to predict the impact of counterfactual policy changes based on historical data is fraught with difficulties, since all too often the underlying macroeconomic relationships cannot be regarded as genuinely structural - in the sense of being invariant to changes in government policy (Lucas 1976). Further still, it is far from clear that averting a devaluation and choosing to limp on, running the gauntlet of chronic internal and external imbalance, is the appropriate choice for macroeconomic policy. To the extent that a downward movement of the nominal and real exchange rate facilitates a return to purchasing power parity, it can be regarded as a necessary adjustment that redresses imbalances in the productive structure and consumption pattern of the economy. Nonetheless, our striking empirical findings do cast Meade's dilemma in a new light, not least because one of the key causal relationships implicitly assumed in his analysis (the negative impact of fiscal policy on the current account) fails to hold within the data. This obfuscates the cut-and-dry taxonomy of instruments and targets outlined by Meade, and subsequently popularised in Trevor Swan's famous diagram (Swan 1963), insofar as devaluation may not have been the inevitability he initially supposed - though whether it would nonetheless have proved *desirable* for the economy is arguably a more important question.

2.7 Conclusion

The question of how to achieve the chimera of simultaneous internal and external balance confounded a generation of British policy makers and stumped some of the country's top academic economists. In the canonical accounts of this period, fiscal policy is singled-out as the key culprit for destabilizing the external balance and giving rise to the damaging 'stop-go' cycles in economic activity that disturbed the "animal spirits" of both businesses and households, arguably undermining economic performance as a result. Our analysis refutes the traditional understanding of the fiscal balance and the current account ("twin deficits") under Bretton Woods, by presenting evidence that fiscal policy was a relatively trivial factor in accounting for the dynamics of the current account. And in the case of the all-important tax policy, which was favoured by successive British governments when conducting its fiscal interventions, we find that expansionary tax shocks actually *increased* the current account balance rather than diminishing it, thus turning the traditional twin deficits logic on its head.

The traditional paradigm is upended further still by the additional empirical finding that current account shocks to the fiscal balance were substantially more important in the data than the reverse (fiscal shocks to the current account), indicating that the direction of causation in the canonical view of the twin deficits was in fact the wrong way round, and thereby serving as a reminder of the dangers of inferring causal relations on the basis of macroeconomic accounting identities. We provide a theoretical explanation as to why our revisionist findings are economically plausible, and highlight the divergent theoretical predictions emanating from an older vintage of income-expenditure type macroeconomic models (such as Mundell-Fleming) compared to the newer suite of inter-temporal, expectations-driven approaches, in which divergent movements between the fiscal stance and the current account balance emerges as a logical consequence of the behaviour of optimizing agents.

In terms of policy implications, the stakes are high: our findings suggest that one of the core tenets of British (and international) post-war economic doctrine was deeply flawed, for in reality no simple relationship existed between fiscal policy and the current account: attempts to "tighten" the fiscal balance in order to produce a corresponding improvement in the current account were at best ineffective, or at worst actually elicited the *opposite* effect to what was desired. When viewed through the lens of an instruments-targets assignment problem, our results indicate a stark violation of Mundell's seminal principle of effective market classification[38], and that a more suitable mix of instruments making greater use of credit policy and the exchange rate was warranted.

Some potentially very interesting findings arise in the domain of monetary policy, with the empirical results indicating a relatively weak role for the short real interest rate, despite the centrality of this variable to most mainstream theoretical approaches. We explore the historical nature of the UK's unorthodox and even Byzantine approach to the conduct of monetary policy under Bretton Woods, positing the idea that credit rather than interest rates, is the key monetary variable to focus on. Modifying our model in light of this insight yields an important role for credit policy in the determination of the current account, strengthening our understanding of the external adjustment process, but also shedding light on the fraught contemporaneous debates regarding the nature of the monetary transmission mechanism; providing some tentative vindication for the so-called 'Radcliffean' approach to monetary policy that emphasized credit rather than interest rates.

Discord concerning the role of the exchange rate in overcoming the UK's chronic current account deficits was never far from the surface, with proponents of the twin deficits view

[38]This basically states that policy instruments should be targeted on the objective (i.e. macroeconomic variable) for which they have a relatively stronger influence, and that failure to do so would generate instability in the form of cyclical fluctuations.

often being pessimistic regarding the efficacy of exchange rate devaluation. Our modelling indicates that an improvement in relative price competitiveness (i.e. a fall in the real effective exchange rate) led to a considerable and persistent increase in the current account balance, and that the real exchange rate was an important variable in accounting for the dynamics of the current account over the period as a whole. We found a particularly powerful role for the real exchange rate in helping to spearhead the turnaround in the current account balance following the infamous 1967 currency crisis and devaluation, whilst the role played by fiscal policy was very modest (in spite of a major fiscal tightening). Although not the proverbial silver bullet for the UK's deep seated economic problems, our findings suggest that the exchange rate was an effective and viable instrument that would likely have had a significant role to play in escaping the straitjacket of the external constraint.

With regard to the viability of the UK's overall policy regime under Bretton Woods, our analysis highlights that policy makers were walking something of a tightrope, in which external shocks from global markets (such as commodity price fluctuations, adverse movements in the terms of trade, reduced demand from key trading partners) left the UK current account significantly exposed to moving into the red. The key to escaping this precarious situation was to ensure that domestic expenditure remained below national income; namely a shift of resources towards the export sector and an attendant decrease in consumption, which would permit a rise in household saving and an improvement in the current account balance. This was of course easier said than done, and we reflect on the famous 'Meade dilemma' in which the distinguished British economist James Meade predicted the ultimate collapse of the fixed exchange rate regime as early as 1951. With that said, our analysis indicates that an exchange rate devaluation would not have proved a bad thing in and of itself, and arguably reflected the need for a structural adjustment in both the productive structure of the economy and in consumption patterns.

All-in-all it seems inappropriate to speak of the "twin deficits" of fiscal policy and the current account under Bretton Woods. One could even go as far to label them as being distant or estranged relatives. Macroeconomic theory suggests a wide menu of variables in understanding the determination of the current account balance, which at its heart is a general equilibrium phenomenon necessitating a core macroeconomic structure - both for theoretical coherence as well as empirical estimation. The excessive emphasis afforded to fiscal policy along the decades seems to be predicated on the simplistic reasoning typified by the income-expenditure models of the day, coupled with tenuous relationships inferred from accounting identities. Our analysis reveals what in some ways ought to be quite unsurprising, namely that there are a number of different drivers of current account imbalances, which vary over the short-run and the medium-run respectively, amongst which fiscal policy is actually the least important. In more modern approaches to understanding the determinants of the current account balance, expectations, inter-temporal optimization, and the distinction between transitory and permanent income see the current account conceptualized as a conduit for saving and investment decisions, which casts a whole new light on the traditional understanding of the meaning of external balance under Bretton Woods.

Ultimately our analysis casts the UK's macroeconomic history under Bretton Woods in a new light, refuting the extant narratives pushing fiscal policy as the key driver of external imbalances. A wider array of economic shocks were responsible for the dynamics of the current account balance, and fiscal policy's role was relatively much less important in this story than has hitherto been assumed. We have analysed how the prevailing theoretical perspectives existing at the time were quite limiting for conceptualizing the role of the current account, and demonstrated how newer model frameworks in the international macroeconomics literature can help provide a sharp reconciliation of data and theory. An area of potential significance meriting further investigation pertains to the to the monetary drivers of current account deficits (surpluses), particularly the unorthodox instruments used for credit control, under

the auspices of the so-called 'Radcliffean' view of monetary policy. Juxtaposing this credit-oriented approach with the textbook focus on interest rates as the key conduit for monetary policy might give rise to salient, new insights on matters both historical and economic.

Appendix

2.A Model Specifications

Given the wide range of different VAR specifications that estimated in the paper, we include a breakdown of each VAR's specification in the Appendix.

Section 2.4.1: Fiscal Balance Shocks

- {RGDP, Fiscal, Short Real Rate, REER, CA/GDP}
- 1955Q1 - 1972Q2, p=4
- For REER and CA/GDP, dummy ('crisis')

Section 2.4.2: Credit as Monetary Variable

- {RGDP, Fiscal, Credit, REER, CA/GDP}
- 1955Q1 - 1972Q2, p=4
- For REER and CA/GDP, dummy ('crisis')

Section 2.4.3: Tax Shocks

- {Tax, RGDP, Credit, REER, CA/GDP}

- 1955Q1 - 1972Q2, p=4
- For REER and CA/GDP, dummy ('crisis')

Section 2.4.4: Real Exchange Rate and External Balance

- {RGDP, Fiscal, Short Real Rate, REER, CA/GDP}
- 1955Q1 - 1972Q2, p=4
- For REER and CA/GDP, dummy ('crisis')

Section 2.5.1: Crisis 1967 - Disentangling the Causes of, and Recovery from the 1967 Sterling Crisis

- {RGDP, Fiscal, Credit, REER, CA/GDP}
- 1955Q1 - 1972Q2, p=4
- For REER, dummy ('crisis')

Section 2.5.2: Twin Deficits Reversed - Current Account Shocks and the Fiscal Balance

- {RGDP, CA/GDP, Credit, REER, Fiscal}
- 1955Q1 - 1972Q2, p=4
- For REER and CA/GDP, dummy ('crisis')

2.B Additional Outputs from Main Paper

In this section we produce those outputs which were alluded to or referenced in the main paper, but were not reproduced there for reasons of space.

2.B.1 Tax Shock to Short Real Interest Rate

The accumulated impulse response function of the short real rate (SRR) plots the cumulative point estimates of the SRR following a negative (i.e. expansionary) tax shock. It is clear that there is a persistent reduction in the short term real interest rate, which by the two-year mark (horizon 8) is lower on average by around 0.33pp per-quarter [39]. This is consistent with the theoretical predictions of Baxter (1995) as discussed in the main body of the paper.

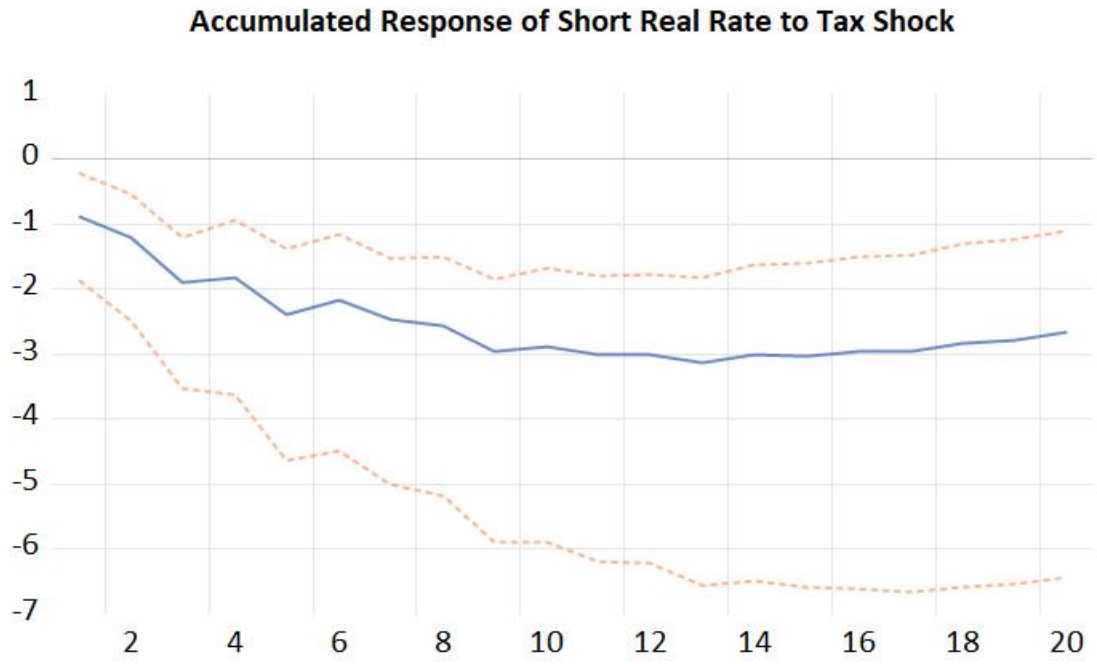


Figure 2.B.1: Accumulated Impulse Response Function of Short Real Interest Rate to a One Standard Deviation Tax Shock.

2.B.2 Forecast Error Variance Decomposition of Fiscal Balance

We examine the FEVD to better understand the drivers of fiscal balance variation, particularly the role played by shocks from the current account. The fiscal balance's own shocks

[39] We obtain this by (2.6/8), i.e. the value for horizon 8, which itself is the cumulative total of the individual point estimates (h1 + h2 + ... h8), divided by the desired $n = 8$ quarters.

account for most of its variation in the short-run; do recall also that the fiscal variable we work with is the *cyclically-adjusted* balance (via the method of Hamilton, 2018), hence we would expect it to be less affected by other transitory shocks given that it the structural fiscal balance. Nonetheless, between horizons 8-16, shocks from the current account are responsible for around one-fifth to one-quarter of the fiscal balance's variability: this is greater than the impact of the fiscal balance on the current account as shown in the main paper, and represents a striking reversal of the traditional twin-deficit logic, in which fiscal shocks are responsible for current account fluctuations.

Horizon	S.E.	RGDP	CA/GDP	Credit	REER	Fiscal Balance
4	0.99	3	5	3	2	87
8	1.20	8	23	3	2	64
12	1.32	10	22	9	5	54
16	1.44	9	20	10	15	46
20	1.54	9	19	9	20	43

Table 2.B.1: Forecast Error Variance Decomposition of Fiscal Balance

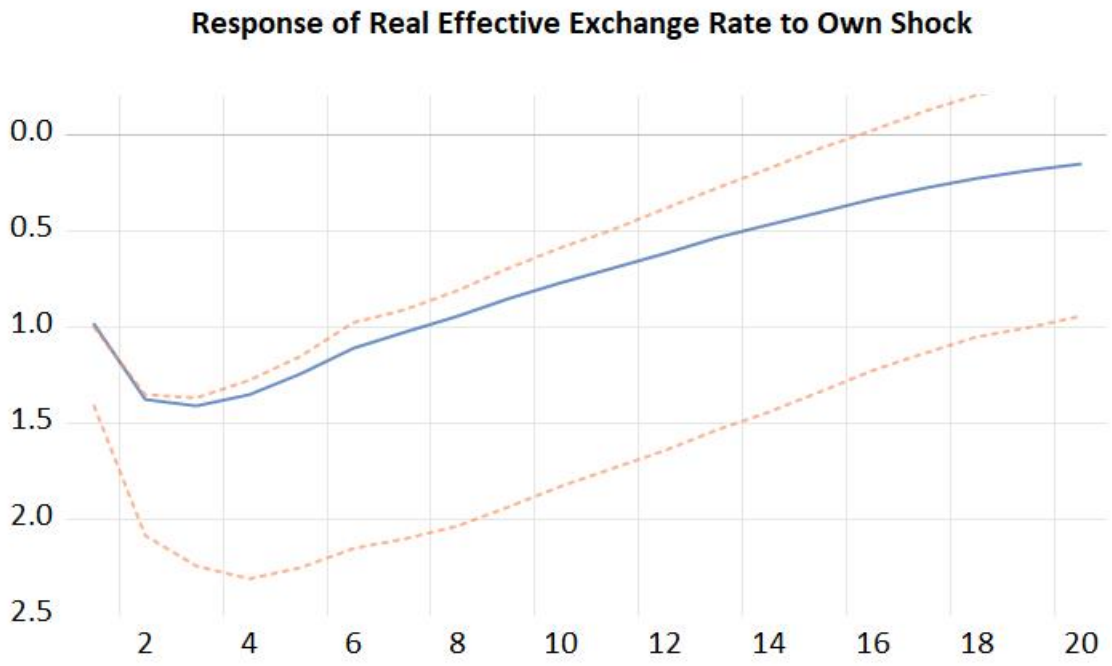
2.B.3 Real Effective Exchange Rate to Own Shock

The impulse response function of the real effective exchange rate to its own shock is shown below: it can be observed that the half-life of the shock, i.e. the time taken for the initial shock to dissipate by 50%, is 13 quarters. Reversion to the pre-shock baseline occurs by roughly the five-year mark (h20). This indicates that changes in relative price competitiveness as embodied movements in the real effective exchange rate are significantly long-lived.

2.B.4 Current Account Balance to Own Shock

The current account's response to its own idiosyncratic shock is shown in the impulse response function: note the extremely short half-life of the shock, which sees over 66% of the

Figure 2.B.2: Impulse Response Function of Real Effective Exchange Rate to Own Shock

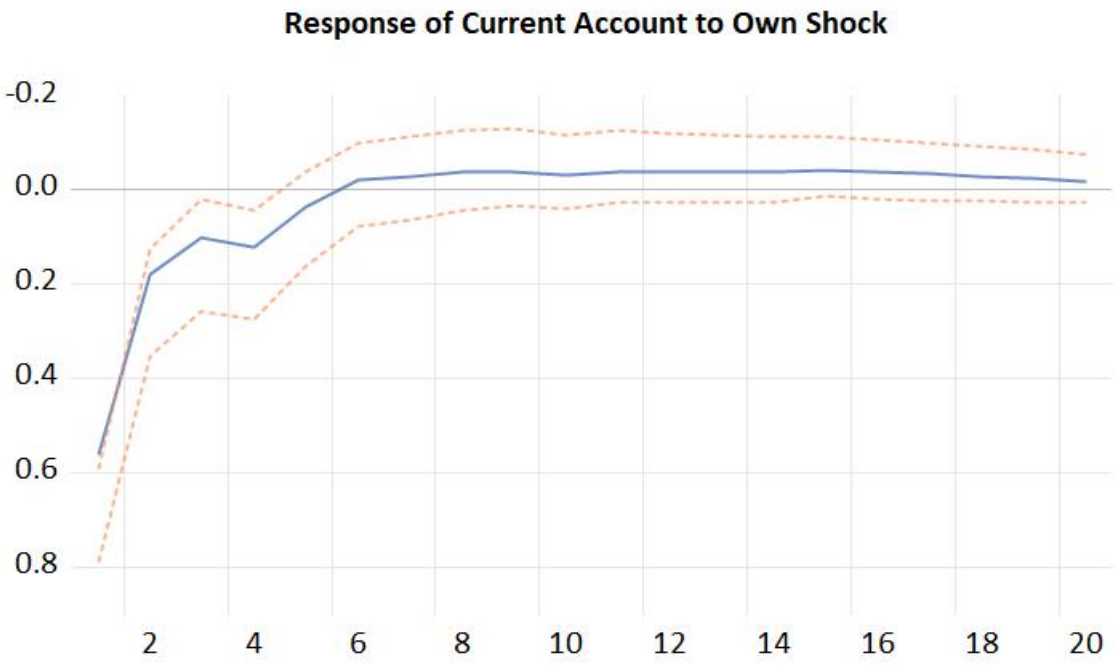


initial decrease (increase) in the current account balance dissipate within a single quarter. This reaffirms the intuition that the current account is subject to its own random shocks that are both sudden and short-lived in effect.

2.B.5 Parsimonious Model Specification

We produce the empirical output from the 'parsimonious specification' VAR shown in the robustness checks section. Recall that this VAR was estimated with a reduced number of parameters based on lag-reduction techniques: comparing the results below to the baseline model below shows that the key findings and conclusions are not materially affected by the reduction in estimated parameters, suggesting a level of robustness to reasonable adjustments in model parameterization.

Figure 2.B.3: Impulse Response Function of Current Account Balance to Own Shock



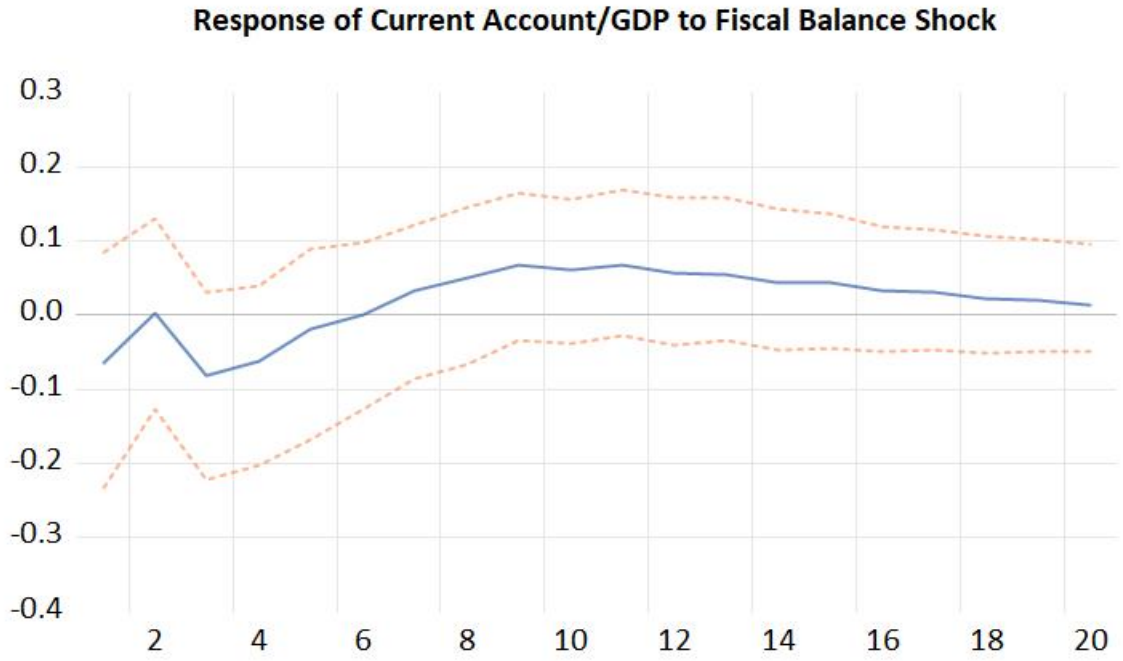
Horizon	S.E.	RGDP	Fiscal	SRR	REER	CA/GDP
4	0.80	39	2	2	2	54
8	0.85	37	3	3	9	48
12	0.94	31	4	4	20	41
16	0.99	29	4	6	23	38
20	1.00	28	4	7	24	37

Table 2.B.2: Forecast Error Variance Decomposition of Current Account Balance - Parsimonious VAR Specification

2.B.6 System Impulse Responses

In this section we produce a complete rendition of the entire system of impulse response functions generated from the estimated VAR models. Note, that in contrast to the impulse response functions shown in the main analysis, the fiscal shocks shown in the 5×5 matrices below are positive one standard deviation shocks that represent a fiscal tightening, rather than the expansionary fiscal shocks shown in the main analysis. At any rate, since the

Figure 2.B.4: Impulse Response Function of Current Account Balance to Fiscal Balance Shock (parsimonious VAR specification)



fiscal shocks are covered in the main paper the purpose of this section is to provide an overview of the system output as a whole. Note that the impulses shown in this section correspond to a *positive* one standard deviation shock; this may differ from some of the individual impulse responses shown in the main analysis, such as the fiscal shock to the current account: indeed, in those earlier cases we were interested in showing the impact of a *negative* shock specifically because it corresponded to a loosening of fiscal policy (i.e. a fall in the cyclically-adjusted fiscal balance). Unless otherwise specified, it is typical for econometrics software to implement a positive shock as the default.

Variables shown in the graphs correspond to the following:

RGDP_ln = real GDP ($log \times 100$)

ANNX_GDP = cyclically-adjusted fiscal balance

SRR = short real (ex-post) interest rate

LN_CREDIT_100 = credit ($log \times 100$)

REER_100 = real effective exchange rate ($log \times 100$)

CA_GDP = current account to GDP ratio

CLOYNE_TAX = tax shock

2.B.7 Results for Serial Correlation Tests

We present below serial correlation test results from those VAR models estimated in the main paper (recorded by section in the table). The null hypothesis is: no serial correlation from lags 1-4, and we use the Rao version of the LM statistic since Edgerton & Shukur (1999) present simulation evidence suggesting that the this version performs best amongst the many variants they consider.

Section	Rao F-stat	df	Prob.
4.1	1.19	(100, 102)	0.19
4.2	1.03	(100, 102)	0.44
4.3	1.15	(100, 102)	0.24
4.4	1.19	(100, 102)	0.19

Table 2.B.3: Serial Correlation Test Results

2.C Model Variables: Construction and Data Sources

This section provides details of where data was sourced from, as well as outlining the procedure for how certain variables were constructed from the raw data.

1. Tax Shocks - the narrative identified tax shocks are drawn from the research of Cloyne

Figure 2.B.5: 5×5 Matrix of Impulse Responses from Baseline SVAR

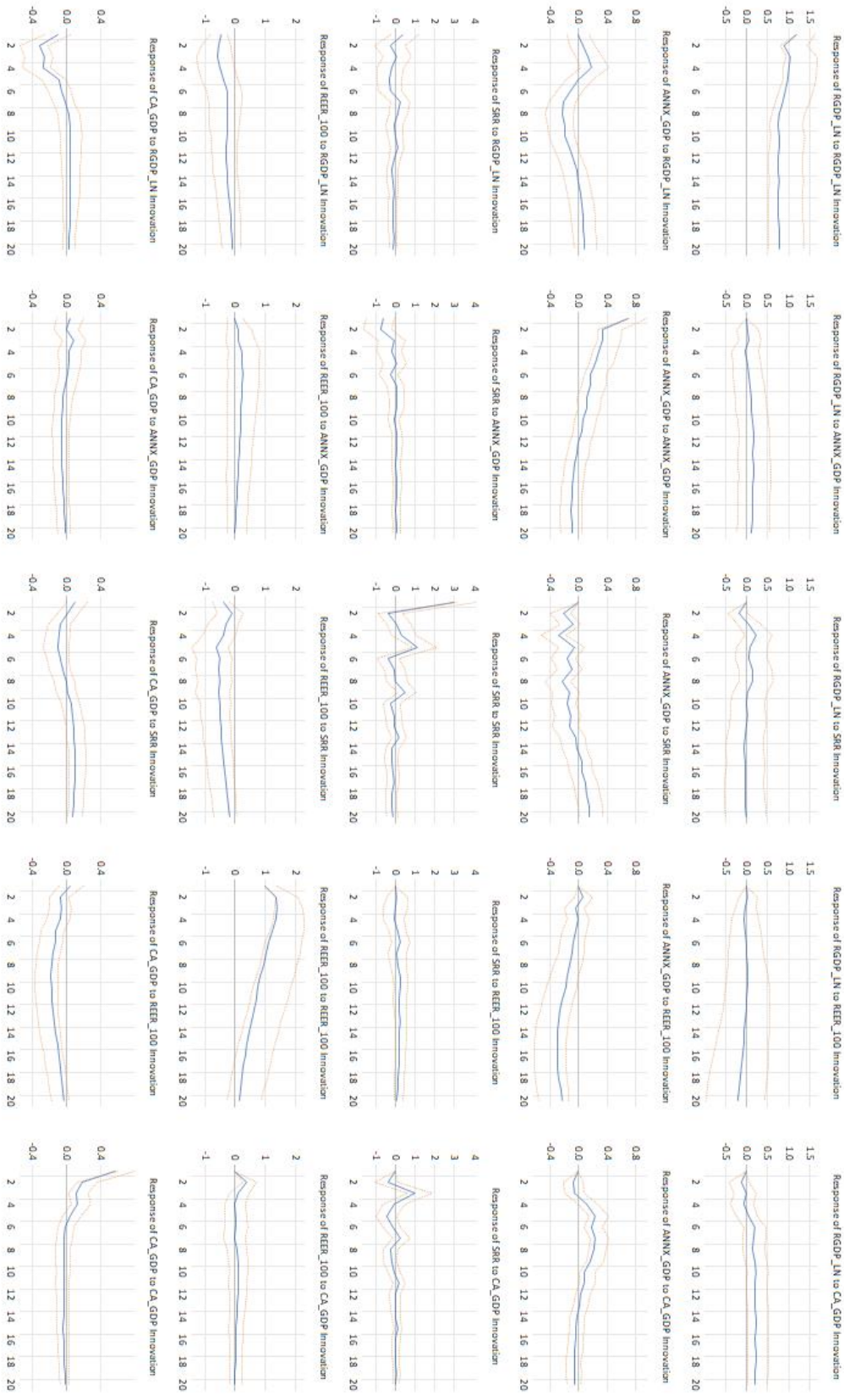


Figure 2.B.6: 5×5 Matrix of Impulse Responses from Credit-Augmented SVAR

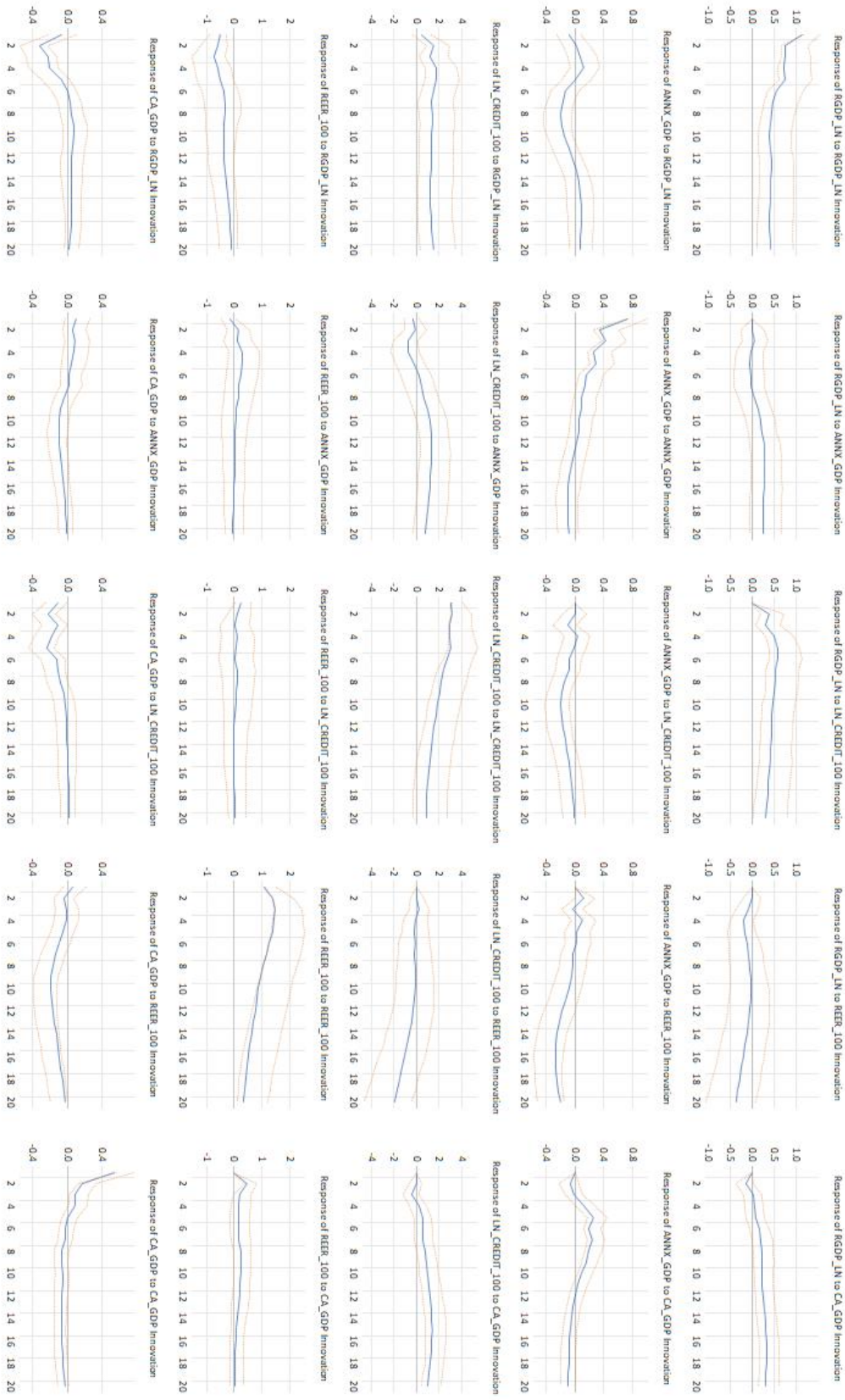


Figure 2.B.7: 5×5 Matrix of Impulse Responses from Tax-Shock SVAR

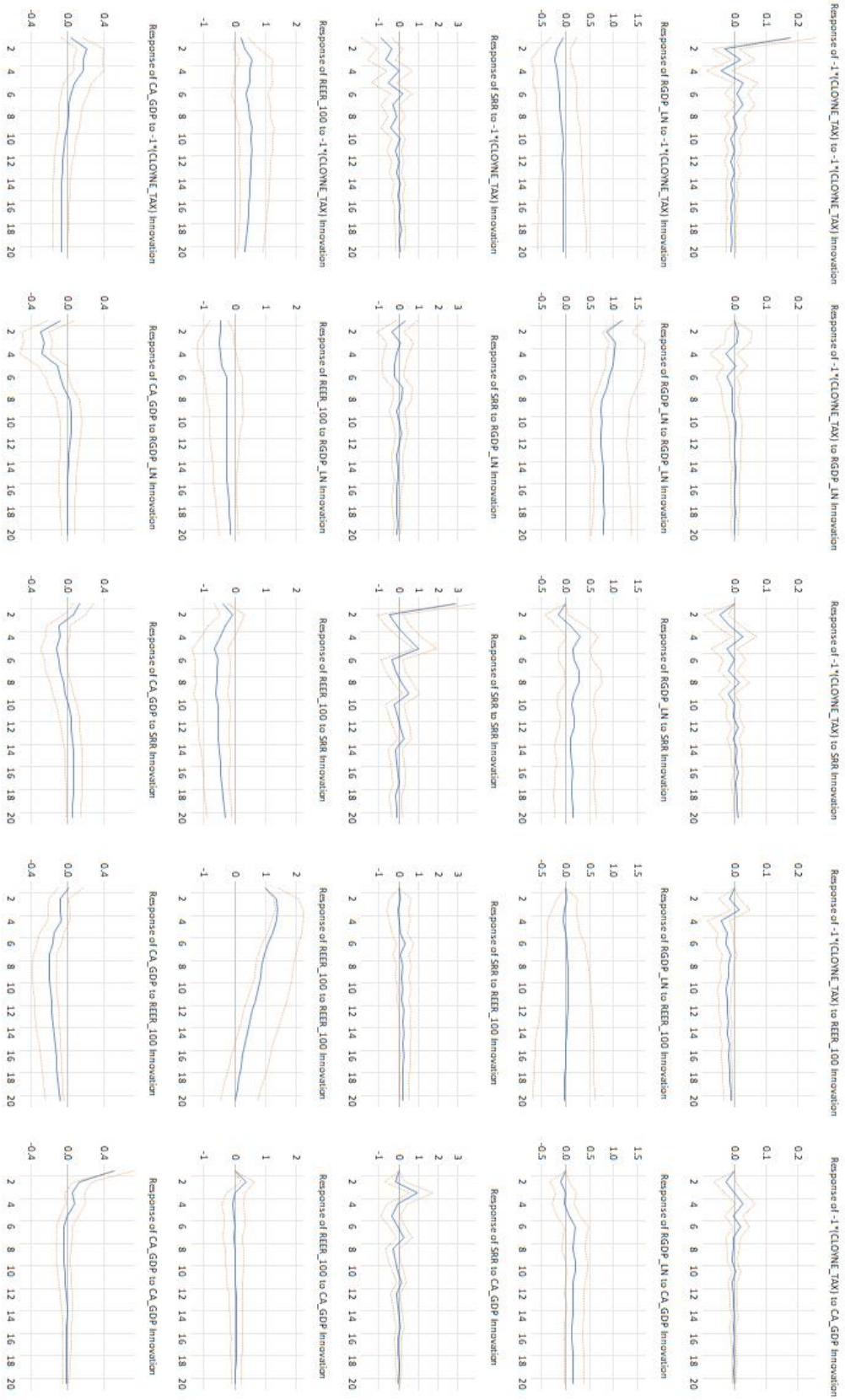


Figure 2.B.8: 5×5 Matrix of Impulse Responses from Alternate Identification Scheme SVAR

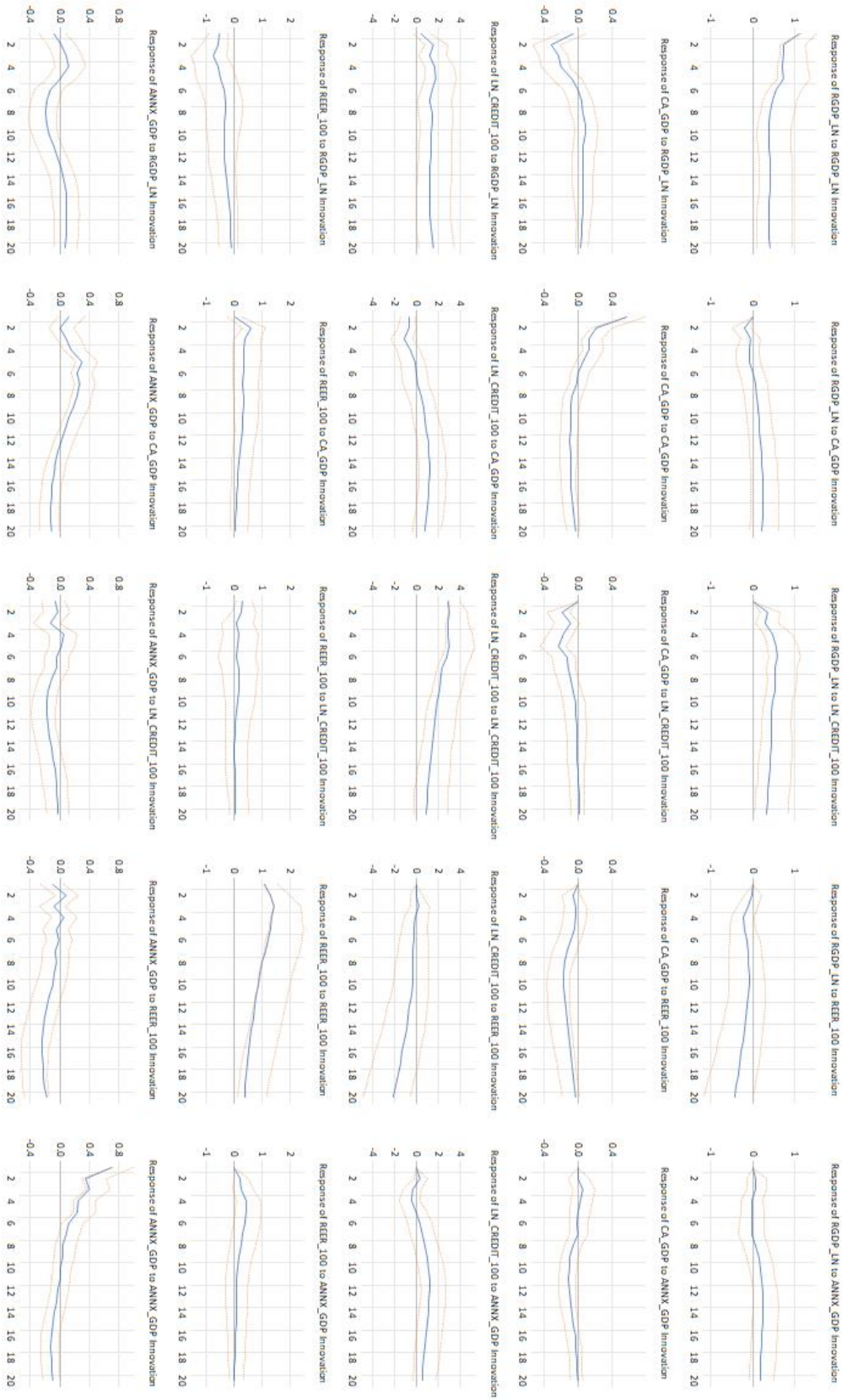


Figure 2.B.9: 5×5 Matrix of Generalized Impulse Responses (From Baseline VAR)

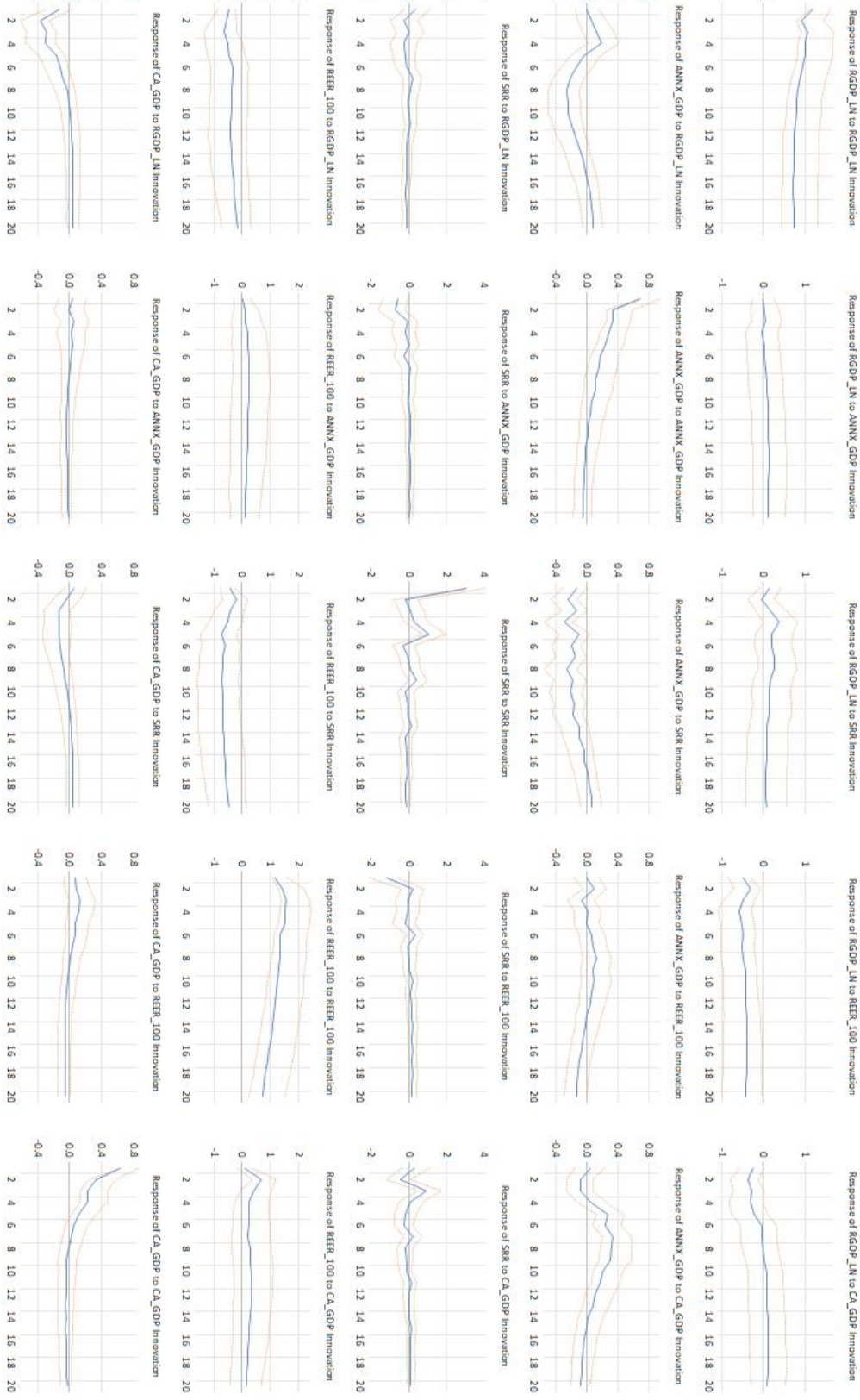
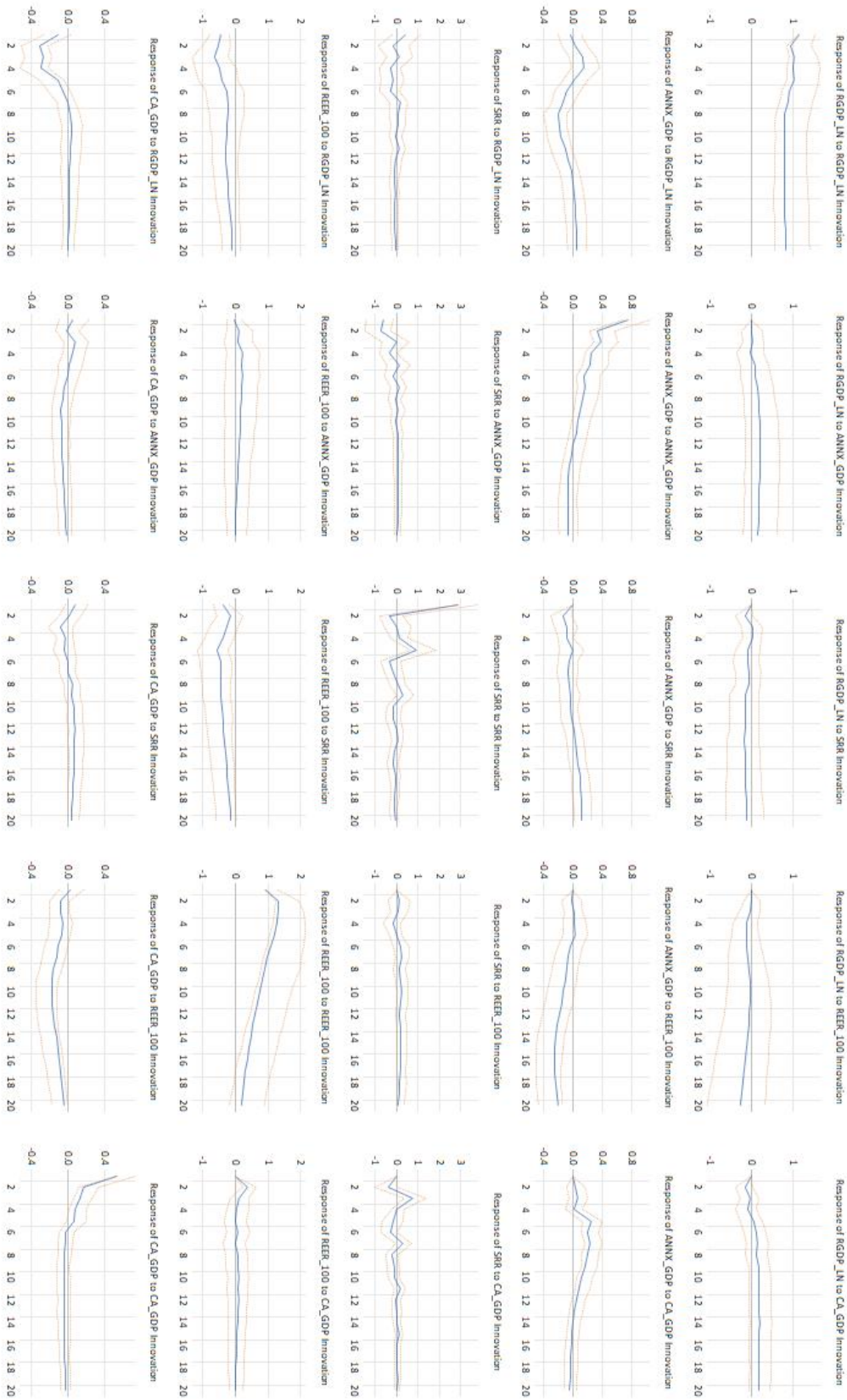


Figure 2.B.10: 5×5 Matrix of Impulse Responses from Parsimonious SVAR



(2013) and downloaded from: https://www.aeaweb.org/articles?id=10.1257/aer.103.4.1507

2. RGDP - is acquired from the Macro-financial dataset of Monnet & Puy (2019), which has superior time coverage. Accessed from Eric Monnet's website: https://www.ericmonnet.eu/macro-financial-dataset-quarterly-since-1950

3. Credit - acquired from the Macro-financial dataset of Monnet & Puy (2019).

4. Short Real Rate - we calculate the ex-post SRR by subtracting the change in RPI price level (i.e. quarterly inflation rate) from the discount rate on short term paper. Note that because the interest rate variable is given as percentage per annum, we first annualize the inflation variable before subtracting. The data was sourced from the Bank of England's *Millennium of Macroeconomic Data* data set. https://www.bankofengland.co.uk/statistics/research-datasets

5. Current Account to GDP Ratio - Downloaded from the United Kingdom's Office for National Statistics. https://www.ons.gov.uk/

6. Fiscal balance - the fiscal balance was obtained from the Office for National Statistics (code: ANNX). The nominal data was transformed into real terms using the price data in Monnet and Puy (2019); this was then cyclically-adjusted using the Hamilton filter (Hamilton 2018) and expressed as a percentage of GDP using the GDP data in Monnet and Puy (2019), which was also cyclically-adjusted in the same manner.

7. Dummy ('crisis') - this exogenous deterministic component is motivated by the discussion in Juselius (2006, Ch.6) on the use of dummies in VARs: an impulse dummy is included to mitigate the large shock arising in the crisis period of 1967-Q4, during which it assumes a

value of 1, and 0 otherwise.

8. REER - The real effective exchange rate index was constructed manually, rather than downloaded, and a full account of its construction is given in this Appendix. In terms of the data used, this comprised (i) IMF CPI data taken from the *International Financial Statistics* database of the IMF. Nominal exchange rate data was sourced from a combination of sources, including: (a) Bank for International Settlements, (b) OECD Economic Outlook, (c) IMF International Financial Statistics. Where data was given in monthly form, mean averaging was used to obtain the quarterly figure.

2.C.1 Construction of Real Effective Exchange Rate

The real effective exchange rate (REER) index was constructed using a standard approach which is frequently employed by central banks and similar organisations. Essentially, the aim was to collate the UK's bilateral real exchange rate for a representative sample of countries (the 'basket') and then to assign weights to each country in the basket based on their relative importance to the UK's trading relationship. The steps involved are as follows:

1. Use the IMF's Direction of Trade Statistics database to analyse the UK's bilateral trade flows in order to gauge the relative importance of the UK's trading relationship with a particular country in a given year: this is based on the sum of both exports and imports between the UK and country X.

2. In each year we take a sample of countries which broadly corresponds to the UK's top fifteen trading partners, although in some cases certain countries are unable to be used due to a lack of official data on nominal rates or domestic price levels, in which case they are substituted with another country. The main aim is to ensure that the fifteen countries comprise a significant percentage of the UK's total trade, and thus can be regarded as a

representative basket. (In our case our annual weights 1955-1972 capture on average around two-thirds of UK visible trade).

3. Country weights are calculated annually (1955-72) based on country X's trade share with the UK as a proportion of the total trade in the basket of fifteen countries. E.g. 10,000/100,000 = 0.1 meaning this country comprises 10% of trade in the basket of fifteen countries (where 10,000 is the value of country X's trade with the UK; and 100 000 is the value of the UK's total trade with the entire basket of countries). The updating of the country weights in this way - time varying weights as opposed to static ones- helps to reflect the non-trivial shifts in the UK's trading relations that took place during this period.

4. In keeping with the Bank for International Settlements approach we apply smoothing to the calculated annual weights via three-yearly rolling averages: this prevents spurious volatility in the index owing to the weighting procedure - in particular the 'saw tooth' pattern that can occur at the beginning of each year due to the annual re-weighting. Thus the weight for year t is the arithmetic mean of years: t, t-1, t-2. Clearly this is not possible for the first and second years of the series, so year 1 is simply its own value and year 2 is the average of itself and the preceding year.

5. Having calculated the weights in this way, all that remains is to calculate the bilateral real exchange rate for the UK and the fifteen partners, using nominal exchange rate and price level data (CPI) for the respective countries. The country-specific weights are then applied to the bilateral exchange rates to give the weighted bilateral exchange rates, which are aggregated into an overall composite real effective exchange rate index.

The 16 nations included in the index comprise a rounded mix of both European, Commonwealth and Rest of World (RoW) countries: United States, Australia, Canada, South

African Common Customs Area (SACCA), New Zealand, Italy, Sweden, Netherlands, Denmark, Germany, Ireland, France, Belgium-Luxembourg, Switzerland, Norway, Finland.

Chapter 3

Black Gold, or Fool's Gold? North Sea Oil, the Sterling Exchange Rate, and the Trade in Manufactures.

Abstract

The emergence of the United Kingdom as an oil exporting economy in the mid-to-late 1970s seemed to open up a brave new world of possibilities. This newfound optimism, however, soon gave way to bitter disagreement regarding the impact of oil on the non-commodity tradable sector, namely manufacturing, and contention as to whether the UK suffered from so-called 'Dutch Disease'. This paper analyses the impact of North Sea oil by constructing a small-scale macro-econometric model to investigate the joint dynamics of oil, the exchange rate, and the trade in manufactures, utilising high frequency monthly data. We find evidence supporting the canonical Dutch-disease prediction of the commodity sector causing in adverse developments in manufacturing, which arguably justifies some ameliorative policy measures. By studying two of the key anti-Dutch Disease proposals of the day, however, we suggest that the appropriate policy response was never clear-cut, and at any rate the shifting ideational landscape made prospects for treating and curing the Dutch Disease a very distant prospect.

3.1 Introduction

The macroeconomic storm clouds unleashed by the 1973 OPEC oil shock appeared to hold something of a much-needed silver lining for the United Kingdom: its oil fields in the North Sea emerged as a substantive and economically viable reserve that could fundamentally transform the country's energy outlook in a relatively short space of time. On paper at least, this was a "manna from heaven" that held the promise of the UK rapidly becoming a net oil exporter and thus escaping the balance of payments constraint on economic growth that had bedevilled a generation of policy makers during the Bretton Woods era. Indeed, the spirit of optimism was captured by Prime Minister James Callaghan who claimed in a 1977 speech that 'God has given Britain her best opportunity for one hundred years in the shape of North Sea oil'[1]. Others, however, took a more circumspect view of this largely unanticipated resource windfall: there remained considerable apprehension that oil would simply act as a sort of "masking agent" for the deep-seated structural problems that existed in the British economy, and undermine the impetus for long overdue economic reforms [2]. Others even went a step further, suggesting that the booming commodity sector would elicit marked negative effects on the non-commodity tradable sector - see for instance Bond & Knöbl (1982)- hence oil itself would become an impetus for economic decline. Against this backdrop of diverging opinions, petro-optimism versus petro-pessimism, the spectre of Dutch-Disease began to rear its head from the early 1980s, threatening to unleash a new and potentially destructive set of forces upon an already beleaguered manufacturing sector.

The paper sets out to explore the UK's history with North Sea oil: this comprises a detailed empirical analysis using high-frequency monthly macroeconomic data to ascertain whether the Dutch Disease hypothesis characterizes the impact of oil on the non-commodity tradeable

[1] Quoted in Harvie (1994, p.2).

[2] Such a view was held by Edmund Dell, a Treasury Minister in the Labour governments of the 1970s, who went on to write a gripping account of the period - see Dell (1991).

sector, from an open-economy perspective. In particular, the role of oil in accounting for the complex dynamics of a floating exchange rate; the impact on net trade performance in the manufacturing sector; and the extent to which oil-induced wealth effects gave rise to potentially unsustainable external deficits. This represents a welcome variation on much of the extant literature, which has largely concerned itself with unpacking the impact of the oil sector on the composition and overall level of employment, as well as the impact of oil shocks on price level stability [3].

We also seek to unravel the complex political economy of oil and to locate it within the shifting tectonics of UK economic policy. In particular, we develop an explanation for the apparent inertia in seeking to counteract Dutch Disease - a seemingly pervasive bout of inaction that transcended Prime Ministers and cut across party political lines. It is argued that this passivity was the product of deep ideational shifts in the conduct of economic policy, which meant that even to the extent that symptoms of Dutch Disease were manifesting (and this was far from widely accepted), the winds of change in both macro and micro-economic thinking were blowing firmly against action against ameliorative policy measures. With that said, it should not be said that the UK's historical experience was a forgone conclusion, and in this spirit we resurrect and analyse two overlooked plans advanced by two of Britain's most esteemed economists, James Meade and Nicholas Kaldor. These fascinating plans provide a compelling insight into the opportunities and threats posed by North Sea oil, and represent arguably the two most cogent and well articulated alternatives as to how the UK could have better managed its newfound oil wealth.

The thorny issue of North Sea oil encompasses a number of key themes within economic history, although not all of these have been fully explored hitherto. Whilst the ostensible impact of Dutch Disease on the UK's severe deindustrialization has at least featured on

[3]For a useful overview of such papers, see Rowthorn & Wells (1987, pp.249-275).

the radar [4], a less well explored avenue is the way in which North Sea oil can shed light on the complex currency dynamics of sterling during the post-Bretton Woods era. Indeed, Schenk (2010) and Eichengreen (2019) both emphasize the prolonged period of flux and enduring uncertainty that came about following the collapse of the Bretton Woods system of fixed parities. The elusive forces that were left to govern the nominal (and real) exchange rate under the floating system were ill-understood at the time, and to a significant degree the agnosticism continues unto the present day in the guise of the so-called 'exchange rate disconnect puzzle' [5]. Our empirical analysis is capable of shedding some interesting light on this topic, with the results reaffirming that for good or ill, North Sea oil undoubtedly holds an important place in the UK's late 20th century economic history.

The management and impact of North Sea oil continue to be one of the most divisive legacies of the UK's postwar history, arousing fierce passions amongst both academics and the general public alike. Questions linger over oil's contribution to the painful demise of the manufacturing sector; the apparent ambivalence by policy makers who (who took no concerted action); and the deeply acrimonious debates over what became of the windfall revenues, and how they ought to have been harnessed for the betterment of society. And it is in tackling these questions that we shed light on the enduring uncertainty as to whether North Sea oil really was Britain's black gold, or merely a fool's gold.

3.2 The Emergence of North Sea Oil: Manna from Heaven, or Resource Curse?

To understand the significance of the UK becoming a producer and net exporter of oil it is first necessary to highlight the broad macroeconomic backdrop against which North Sea

[4]See, for example, Bean (1987)

[5]The seminal article that spawned this vast literature was Meese & Rogoff (1983), whilst Itskhoki & Mukhin (2021) provide an up-to-date attempt at resolving various exchange rate puzzles.

oil came into being. The emergence of North Sea oil as a serious and economically viable proposition by the mid-1970s, in conjunction with the new floating exchange rate post-Bretton Woods, led many to believe that the UK's troubles with external balance would imminently be consigned to the history books - an opinion that Denis Healey, Chanellor of the Exchequer 1974-79, was all too happy to subscribe to [6]. The discovery of significant reserves of oil beneath the North Sea actually occurred during the 1960s when prospecting gas fields, and the find came as a major surprise to the technical teams involved (Shepherd 2015, pp.28-41). Nonetheless, the prevailing price of oil at that time was too low to make the complex engineering and logistical challenges associated with extraction a worthwhile financial endeavour. This would all change, however, with the huge oil shock of late 1973 when the price of oil quadrupled due to an oil embargo instituted by the Organisation of Arab Petroleum Exporting Countries against a range of nations in response to perceived support for Israel in the Yom-Kippur war. In this uncertain new world in which the 'oil weapon' had become a tool for exerting geopolitical pressure, the previously unviable North Sea oil had now became profitable to extract and policy makers started to become aware of the dawning reality that the UK would not only become self-sufficient in oil, but would also generate a sizeable net export surplus.

A range opinions abounded in the mid-to-late 1970s regarding future prospects for the UK economy in light of its newfound status as a significant oil exporter. Amongst some there was a growing sense of optimism that the development would herald a new era for the country: in particular they believed that the bad old days of chronic current account deficits would finally be vanquished and the UK would never again have to walk a tightrope between internal and external balance[7]. For a generation of policy makers who were haunted by the bad memories of perpetual exchange rate difficulties under Bretton Woods (and even in the

[6] An excellent account of Healey's time in the Treasury, including his attitude towards North Sea Oil, can be found in Dell (1996, Chapter 14).

[7] For a insight into the optimism that North Sea oil engendered during the early years, see Smith (2011, Ch.1).

mid-1970s under the floating regime) the North Sea oil might as well have been the product of a divine intervention. It raised hopes that in spite of the obvious structural problems bedevilling the British economy, the balance of payments constraint on economic growth would not undermine attempts at breaking out of the economic straitjacket in the way that it did during the 1960s. On the contrary, the bountiful commodity tax revenues might even provide the financial resources with which to pursue a revitalization of British industry. This growing sense of confidence was further reinforced by the prospects of securing energy independence at a time when other advanced economies were seemingly left by the whims of geopolitics and the precarious nature of their energy security.

Optimism surrounding North Sea oil notwithstanding, a rose-tinted view of the future was by no means universal, and growing doubt exploded into outright dismay at the perceived impact of oil in the early-1980s. Indeed, the coalition of actors who ended up arrayed against the ostensibly negative impact of oil (in particular by driving a major appreciation of the real exchange rate) was as diverse as it was unlikely: academics, captains of industry, and trade unionists alike found themselves allied in common cause - something of an irony given the often antagonistic relationship that had prevailed between management and unions in the preceding years. Their view was captured very aptly by the Chairman of British Leyland Ltd. Sir Michael Edwardes in 1981, who wryly remarked that 'if the cabinet does not have the wit and imagination to reconcile our industrial needs with the fact of North Sea oil, they would do better to leave the bloody stuff in the ground' [8].

One of the most prolific critics was the esteemed Cambridge Professor (and Keynesian) Nicholas Kaldor, who used his academic writings as well as his position as a member of the UK's House of Lords to mount a sharp critique of the UK's policies with respect to North Sea oil (Kaldor 1983). Firstly, he argued that the UK manufacturing sector was already

[8]Quoted from Albertson & Stepney (2020, p.335).

experiencing serious difficulty in managing the competitive shock resulting from entry into the European Economic Community a decade earlier; any additional pressure in the form of declining price competitiveness (arising due to oil-induced exchange rate appreciation) could be the coup-de-grace for British manufacturing. Secondly, even if the country began to run current account surpluses on the back of North Sea oil, Kaldor contended that investing the revenues overseas into a kind of sovereign wealth fund would (though admittedly delivering returns over the long-term) do nothing to arrest the state of recession and relative decline which had been plaguing the economy independently of the oil. In essence, a sovereign wealth fund bequeathed to future generations would be of little comfort to the large numbers of unemployed persons and bankrupt businesses of the early-1980s, which threatened to permanently undermine the competitive standing of the UK economy. Kaldor was certainly not alone in his pessimistic assessment regarding the alleged gift of North Sea oil, but despite a vocal chorus of criticism from the disparate interests opposed to the Thatcher government's policy on oil, they proved too fragmented and ill-organized to stand a serious chance of upending the settled policy position (Harvie 1994). Nonetheless, these were the voices were the vanguard warning that not only would North Sea oil fail to revitalize the economy in the way many had previously believed, it would in fact become the catalyst for further economic decline (Marriott & Macalister 2021) [9].

A somewhat sanguine view began to emerge, which although not completely discounting fears that exchange rate overvaluation -as well as other symptoms of Dutch-disease- would harm manufacturing, they believed that several compensating mechanisms meant that on balance fears of economic harm arising from North Sea oil were largely misplaced. As documented by Rowthorn & Wells (1987) an increasing number of policy makers and commentators took the view that any job losses in manufacturing would be offset - at least partially if not

[9]Some of the other adverse symptoms of Dutch Disease that were touted include greater competition for financial capital (thus potentially crowding out manufacturing investment), as well as a "brain drain" of skilled labour and personnel from the manufacturing sector into the booming commodity-extracting sector - see Corden (1984).

fully- by the growth of employment in the new and burgeoning oil sector, coupled with an expansion of the service sector. Whilst admitting that the resource extracting sector was in some sense finite and that one day the oil would eventually "run out", leading figures in the Thatcher government took the view that the UK manufacturing sector was in a state of structural decline irrespective of North Sea oil, and at worst oil would only speed up its inevitable demise. To the extent that the balance of payments still entered into the discussion, the Chancellor of the Exchequer Nigel Lawson famously invoked comparative advantage to argue that there was no requirement for the UK to balance its manufactures trade, let alone to run a surplus, and that the future of the country lay in surpluses on financial and businesses services [10] [11]. In essence, this train of thought acknowledged the potential adverse impact of North Sea oil on manufacturing, but since it did not envisage a role for the manufacturing sector in the brave new post-industrial economy underpinned by services, politicians learned to be relaxed about oil-aggravated deindustrialization, taking a largely apathetic approach in which Dutch Disease should simply be allowed to run its course without undertaking government interventions that would simply prolong the inevitable.

3.2.1 The UK Balance of Payments After Bretton Woods

Having outlined the various strands of contemporaneous opinion that emerged with the advent of North Sea oil, it is helpful to review some high-level trends in the UK's external accounts in order to contextualize the evolving nature of the historical debate. The graph in Figure 3.2.1 features the overall current account balance, as well as the manufactures and services balances respectively [12]. A few key points are worth noting: firstly, the UK's current account balance has overwhelmingly been in deficit over the period shown, indeed, external deficits are something of a stylized fact of the UK economy over the period 1972-

[10] See Wilks (1997, p.693).

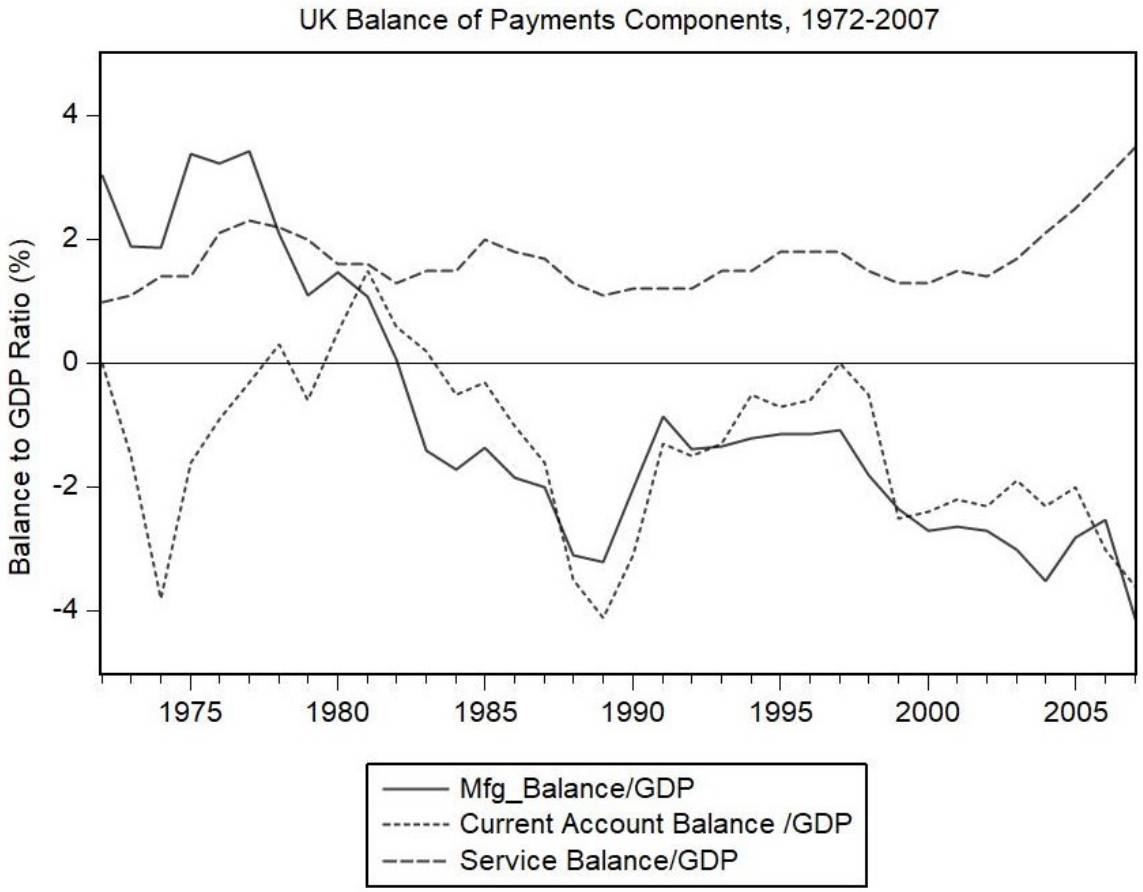
[11] As things turned out, the much touted large surpluses on the services account predicted by Nigel Lawson never materialized in any significant fashion until the second half of the 2000s, meanwhile the manufactures balance and indeed the overall current account balance, trended into ever deeper deficits.

[12] Data sources for the graph are listed in the Appendix.

2007. Secondly, the services balance has been remarkably stable at a small surplus averaging around 1.5% of GDP, although it is worth noting the uptick towards the end of the period in the mid-2000s. Thirdly, the manufactures balance began in surplus during the 1970s but since the early 1980s it moved into deficit from which it has never recovered. Indeed, the long term trend of the manufactures balance is evidently trending downwards, and contrary to some optimistic views at the time regarding offsetting movements in the services balance, it is clear from the graph that these never materialized in any sustained fashion. A final important observation pertains to the seemingly tight co-movement of the manufactures balance and the current account balance, particularly in the post-1980 period: whilst one cannot infer causation from a graph, this seemingly tight co-movement should not be surprising since the manufactures balance is quantitatively a large component of the overall current account balance.

The UK's history as an oil exporter makes for a particularly interesting case study in the analysis of Dutch Disease owing to some of the unique characteristics of the British economy, which make it hard to place into a taxonomy of commodity exporters versus commodity importers. On the one hand, some economies can easily be classified as commodity exporters because of the strong prevalence of commodities in their export portfolio, employment structure, and overall national income. And and contrariwise, some countries are clearly identifiable as non-commodity based economies - they are net importers of commodities who simply take the world price for their commodity consumption bundle whilst paying heed to commodity price fluctuations mainly for the purpose of the inflationary outlook. Indeed, much of the Dutch Disease literature studies low or middle income countries for whom commodities are the lifeblood of the economy, or alternatively those high income economies for whom oil rents are extremely high on a per-capita basis and where the commodity sector is an integral part of the economy. The UK, however, does not fall neatly into this taxonomy of oil exporters, a point noted by Kilian et al. (2009): it was in the relatively uncommon

Figure 3.2.1: Components of the Balance of Payments as Percentage of GDP, 1972-2007.



position of being a high income economy with a sufficiently diversified economic structure so as not to be highly dependent on its commodity sector, but at the same time oil still made significant contributions to exports, employment, and national income. Furthermore, the UK was characterised by a freely and widely traded currency, openness to capital flows, and an absence of serious forms of institutional corruption and malfeasance. In this vein, the UK is ideally suited for examining the macrodynamics of Dutch Disease.

3.2.2 Managing the Oil Windfall: Penny-Wise, Pound-Foolish?

Having considered the macroeconomic backdrop to the emergence of North Sea oil, as well as the evolving policy landscape which arguably undermined a concerted anti-Dutch Disease effort, we now address the thorny and contentious matter of how the oil windfalls were

actually spent. The word 'spent' may of course be misleading - a government could simply transfer all the windfalls back to households in the form of tax cuts; but overriding point remains that the substantive oil revenues had to be used for *something* given that the UK did not invest into a sovereign wealth fund in the manner of Norway and others.

So where did the oil revenues go? The answer is that they were amalgamated into general government revenues and were never specifically ring-fenced or designated for a particular purpose. This makes identifying precisely how the revenues were spent or disbursed somewhat more challenging, and prone to subjective biases in interpretation. Indeed, in the early to mid-1980s when the government was receiving buoyant oil revenues, the broad thrust of macroeconomic policy was geared towards the so-called Medium Term Financial Strategy (MTFS). In short, this comprised contractionary fiscal and monetary policies and contained an explicit goal of reducing public borrowing (Begg 1987, pp.39-41); thus in one respect it can be said that the oil revenues contributed to reducing the fiscal deficit, which would have been higher in the absence of the said revenues (possibly leading to new tax hikes or spending cuts). Conversely, it has been argued that since the thrust of macroeconomic policy was contractionary and the economy itself in a state of significant recession, the oil revenues were essentially used to pay for unemployment benefits - both during the recession as well as those permanently unemployed thereafter Gibson & Thirlwall (1992, pp.315-318). Hence there are two somewhat opposing explanations concerning the UK's early days as a net oil exporter: a view whereby the oil revenues were harnessed in pursuit of a carefully designed programme of fiscal consolidation, and another in which they were simply burned on the altar of a failed contractionary macroeconomic strategy with little to show but elevated unemployment.

Another key area of the public finances where the oil revenues arguably made their presence felt is in the realm of taxation; specifically that the oil revenues helped create the necessary fiscal space within the public finance envelope for Chancellor Nigel Lawson to enact landmark

reductions in both corporate and personal taxation from the 1984 budget onward. Although it is not strictly possible to "prove" that the oil revenues were disbursed in this way (owing to the fact said revenues found their way into the general pool of taxation) there is widespread agreement that both the oil windfall and revenues from privatization helped to finance an ambitious programme of tax cuts following the 1983 general election Dell (1996, Ch.15 & 16). The obvious question to ask then, is whether the tax cuts constituted an effective use of the oil windfall? Indeed, the use of commodity windfalls to fund current expenditure (or tax reductions) is typically contentious when viewed through the lens of resource economics, though not entirely without support in certain specific circumstances [13]. Proponents of the tax reforms undertaken in the 1980s argue that the tax cuts significantly improved the supply-side performance of the UK economy and were a key strand of the policy agenda that helped transform the UK from being the 'sick man of Europe' to a resurgent and revitalized economy Minford (2015). When viewed through this favourable lens it can be argued that the dynamic benefits arising from the tax cuts outweighed the benefits from the long and drawn out task of seeking to build up a sovereign wealth fund and receiving a modest-by-comparison annual return to bolster government revenues. It has further been argued that public borrowing, i.e. running a fiscal deficit, makes little sense when the gap between expenditure and revenues can be plugged using commodity revenues (Segal 2012): after all, why pay to borrow money when you can provide the necessary funds from the commodity revenues?

An alternate interpretation would suggest that the tax reforms of the 1980s were not decisive in improving UK economic performance, and that they reflected a normative desire to redistribute income and wealth towards a target demographic or constituency, as much as achieving any sort of clear, measurable, or well defined economic goal (Albertson & Step-

[13] As a general proposition, the celebrated Hartwick Rule of resource economics (Hartwick 1977) argues that policy makers should 'invest resource rents' and that any diminution in natural resource wealth must be exactly compensated by an increase in other forms of net wealth (broadly defined). For an insightful discussion of the complexities surrounding the practical application of the Hartwick rule see Ploeg (2014).

ney 2020). Furthermore, the implementation of the tax cutting agenda actually stoked up significant domestic inflation which proved destabilizing to the UK's business cycle, and to the extent that this was aided and abetted by proceeds from North Sea oil it is without doubt a classic symptom of Dutch Disease [14]. Chancellor of the Exchequer Nigel Lawson arguably came unstuck when it turned out he had significantly overestimated the impact of his mid-1980s tax cuts on the productive potential of the economy, as evidenced by the subsequent marked deterioration in the fiscal balance [15].

Meanwhile, the argument that it makes no sense to borrow money by running bond-financed deficits instead of using oil revenues to plug the gap is arguably a gross oversimplification of prudent public financial management [16]. Indeed, by disallowing politicians to use commodity revenues in order to meet a shortfall between expenditures and taxes, it is possible to enforce a measure of fiscal discipline that helps to immunize against pork-barrel spending; political business cycles; and myopic time horizons in public spending decisions with all their attendant welfare implications (Frankel 2010). In this interpretation, politicians should be required to finance tax cuts in a way that is independent of the oil revenues, thereby enforcing a higher standard of accountability on the taxpayer. Indeed, if large tax cuts fail to deliver the envisioned increase in productive capacity, growth and revenues, this will necessitate either rising public borrowing, or a combination of expenditure cuts and tax increases in other areas, thus preventing politicians from simply papering over the cracks using windfall revenues.

In summary, the issue of where the UK oil windfalls actually went is not a straightforward

[14]The idea that commodity revenues end up causing burgeoning excess demand, inflationary pressures, and imprudent deficits (current account and/or fiscal) are all classic hallmarks of Dutch Disease - see Frankel (2010) for further discussion.

[15]For a chastening overview of mistakes made by those relatively more recent UK Chancellors in the domain of fiscal policy, see Johnson (2015).

[16]For an overview of the extensive literature concerning fiscal rules and the so-called 'New Political Macroeconomics', see Wyplosz (2012).

question to answer, which makes an evaluation of how effectively these monies were utilised a fraught and difficult question to answer. What is abundantly clear is that the revenues were not directly earmarked for a particular project or goal, nor were they saved into any kind of fund or invested into any directly observable assets. Contrasts are often drawn with the much admired Norwegian model and it is often argued that the UK should have pursued this alternate approach. All-in-all there are a range sharply diverging assessments concerning how the revenues were spent and how effectively they were disbursed: some interpretations suggest they were an integral part of Thatcher's stabilization and revitalization of the UK economy, whilst others suggest they were frittered away on paying for the high costs of unemployment, coupled with ideologically inspired tax cuts for higher earners and business. Needless to say, the controversy over the fiscal choices surrounding the North Sea windfalls continues to the present day.

3.3 Ideational Shifts in UK Macroeconomic Policy and Dutch Disease

Having provided a backdrop to the emergence of the UK as a net oil exporter it is necessary to consider in greater detail some of the key shifts in British macroeconomic policy that rendered policy makers relatively sanguine to the notion of Dutch Disease afflicting the economy. Indeed, certain permissive factors were at play which tilted the field against policy makers taking concerted action to offset the negative effects from the nascent commodity sector. As we will argue, these factors were largely independent of the UK's transition to becoming an oil exporter, but nonetheless help to explain why concerted action was not forthcoming, even if the diagnosis of Dutch Disease were to have gained majority acceptance (which it did not). We attach particular salience to shifting views concerning the importance of the balance of payments; priorities regarding the exchange rate; and attitudes towards sector-specific policies.

3.3.1 Demise of the Balance of Payments

One of the most marked shifts in UK economic policy was the dethroning of the balance of payments from being arguably one of the most closely watched macroeconomic indicators, from the end of the Second World War until at least the late 1970s, to becoming an indicator of somewhat peripheral interest (Bean 2009, pp.458-459). This newfound sense of nonchalance was perhaps most cogently articulated in the 1980s under the auspices of the so-called 'Burns Doctrine' (so-named on account of one of its leading proponents - the academic and policy-maker Sir Terrence Burns) which provided the economic intuition as to why current account deficits were met with ever greater indifference by UK policy makers. It is important to observe that this phenomenon was not exclusive to the UK, and there were concurrent ideational changes underway in Australia for example, with the 'Pitchford thesis' essentially arguing that current account imbalances were the result of 'consenting adults' engaging in private transactions and that this was of little to no relevance for the conduct of macroeconomic policy (Pitchford 1989). Indeed, it was argued that since private agents and businesses formulate their savings-investment decisions in line with rational expectations theory, the resulting imbalances (be they surpluses or deficits) were the simply the aggregate-level corollary of rational economic actors engaging in their desired transactions. In this vein, external imbalances were not held to be a public policy issue.

It is worth examining the observations-cum-propositions that constituted the core tenets of the Burns Doctrine given their salience for macroeconomic policy with respect to the external balance [17]. Firstly, the current account deficits of the 1980s were regarded as a temporary phenomenon and were not perceived as a sign of structural weakness in terms of tradables. Secondly, invisible earnings and exports of services were seen to be successfully replacing manufactures as the UK's key internationally traded outputs. On this point Nigel Lawson,

[17] These core facets of the Burns Doctrine were documented by Muellbauer & Murphy (1990) in an insightful study into the sustainability of the UK's current account position.

UK Chancellor of the Exchequer (1983-1989), forcefully expounded the belief, noting: 'There is no adamantine law that says we have to produce as much in the way of manufactures as we consume. If it does turn out that we are relatively more efficient in world terms at providing services than at producing goods, then our national interest lies in a surplus on services and a deficit on goods' (Lawson 1985, p.554). Third, the UK's net international investment position, i.e. the ratio of overseas assets to overseas liabilities, was understood to be so strong as to be able to withstand many years of large deficits without encountering any issues. Fourth, international financial liberalization was seen to have fostered sufficient capital mobility as to remove any difficulties in the financing of temporary deficits: in essence, gone were the bad old days of having to negotiate loans from the IMF and partner countries to cover incipient shortfalls on the external account; instead private capital would flow unencumbered to keep the financial plumbing free of proximate constraints. And finally, the current account position was seen to reflect the deficit of the private sector's financial balance, since for a time the public sector had been in surplus whilst the private sector was in the red. This was in keeping with the new macroeconomic zeitgeist suggesting that the public sector should avoid dis-saving (deficits) whilst the private sector, be that household or business, should be left to formulate its saving-investment decisions optionally and rationally a la Pitchford (1989). If the outcome of this process yielded current account imbalances then it ought to be of little concern to policy makers.

It is not the purpose of this study to retrospectively unpick the claims comprising the Burns doctrine per-se, but rather to highlight the way in which they exemplified the pervasive apathy towards current account imbalances that persisted throughout the Great Moderation, and arguably even after the Global Financial Crisis. Nonetheless, for context it is apparent that the ostensibly "temporary" current account deficits were in fact very persistent, and the transition to a strong balance on service exports did not materialize for another twenty

years or so (i.e. the mid 2000s) [18]. Meanwhile the Net International Investment Position trended downwards hand-in-hand with the current account deficits. It is worth emphasizing that points (2) and (4) - the rise of service exports and the ease with which deficits could be financed - continued to be widely held in the decades following the 1980s and came to represent the enduring face of mainstream opinion [19]. It was in this spirit that people learned to be relaxed about -and even to love- current account deficits, with some adherents viewing them merely as the corollary of capital inflows that greased the wheels of economic growth via higher investment, and ensured that output was not constrained by the necessity of maintaining a higher domestic savings ratio [20]. An important point to recognise is that whilst prime ministers, governments, and ruling parties changed in the years since the 1980s, the core tenets of the Burns Doctrine exhibited remarkable persistence in their influence over macroeconomic policy, and in this light we can see how the Dutch Disease argument of declining competitiveness in the non-commodity tradable sector (and the consequent diminution in manufactures trade balance) failed to gain much traction in the officialdom of British economic policy.

3.3.2 The Relegation of the Exchange Rate

The evolving role of the exchange rate is a particularly interesting facet of the UK's post-Bretton Woods macroeconomic history: whilst it managed to avoid the same kind of obsolescence as the balance of payments, the prominence of the exchange rate in economic policy nonetheless changed forms and was diminished compared to its heyday under Bretton Woods. Indeed, during the Bretton Woods era (and arguably for a decade or so after its collapse) the real exchange rate occupied a key place within both policy discourse and

[18]This point is readily apparent from the graph in Figure 1 (Section 2) which depicts the evolution of different components of the balance of payments 1972-2007.

[19]Eatwell & Taylor (2000, Chapter 1) arguably go further by suggesting that market participants no longer regard the current account balance as an economic 'fundamental', which contributes to explaining why external imbalances no longer provoke the reaction they once did from financial markets during earlier decades.

[20]For an insightful discussion of the economics of current account deficits and capital flows through an optimist's lens, see Higgins & Klitgaard (1998).

academic analysis, as it was seen to hold important information regarding the relative price of UK goods and services vis-a-vis other countries. A price level persistently above that of key trading partners, coupled with a nominal exchange rate that failed to reflect the price level differential, was considered to be an overvalued real exchange rate that typically went hand-in-hand with current account deficits, thereby constituting a disequilibrium requiring corrective action. Unsurprisingly, the financial community -centred largely on the City of London- had long taken an interest in exchange rate policy and had exercised its considerable leverage to advance its views and interests in this area (Kitson & Michie 1996) [21]. Following the Great Inflation of the 1970s, however, a confluence of different factors came together that would re-cast the role of the exchange rate from playing a central role in the conduct of macroeconomic policy to a largely supporting one.

One of the key shifts affecting the exchange rate relates to a marked change in the primary objective of macroeconomic policy, namely the primacy afforded to controlling inflation that emerged in the late 1970s cum early 1980s. Whilst it would be somewhat superficial to characterise pre-1980s opinion as buying into a simplistic Philips-Curve type trade-off between inflation and unemployment (Forder 2014), it was generally the case that policy makers were implicitly more concerned with the sacrifice ratio -i.e. the amount of extra unemployment that would be tolerated in order to lower inflation by a given amount- compared to the years after 1980. The newfound emphasis on inflation control affected the role of the exchange rate in a number of ways: it meant that policy makers were far more willing to pursue tight monetary policy irrespective of whether that caused a serious diminution in the price competitiveness of the tradable sector due to the resulting nominal exchange rate appreciation coupled with wage (and price) stickiness or rigidity. If real output losses via the external demand channel were a corollary of raising interest rates this did not appear to weigh too

[21] It should be acknowledged that the role of the City of London - and the financial sector more broadly- is contested territory in the fraught story of UK economic underperformance and relative decline. For an insight into the debate, see the edited works of Michie & Williamson (2004).

heavily in the minds of policy makers, indeed, ministers in the Thatcher governments took something of a "sink or swim" approach to issues of firm competitiveness and the exchange rate: if manufacturing firms couldn't stand the heat of a strong pound, then they should get out of the kitchen and make way for more efficient producers (and not necessarily in manufacturing).

The exchange rate's role in the struggle to tame inflation even went a step further at times, becoming an 'intermediate policy target' such that officials had a careful eye as to some desired value for the exchange rate, although the exchange rate was never the ultimate objective in itself (Fischer 1987). The reason for this pertains to the exchange rate channel in the transmission of inflationary pressures; the UK had traditionally been recognised for having a strong pass-through from imports to rises in the general price level, hence the exchange rate became a conduit in the practise of anti-inflationary monetary policy of various guises. Arguably the pinnacle of the exchange rate's role in the battle to tame inflation was the UK's entry into the European Exchange Rate Mechanism (ERM) in October 1990, which saw sterling tied to a fixed exchange rate against the Deutschmark. This ended up entailing a significant cost to the real economy but was pursued vigorously in pursuit of the ever elusive anti-inflationary credibility, until the collapse of the parity on 'Black Wednesday' in September 1992. In the period thereafter, the exchange rate was watched closely as an intermediate indicator for inflation, although active attempts to manage its level were mostly abandoned.

Another important reason behind the diminished role of the exchange rate can be ascribed to its role in international trade, namely a reduction in the perceived importance of relative prices for determining international trade flows. Opinion began to move significantly away from the view that price competitiveness - as manifest by the real exchange rate- was the key variable in ensuring that external imbalances would be corrected (an early manifestation

of this view can be found in Kaldor (1978*b*). A significant wave of research under the umbrella of the 'New Trade Theory' emphasized non-price competition as the key ingredients behind international trade flows: quality, diversification, standards of service and aftercare, as well as brand value and marketing all began to take centre stage at the expense of the real exchange rate (Helpman & Krugman 1987). This train of thought was buttressed by concepts such as 'pricing to market' with firms setting the price of their products based on perceived willingness to pay, differing along lines of market segmentation. The practical implication for policy was that the notion of a fundamental equilibrium exchange rate - whereby simultaneous internal and external balance could be achieved- was seldom given serious airtime. Furthermore, as attitudes hardened a "sink or swim" approach emerged towards issues of firm competitiveness and the exchange rate: in essence, if firms were unable to compete on grounds of non-price competitiveness, or lacked sufficient financial resilience to ride out periods of elevated exchange rates, then their failure was inevitable and both labour and capital ought to be reallocated to more productive uses via the market mechanism. It was against this backdrop that anti-Dutch Disease arguments concerning the exchange rate gained limited traction over the long term, with the notion that relative price competitiveness was an antiquated concept that was ill suited to characterizing differentiated international trade flows in an ever more globalized world.

3.3.3 Abandonment of Sector-Specific Policies

The pronounced decline of sector-specific policies was the final plank in the shifting policy landscape which compromised a concerted and robust anti-Dutch Disease response. The UK's post-war track record with industrial policy could be regarded as mixed: at best it failed to appreciably improve industrial performance, and on the other hand it can be seen a costly exercise in failure that may well have done its part to hinder overall economic performance (Crafts 2018, Section 5.3). The backlash against sector-specific policies came arguably in two distinct phases: the first came during the Conservative governments led by

Margaret Thatcher, who oversaw a significant dismantling of industrial policies which they regarded as costly to the taxpayer; propping up dying businesses; and very much antithetical to economic performance. The second phase occurred under the New Labour governments of Tony Blair, whose approach favoured a more 'horizontal' approach to "industrial" policy, which was a far cry from the traditional approach embodied by the Labour governments of James Callaghan and Harold Wilson during earlier decades.

Even by the mid-1970s, the recurrent fiscal costs arising from industrial support were becoming an unmanageable burden to the Treasury, whilst at the same time the country's industrial performance had deteriorated markedly across a range of indicators relative to her competitors (Foreman-Peck & Hannah 1999). When reductions in public expenditure became a key priority under the umbrella of the 'Medium Term Financial Strategy' instituted in the early 1980s under Margaret Thatcher's first government, industrial support was a prime candidate for fiscal retrenchment. Indeed, serious doubts abounded over whether funds disbursed by government were simply squandered on ill-fated attempts at 'picking winners'; as well as pouring good money after bad by helping to prop up losers ("defensive" industrial policy) on account of the adverse political consequences from allowing firms to fail, e.g. localized unemployment. Questions lingered over how the apparatus of the state bureaucracy could possess the necessary information to allocate substantial sums of capital, and why the default presumption of leaving entrepreneurial and commercial activity to the private sector should not be respected [22]. Another factor weighing down on sector-specific policies was the unhappy connotations of militant unionism and industrial strife that, rightly or wrongly, had become tied up in the popular consciousness with British manufacturing [23].

[22]For a critical appraisal of this view -namely the primacy of the market mechanism as regards allocative efficiency in the British economy- see Eatwell (1982).

[23]It is worth noting that trade union membership was strongly associated with establishment size - i.e. the greater the number of workers in a given workplace the more likely there was to be a union and the higher the rate of union density amongst the workforce. Insofar as manufacturing tended to have large factory-style workplaces with a sizeable number of employees on site (vis-a-vis other sectors) then it is straightforward enough to observe the association between manufacturing and union presence. A number of arguments have been proffered to try and explain the economic basis for this observation - see Richardson (1991) for an

Indeed, manufacturing played host to a plethora of different trades unions (even within the same workplace - so-called 'multiple unionism'), who were perceived by the Conservative governments of Thatcher, as well as increasingly large numbers within the Labour party, to be an intransigent workforce wedded to restrictive practises and prone to impulsive bouts of industrial action (Brown 2004, pp.415-422). The perception was one of a workforce driven increasingly by its political whims and motivated by rent-seeking behaviour, rather than acting prudently to ensure the long term viability of their company. Increasingly from the 1980s, the idea that public money be proffered in support of such a strike prone and recalcitrant workforce; one largely synonymous with lacklustre productivity performance and lacking in commercial success, became increasingly untenable in the eyes of policy makers and to some degree the wider public.

A second phase of rejecting sector-specific policies took root under New Labour: they were not so much against sector-specific policies on the grounds of the fiscal implications, indeed, New Labour spent substantially across a number of different areas and were not averse to doing so on the back of increased public borrowing, in keeping with the Chancellor of the Exchequer Gordon Brown's so-called 'golden rule' [24]. New Labour's disdain for sector-specific policies sought to avoid the economically contentious and politically toxic implications that the government was somehow seeking to 'pick winners'. Indeed, perhaps one of the most visible repudiations of industrial policy on the part of New Labour was the renaming of the Department for Trade and Industry (DTI) to the 'Department for Business Innovation and Skills', which was not merely an unsubstantiated gesture but rather genuinely reflected the disposition of the government. New Labour made prominent use of a 'horizontal' kind of industrial policy (although the phrase industrial policy was assiduously avoided,

overview.

[24] An exception to this would be in the dying days of Gordon Brown's government, in which the Secretary of State for Business, Innovation and Skills, Peter Mandelson, administered a number of grants to industrial firms as part of the fiscal stabilization measures in response to the Global Financial Crisis. These came quite late in the day, and were arguably more of a fiscal stimulus measure than as part of any genuine or premeditated re-conversion towards sector specific policies.

doubtless to avoid unwanted association with the policies of the Labour governments of the 1960s and 1970s) in which targeted public investments were made with a view to reaping aggregate productivity benefits but crucially, however, the measures did not focus specifically upon one industry or sector, but rather affected the economy symmetrically (Beath 2002). Investments favouring heightened connectivity, both in terms of transport as well as communications technology, and broad-based human capital accumulation -particularly core skills in mathematics and English as opposed to say technical qualifications geared for manufacturing- were in vogue. In reality the claim that so-called 'horizontal' policies did not have a sector-specific bias is in fact quite dubious - there was an implicit bias favouring business-services and perhaps most prolifically the financial sector, with whom New Labour went to great lengths to associate itself and whose interests it actively promoted Kitson & Michie (2014). In this way, large sums of public money were committed to investments tacitly favouring what has variably been referred to as 'the new economy'; 'the knowledge economy' and even the 'weightless economy'. Whether this decision was economically astute is beyond the scope of this paper; rather what we have sought to make apparent is that the possibility of a latter-day anti-Dutch Disease policy under New Labour was a forlorn aspiration given that sector-specific policies targeting manufacturing had been consigned to the wilderness - an appendage of the "Old Labour" approach both in terms of politics and economics.

It could well be argued that policies to counter Dutch Disease would not have constituted industrial policy per-se, since its objective would have been focused singularly on offsetting the detriment caused by the oil sector. This stands in stark contrast to the usual mix of objectives that usually characterize industrial policy, which typically encompass raising innovation, increasing capital investment, upgrading skills and training etc, with a desire to enhance, expand or lift the the manufacturing sector's fortunes in some broad sense. To the extent that an anti-Dutch Disease policy was simply aiming to compensate for the negative

spillover(s) arising from the booming commodity sector, there is an argument to be made that it would be unfair to characterize financial support in this mould as industrial policy. In reality, however, such an argument would have proved largely academic, and swimming against the tide of post-1980s economic policy: the subtle yet potentially important distinction of remedying Dutch Disease versus promoting active industrial policy proving too inconvenient in terms of political optics.

3.4 The Empirical Analysis of North Sea Oil

In this section we consider some insightful studies on North Sea oil from the literature in order to gauge what the existing views are regarding Dutch Disease, as well as to consider some important issues in relation to model estimation. Building on this, the discussion then moves on to some more recent insights from the applied econometrics literature regarding how to recover genuinely exogenous oil shocks and the current state of best practise for examining dynamic causal relationships in relation to oil. Finally, we provide a discussion of our baseline empirical specification and the economic rationale behind the variables captured in the model.

Although much of the empirical analysis of oil in the UK economy has focused on the consequences for internal balance - namely the impact of oil shocks on GDP, unemployment and inflation- there are still some notable publications considering the impact of oil from a resource economics standpoint. It should be noted from the outset, however, that even those publications analysing Dutch-disease tend to be focused more on the internal aspects of the UK manufacturing sector (e.g. output and employment) rather than the consequences for the real exchange rate, trade balance, terms of trade etc. Nonetheless some helpful insights can still be drawn in understanding the flavour of existing opinion on the topic, and of particular significance will be some critical discussion of the methodologies used and some

potential pitfalls (which we seek to mitigate in our own analysis).

3.4.1 Existing Studies in the Literature

An insightful study was undertaken by Bean (1988), which sought to shed light on the impact of sterling misalignment on British trade performance during the late 1970s and 1980s. The econometric approach comprises a model estimated on postwar quarterly data, comprising 25 state variables, of which 4 were determined endogenously: the exchange rate, long-interest rate, and both manufacturing and non-manufacturing stock prices. The model is rational expectations in spirit, whilst incorporating sticky wage-price adjustment in the spirit of Dornbusch (1976). One of the pertinent questions tackled by the author is whether the sharp sterling appreciation of the late 1970s/early 1980s was oil-induced or rather the product of the contractionary macroeconomic policies, - particularly those implemented by the Thatcher government following the 1980 budget. At risk of condensing Bean's thorough discussion, it can be inferred that perhaps 12 percentage points or so of sterling's real appreciation can be attributable to oil over the period 1978-80. Whilst a combination of tight money and a deteriorating supply-side position might explain upward of 12 percentage points. Importantly, he notes that most of this movement was due to changes in fundamentals rather than Dornbusch-overshooting (i.e. disequilibrium effects).

The other investigative aim of the paper focuses on whether there were permanent (detrimental) effects arising from the hardening of the real exchange rate on the export sector. On this front, Bean adopts a cointegration approach based on a long series of annual data beginning at the turn of the 20th century. A high level summary of the findings would be to say that the results do potentially indicate the presence of export hysteresis, however, there are considerable difficulties in actually discerning between genuinely permanent effects (i.e. pure hysteresis) resulting from transitory exchange rate fluctuations, versus effects that are nonetheless very long-lived without being permanent in the strict sense. The author is

guarded about these findings in light of a range of theoretical and conceptual issues, and suggests that further study would be needed to produce more conclusive and convincing evidence. In discerning the relevant policy implications of his analysis, Bean highlights the difficulty in whether to regard the structural changes as being induced by genuine shifts in economic fundamentals (and are thus an equilibrium phenomenon) or whether the resultant changes in the economy, such as a diminution of manufacturing, really only amount to temporary changes in industrial structure. If it is the latter, then this could provide grounds for state intervention, however, this is not clear cut and would arguably not apply if firms successfully internalized the costs of re-entering foreign markets.

An alternate empirical approach was provided by Hutchison (1994) and Bjørnland (1998) who utilised vector autoregressive models incorporating various types of long-run identifying restrictions. Hutchison estimated a vector error correction model (VECM) for the period 1976Q1-1989Q2 with quarterly data, whilst Bjornland estimated a structural vector autoregression (SVAR) utilising a mixture of short-run and long-run identifying restrictions for the period 1976-1994. Hutchison's study argues that the data does not support the view that an energy boom in the UK leads to manufacturing decline and that if anything, it led to a net positive impact on the manufacturing sector (with respect to output). In essence, the study is highly critical of the notion that UK oil contributed to deindustrialization or any sort of Dutch-disease. Bjornland, meanwhile, produces a study again focused overwhelmingly on the non-open economy facets of Dutch disease (manufacturing output and domestic prices/inflation). At most she finds only 'weak evidence' for a Dutch-disease in the UK, with other variables (than oil) seeming to exert drastically more impact on the fortunes of manufacturing, indeed, based on the magnitudes implied by the econometric analysis it might even be fair to characterise the supposed Dutch-disease effects as negligible.

Although the emphasis in these two papers is different to the open-economy approach pursued

in this study, it is worth critically discussing some of their key methodological aspects since they contain a number of problematic features that the current analysis seeks to mitigate against. Indeed, a potential problem common to both papers that has been discussed at length in the time series literature relates to the timing and the frequency of the structural shocks. The VAR models they estimate use quarterly data recover the structural shocks of interest from their system, however, there are considerable grounds for believing that the shocks extracted using this frequency of data might result in biased inferences. Firstly, the concept of 'temporal aggregation bias' refers to the problems arising from the use of observations that are of a lower frequency than that of the original data, such that not all realizations of the original process are observable. An obvious example of this is the averaging of a monthly manufacturing output index into a quarterly series; or a monthly exchange rate series averaged into quarterly. Secondly, in a related though still distinct vein, Ramey (2011) has emphasized the importance of timing when seeking to identify genuinely structural macroeconomic shocks and demonstrated some of the pitfalls that can arise when this is not met. For certain variables that are adjusted at low frequencies such as fiscal policy post-1980s as argued by Beetsma et al. (2008), quarterly or even annual data is adequate (the authors argue that during the Great Moderation it became common for many countries to abandon discretionary fiscal policy and instead adjustments were made only once-per year in the annual budget plan). For certain "fast moving" variables, however, it is necessary to ensure that the frequency of the modelling approach is congruous with the time horizons that govern the evolution of those variables in the real world: commodity prices and (floating) exchange rates provide good examples of this since they are determined at high frequency in highly globalized financial markets. Failure to ensure that core variables are modelled at the correct frequency risks distorting parameter estimates and hypothesis tests.

Bjornland's imposition of long-run identifying restrictions a la Blanchard (1989) also raises serious questions on both a conceptual as well as econometric level. Firstly, the nature of

the long-run identifying restrictions are far from being innocuous theoretically: she assumes that aggregate demand shocks can have no long-run effect on output as-per the natural rate hypothesis. Whilst possessing some foundation in theory and precedent within the literature, the historical experience of the United Kingdom (particularly during the 1980s) as well as a large corpus of theoretical literature suggests that this assumption is misplaced: substantive aggregate demand shocks can elicit permanent effects on unemployment and output, with the long-run path of these variables being plausibly influenced on the demand-side via induced hysteresis effects [25]. There are also considerable econometric limitations of long-run restrictions: Faust & Leeper (1997) point to a lack of robustness at lower data frequencies and posit that aggregation will tend to invalidate the assumption of orthogonal structural shocks, even if that assumption applied at higher frequencies. This point is particularly relevant since both the manufacturing production and oil variable in Bjornland's model are quarterly averages from monthly averages. Secondly, long-run restrictions can exhibit marked sensitivity to data transformations, such as whether depending on whether variables enter the model in differences, levels, or even growth rates. The potential effects of this are non-trivial and can cause substantial bias in the resulting estimates. The fact that Bjornland's model specifies a number of variables in first differences can also lead to important low-frequency co-movement between variables being lost, since it is implicitly set to zero via differencing but would otherwise be allowed for in a levels specification. Gospodinov et al. (2011) present evidence suggesting that even very minor mis-specification with respect to differencing can lead to substantial bias in the resulting impulse response functions.

A non-trivial issue with Hutchison's paper pertains to the relatively small number of observations in his analysis and the particularly negative implications this carries for the study of cointegrating systems: indeed, the basis of a vector error correction model (also known as a cointegrating VAR) is that there are stochastic trends present in some of the variables –

[25] See for instance the paper of Cover et al. (2006), who suggest that a aggregate demand shock may have permanent effects on the output level by indirectly shifting the aggregate supply curve.

this is ascertained via unit root testing. Assuming that some of the series appear to exhibit stochastic non-stationarity based on the unit root tests, one then proceeds to test whether they are cointegrated – analogous to analysing whether there are any long-term equilibrium relationships between variables manifest within the data. Based on the outcome of this cointegration test one then proceeds to specify the number of cointegrating relationships to be included within the VECM estimation. As is readily apparent, the approach relies on a significant amount of pre-testing: first to establish whether any of the variables exhibit unit root tendencies, and secondly to see whether any of the presumably integrated series are in fact cointegrated. It is well known, however, that in small sample sizes the statistical power of unit root tests and cointegration tests can be highly dubious and may lead to the erroneous imposition of cointegrating relations which actually have no basis in reality (Elliott 1998). Based on the simulation exercises of (Gospodinov et al. 2013) it is clear that Hutcheson's limited number of observations falls firmly within the "small sample" bracket and hence there are considerable misgivings over the reliability of the putative cointegrating relationships. Further to this point, it could be argued that a simple corroborating test is to estimate the model as a regular structural VAR without recourse to the cointegrating relations and assess whether the results obtained from the VECM are broadly replicable from the SVAR - a robustness check that is not undertaken in Hutchison's paper.

3.4.2 Modelling the Effects of Oil: Identification via External Instruments (the Proxy-VAR Approach)

When seeking to analyse the impact of oil shocks on macroeconomic variables such as the exchange rate, or similarly to examine the impact of the exchange rate on exports, it is important to adopt an empirical strategy that controls for other key endogenous variables that might obfuscate the true causal dynamics at play. Second, with particular regard to the oil shocks, it is important to recognise that if oil shocks are not identified correctly they can end up "contaminated" insofar as they are not genuinely orthogonal. The literature of

the past decade or so has highlighted the significant risks associated with imposing arbitrary block exogeneity on a model, with the thrust of current thinking now explicitly advocating the inclusion of oil within the main model alongside a variable designed to capture movements in global economic activity [26]. Third, the shocks must be available at a sufficiently high frequency so as to provide credible identification given the speed at which commodity markets (and hence the price of oil) and the exchange rates move at; this necessitates the use of monthly data rather than quarterly.

In light of the above, the empirical approach taken in this study will make use of two approaches to modelling the impact of oil shocks to ensure robustness: (i) structural VAR models identified via short-run exclusion restrictions and (ii) the increasingly influential 'Proxy-VAR' framework, which takes a different route to establishing dynamic causal inferences. Since a detailed exposition of the structural VAR approach - in particular the relationship between reduced form errors and the all-important structural shocks - is discussed at length in Chapter 2, we will avoid needless repetition by focusing discussion on the Proxy-VAR approach. Further discussion will also be devoted to the contentious issue of lag-order determination in the context of modelling oil shocks, which arguably differs compared to other facets of empirical macroeconomics.

The Proxy-VAR approach concerns structural shocks of interest that are identified with an external instrument and notably employs information that is extraneous to the VAR model itself. The resulting shock series can be used in the usual way to estimate structural impulse response functions and other empirical outputs of interest (Montiel Olea et al. 2021). In this sense is reminiscent of the well known contribution of Romer & Romer (2010) who studied legislative changes to fiscal policy in order to identify exogenous fiscal shocks.

[26] Two notable contributions in this vein are Pesaran et al. (2006) and Kilian (2009).

As-per Stock & Watson (2016), consider the identification of a single shock, ϵ_{1t}; suppose there is a vector of variables Z_t that satisfies:

$$E(\varepsilon_{1t} Z_t') = \alpha' \neq 0 \tag{3.1}$$

$$E(\varepsilon_{jt} Z_t') = 0, j = 2, ...n. \tag{3.2}$$

The first condition corresponds to the typical relevance condition in instrumental variables regression, which necessitates that the instrument is correlated with the structural shock of interest, ε_{1t}. The second is the usual condition for instrument exogeneity, namely that the instrument must be uncorrelated with the other structural shocks. An instrument capable of satisfying both of these conditions can be used to identify the shock ε_{1t}.

The general procedure for utilising an external instrument in lieu of the structural shock of interest may be surmised in three simple stages à la Ramey (2016):

- Estimate the reduced form system to obtain estimates of the reduced form errors, η_t.
- Regress η_{2t} and η_{3t} on η_{1t} using the external instrument Z_t as the instrument. These regressions will yield unbiased estimates of b_{21} and b_{31}, and the residuals of these regressions are denoted as ν_{2t} and ν_{3t}.
- Regress η_{1t} on η_{2t} and η_{3t} using the ν_{2t} and ν_{3t}, estimated in the previous step as the instruments. This yields unbiased estimates of b_{12} and b_{13}.

For further insights into the link between external instruments and the structural VAR, James Stock's 2017 Sargan Lecture provides an accessible discussion - see Stock & Watson (2018).

The approach has been applied productively in the literature to study a range of issues within macroeconomics. Miranda-Agrippino & Ricco (2023) study the transmission of both conventional and unconventional monetary policy shocks; Angelini & Fanelli (2019) take up the question of of whether financial and macroeconomic uncertainty can be regarded as exogenous drivers real economic activity; Mertens & Ravn (2013) analyse the effects of changes in personal and corporate income tax changes in the US; whilst Aghion et al. (2009) examine the impact of exchange rate volatility on productivity growth.

In terms of the economics of oil market fluctuations, the contribution of Känzig (2021) provides a novel approach for analysing oil's effects on a range of macroeconomic variables. Indeed, the author exploits institutional features of OPEC and utilizes high frequency data to identify an oil supply news shock, finding that they exhibit both statistically and economically significant effects. More specifically, the paper exploits variation in oil futures prices around OPEC production announcements: this is particularly helpful in overcoming the endemic difficulty that supposedly "exogenous" oil shocks may in fact be contaminated with the endogenous response to current or expected global economic conditions. By measuring the changes in oil futures prices within a tight window around the OPEC announcements, however, the reverse causality bias caused by the global economic outlook can plausibly be ruled out since it is already priced in at the time of the announcement (and unlikely to change within such a tight window). In this vein, Kanzig estimates a monthly series of structural oil supply news shocks, which constitute an external instrument for the purposes of an oil market VAR model. This enables us to provide a powerful cross-check on the results obtained from structural VAR models identified via short-run restrictions, and to establish whether our empirical findings regarding oil, the exchange rate and the performance of UK tradeables are robust to a leading alternate approach to identification.

3.4.3 Lag Order Selection

Economic theory is generally agnostic when it comes to confronting the choice of how many lags of the endogenous variables to include. In practise, a number of considerations are likely to weigh in on the modeller's decision, which include the nature of the economic problem under analysis; the sample size and the resulting degrees of freedom in the model; statistical adequacy concerns such as the serial correlation properties of the residuals.

Reconciling the trade-off between model parsimony (namely the number of parameters estimated) with the improved goodness of fit as the lag-order increases is a classical issue confronting the macroeconomic modeller. There is no single way of going about this: one approach relies on the optimization of a penalized goodness-of-fit criterion, which includes the popular Akaike Information Criterion (AIC); Schwartz-Bayes Criterion (SBC); and Hannan-Quinn Criterion (HQC). It is well recognized that the information criterion approaches tend to favour greater parsimony in lag-order selection; in essence the larger the penalty term the greater the tendency to favour a shorter lag structure, with SIC generally being more parsimonious than the SBC, which in turn tends to be more parsimonious than AIC. The proclivity of such techniques, however, to distort model dynamics through excessively penalizing higher lag orders containing important information is not merely an abstract or hypothetical risk: in a study by Edelstein & Kilian (2009) examining the sensitivity of consumer expenditures to retail energy prices, the Akaike Information Criterion produced implausibly low lag-order estimates, which led to counter-intuitive impulse response results. In response, the authors simply imposed a higher lag order throughout and found that the problem disappeared. It is striking that this apparent issue with underfitting was encountered using the AIC selection approach, which is ostensibly the *least* parsimonious of the main information criterion approaches, implying that the problem might have been even more acute applying the SBC or HQC criteria. This example highlights the risk of essentially sub-contracting the

important decision of determining a suitable lag-order to an information criterion, and and at minimum suggests that the modeller needs to carefully examine the empirical plausibility of models estimated in this manner, with the costs of excessive lag truncation running high.

Given the risk of underfitting arising from use of information criterion, it is natural to ask what other approaches might be used to reliably specify the lag-order. A well-used rule of thumb found throughout the literature is to include 12 monthly lags (or 4 lags if using quarterly data) since it is judged to be sufficiently long as to allow the pass-through effects of core macroeconomic variables to be felt, whilst at the same time not being overly exacting on the parsimony of the model (assuming of course that the dimensionality of the VAR, i.e. the number of endogenous variables, remains manageable). An influential contribution by Bernanke et al. (1997) analysing the impact of monetary policy and oil shocks on GDP underscores the value of this simple rule of thumb - and how undershooting it can lead to unreliable inferences. Their model employed a lag order of p(7) as indicated by the Akaike Information Criterion, however, this was subsequently shown by Hamilton & Herrera (2004) to be excessively short since when the lag order was increased to p(12) and p(16) respectively, the substantive findings of the paper were overturned. Indeed, Hamilton and Herrera found that there were large and statistically significant direct effects of oil price shocks for p(12) and p(16) that were not manifest by the p(7) specification. In this vein, it is often the case that for many practical applications in empirical macroeconomics a year's worth of lags provides an attractive starting point from which further addition or truncation of lags can occur as necessary.

An important facet of the applied econometrics literature regarding lag-order specification pertains to the apparent asymmetry of the costs arising from underfitting and overfitting respectively. Kilian (2001) notes that in the context of impulse response analysis the overestimation of the lag-order is costly only to the extent that the impulse response estimates are

less precise, whilst underestimation tends to greatly distort the impulse response functions - particularly at longer horizons. This leads to the suggestion that the modeller ought to employ an asymmetric loss function that errs towards including too many lags rather than too few, and that the use of a reasonably large fixed lag order helps avoid the problems of inference analysed in Leeb & Pötscher (2005). In a key contribution to the oil shocks literature, Kilian (2009) includes 24 monthly lags in his analysis of the global oil market since it can be shown that the salience of global demand shocks vanishes if the model is restricted to just 12 lags. Therefore, an important point worth emphasizing is that the appropriate lag order intimately depends on the variables being modelled and the duration required for pass-through following a shock: since our own investigation will be concerned with, inter alia, the impact of exchange rate movements on the manufactures trade balance and the differential impact of nominal (monetary) versus real (oil) shocks on the exchange rate, it would seem necessary to veer towards a longer lag length in order to avoid omitting any important dynamics that manifest beyond the 12 month mark.

3.4.4 Baseline Model Specification

Our baseline analysis comprises a six-dimensional structural VAR inspired by the framework of Chen & Chen (2007); we have augmented the model to include variables specific to the manufacturing sector, in keeping with the focus of the paper. In this vein the model comprises: {global economic activity index; real oil price; RGDP; real effective exchange rate, manufactures trade balance; long term interest rate}. Oil price, RGDP, and the real effective exchange rate are in logarithms. The estimation period is 1979m06 - 2005m12: this aligns with the election of Margaret Thatcher's first government as well as capturing the period in which the UK was a net exporter of oil. Following the suggestion of Ramey (2011) and Ramey (2016) we include a quadratic trend to help account for shifts in productivity growth as well as the effect of demographic changes working through macroeconomic variables. The baseline model is identified recursively, with the short-run restrictions shown below by the

vector and matrix representation of the VAR system [27]:

Global Activity Index: constructed by Kilian & Zhou (2018), this variable is designed to capture fluctuations in global economic activity, which are likely to affect both the real price of oil as well as other open-economy macroeconomic variables. It avoids some of the pitfalls associated with using global GDP or industrial output - see Kilian's paper for further discussion.

Real Oil Price: the logarithm of the real price of Brent crude. We condition this variable on the global activity index to ensure that our oil shocks are not merely picking up the impact of rising (falling) global demand.

RGDP: controlling for changes in domestic economic activity is relevant for the exchange rate, trade balance, and other variables of interest.

Real Effective Exchange Rate: REER is the key relative price variable capturing the impact of decreasing (increasing) competitiveness. It also features heavily in the theoretical models of Dutch Disease that are used to frame discussions regarding the impact of a booming commodity sector.

Manufactures Trade Balance: this variable captures internationally traded manufactured goods, and is regarded as a key bellwether for establishing whether Dutch Disease is afflicting the economy (through a variety of potential channels).

Long Term Interest Rate: the long-term interest rate is a key factor underpinning the cost of capital, which is of marked importance for the manufacturing sector. It also has close

[27] Deterministic components are omitted from this schematic representation for ease of exposition.

theoretical links with the famous Hotelling Rule from resource economics, which posits a relationship between commodity prices and the long term interest rate [28].

$$\begin{pmatrix} U_t^{GAI} \\ U_t^{Oil} \\ U_t^{RGDP} \\ U_t^{REER} \\ U_t^{MTB} \\ U_t^{Long_i} \end{pmatrix} = \begin{bmatrix} b_0^{11} & 0 & 0 & 0 & 0 & 0 \\ b_0^{21} & b_0^{22} & 0 & 0 & 0 & 0 \\ b_0^{31} & b_0^{32} & b_0^{33} & 0 & 0 & 0 \\ b_0^{41} & b_0^{42} & b_0^{43} & b_0^{44} & 0 & 0 \\ b_0^{51} & b_0^{52} & b_0^{53} & b_0^{54} & b_0^{55} & 0 \\ b_0^{61} & b_0^{62} & b_0^{63} & b_0^{64} & b_0^{65} & b_0^{66} \end{bmatrix} = \begin{pmatrix} W_t^{GlobalDemandShock} \\ W_t^{OilPriceShock} \\ W_t^{AggregateDemandShock} \\ W_t^{REERShock} \\ W_t^{ManufacturesTradeShock} \\ W_t^{InterestRateShock} \end{pmatrix}$$

3.5 Output and Discussion

3.5.1 Oil and the Real Exchange Rate

The impulse response function in Figure 3.5.1 shows the response of the real effective exchange rate to a one standard deviation real oil price shock [29]. The exchange rate begins to appreciate steadily over the course of the first 18 months, before hitting a peak of around 1.1% around horizon 20. The exchange rate continues to remain elevated for a protracted period, undertaking a slow reversion towards the baseline, with the full effects of the shock finally dissipating a little short of the 5-year mark. The key takeaway from this impulse response is that not only do oil shocks produce a substantive appreciation of the real effective exchange rate, in keeping with the standard Dutch-Disease hypothesis, the effect is also characterized by marked persistence, which carries considerable implications for the price-competitiveness of the tradable sector. The forecast error variance decomposition (FEVD) in Table 3.5.1 confirms the substantive impact of oil shocks on the dynamics of the real

[28] There is a substantial theoretical literature analysing the Hotelling rule: for an useful overview see Livernois (2009).

[29] Dashed Lines Denote 95% Confidence Bands Constructed Using Hall's Percentile Bootstrap

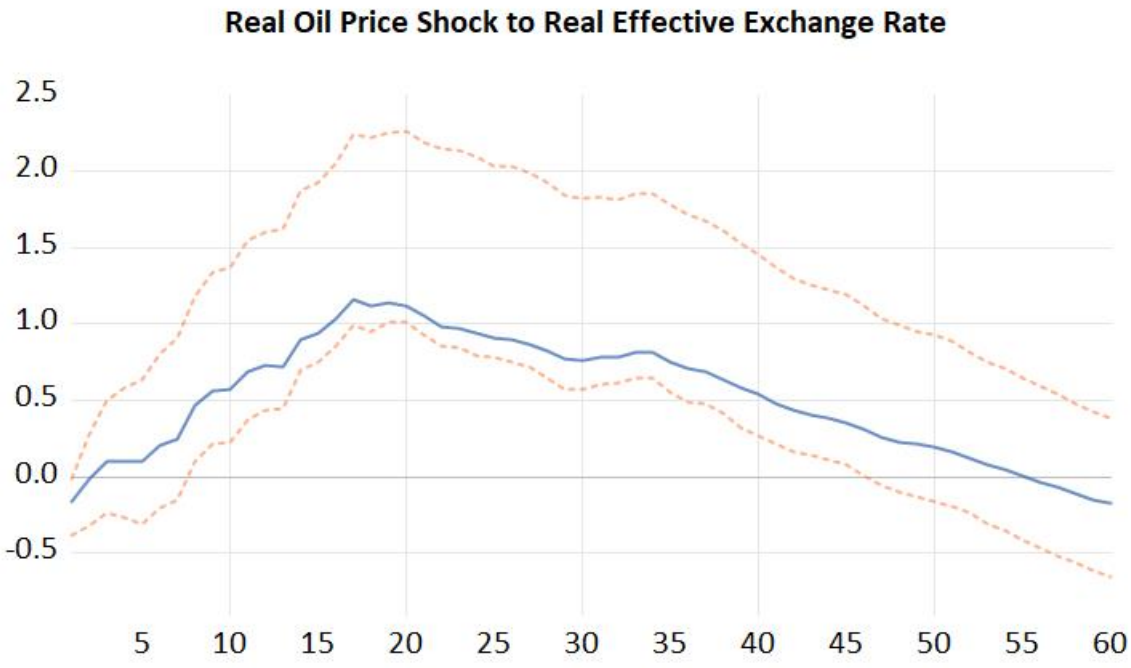


Figure 3.5.1: Impulse Response of Real Effective Exchange Rate to One Standard Deviation Real oil Price Shock

exchange rate, particularly at longer horizons, indeed, between horizons 36-60 oil accounts for more than a quarter of exchange rate perturbation. As is clear, the impact of oil is greater than all the other shocks (RGDP, global demand, long term interest rates etc) bar the exchange rate's own idiosyncratic shocks.

Horizon	S.E.	Global	Oil	RGDP	REER	Trade Bal	Long i
12	0.06	6	5	5	79	1	4
24	0.08	5	20	4	66	1	4
36	0.09	5	27	3	59	1	5
48	0.09	5	28	3	57	1	5
60	0.09	5	29	3	57	1	5

Table 3.5.1: Forecast Error Variance Decomposition of Real Effective Exchange Rate

3.5.2 Corroborating Evidence From Oil News Shocks

The preceding analysis identified oil shocks in the context of a structural VAR model, taking care to control for the potentially confounding influence of global demand when seeking to recover genuinely exogenous oil price shocks. Care was also taken to model those domestic economic variables likely to affect the dynamics of the real exchange rate. It would be highly desirable, however, to ascertain whether the core findings regarding oil and the real exchange rate (as typified by the impulse response function and forecast error variance decomposition) can be obtained using an alternate leading approach from the literature on identifying oil shocks.

In this vein, we utilise the Proxy-VAR approach discussed in the previous section, which essentially makes use of external-instruments, i.e. information obtained from *outside* the VAR model that act as a proxy for the true structural shock of interest. We use the OPEC oil news shocks advanced by Känzig (2021) as an external instrument to study the impact of oil shocks on the real exchange rate: we estimate a bivariate VAR, since the oil news shock is (by its very construction) an exogenous regressor that it is orthogonal to other confounding macroeconomic influences [30]. Indeed, a noted advantage of the external instruments approach is the ability to estimate much more parsimonious models, since endogenous influences have been expunged during the first-stage estimation, whereas in the structural VAR it is necessary to control for key endogenous influences in order to recover genuinely orthogonal shocks.

It is quite evident that the impulse response function of the real effective exchange rate (REER) to the oil news shock in Figure 3.5.2 is very similar to the result obtained in the baseline SVAR analysis [31]. In both cases the response of the REER is to appreciate

[30] Complete model specification is available in the Appendix.

[31] The impulse response function is bounded by 68% and 95% confidence intervals respectively, constructed via Hall's Percentile Bootstrap.

Figure 3.5.2: Impulse Response Function of Real Effective Exchange Rate to One Standard Deviation Oil News Shock.

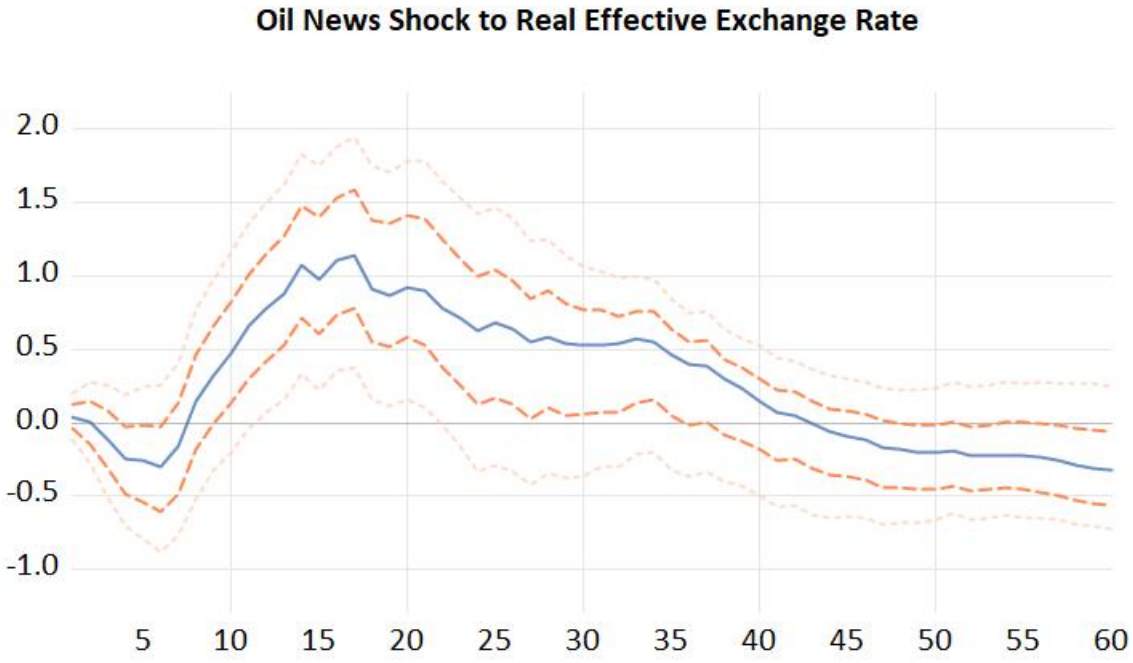


Table 3.5.2: Forecast Error Variance Decomposition of Real Effective Exchange Rate

Horizon	S.E.	Oil News	REER
12	0.06	5	95
24	0.08	21	79
36	0.08	24	76
48	0.08	24	76
60	0.08	23	77

persistently, hitting a peak of just over 1% around the 18 month mark. The reversion back towards the pre-shock baseline occurs slightly faster in the case of the oil news shock (around the 45 month mark) where as in the SVAR this takes about 55 months, thus indicating greater shock persistence in the latter. A comparison of the forecast error variance decomposition is also helpful, since it allows us to assess the relative importance of each of the oil shocks in accounting for the overall dynamics of the REER. The results are reassuring: we can see in Table 3.5.2 that by horizons 24 and 36 respectively the oil news shock accounts for 21% and

24% of REER variation, compared to 20% and 27% for the baseline SVAR specification. In other words, oil shocks account for around one-fifth and one-quarter of REER dynamics at the 2-year and 3-year marks respectively under both specifications.

3.5.3 The Real Exchange Rate and Tradeable Manufactures

An area of great contention in the UK public policy debates surrounding North Sea oil pertained to the impact of a rising real exchange rate on the competitiveness of UK manufactures tradeables. The atrophying of the non-commodity tradeable sector is a hallmark of Dutch Disease, namely the risk that the booming commodity sector causes a deterioration in the relative price competitiveness of the home country's exports, thereby inducing decline in the manufacturing sector. In the case of the United Kingdom, however, there had been some ongoing debate (even prior to oil becoming a controversial policy issue) regarding the extent to which exchange rate induced fluctuations in relative price competitiveness actually affected export performance.

One strand of thought, which was captured under the auspices of the so-called 'New Trade Theory' suggested that price competitiveness was no longer the defining feature of success in international trade, and that attributes such as quality, diversification (particularly the ability to customize products), as well as the level of customer service; after-care, and delivery times were in fact the major determinants of export performance. The other train of thought was so-called 'pricing-to-market', which suggested that under conditions of imperfect competition it would in fact be possible for a given firm selling its goods internationally to engage in price discrimination based on perceived willingness to pay (Goldberg & Knetter 1997). The policy implications of this were straightforward enough, namely that devaluation might not actually pass-through to improved price competitiveness if firms simply opted for offsetting price adjustments, whilst in the case of an ostensibly overvalued exchange rate, firms could selectively lower prices for their more price-sensitive clientele whilst cross-subsidizing this

with selective price rises amongst the less price conscious of their customer base. Whatever the merits or de-merits of each of these positions, they collectively amounted to a serious challenge against the importance of relative prices as the key driver of export performance.

So how did the real effective exchange rate (REER) affect manufactures exports? We modify the baseline model slightly to include variables of manufactured exports and manufactured imports respectively, estimating a six variable VAR model - see Appendix for full model details. Figure 3.5.3 plots the impulse response of manufactures exports to a one standard deviation REER shock (+1.6%): the response is quite textbook ('J-curve') insofar as the appreciation leads to an initial rise in the manufactures trade balance for six months or so, before entering a prolonged decline with the trough occurring around the 30 month mark. Reversion to the pre-shock baseline is slow, taking nearly a full 60 months, implying that REER shocks exert highly persistent effects on export performance. Cumulating the responses of the individual point estimates h1, h2 ... h60, and dividing by the total number of months (i.e. 60), we obtain an average decrease in manufactures net export earnings of around 1% per month for five years. At minimum this entails a sizeable reduction in manufactures export earnings, whilst also carrying potential for a loss of market share that could be costly to recover or even irreversible.

Our findings echo Beaven et al. (2013), who undertake a comparative analysis of the UK manufacturing sector vis-a-vis a group of OECD competitors: they find that the UK underperformed substantially in terms of price competitiveness since the 1980s and ascribe an important role for the exchange rate in this story. Similarly, two NIESR economists, Mortimer-Lee & Mao (2022), consider the role of the exchange rate in the context of the UK's broader deindustrialization experience; they ascribe particular importance to the exchange rate as a conduit for profitability in the manufacturing sector (notably in relation

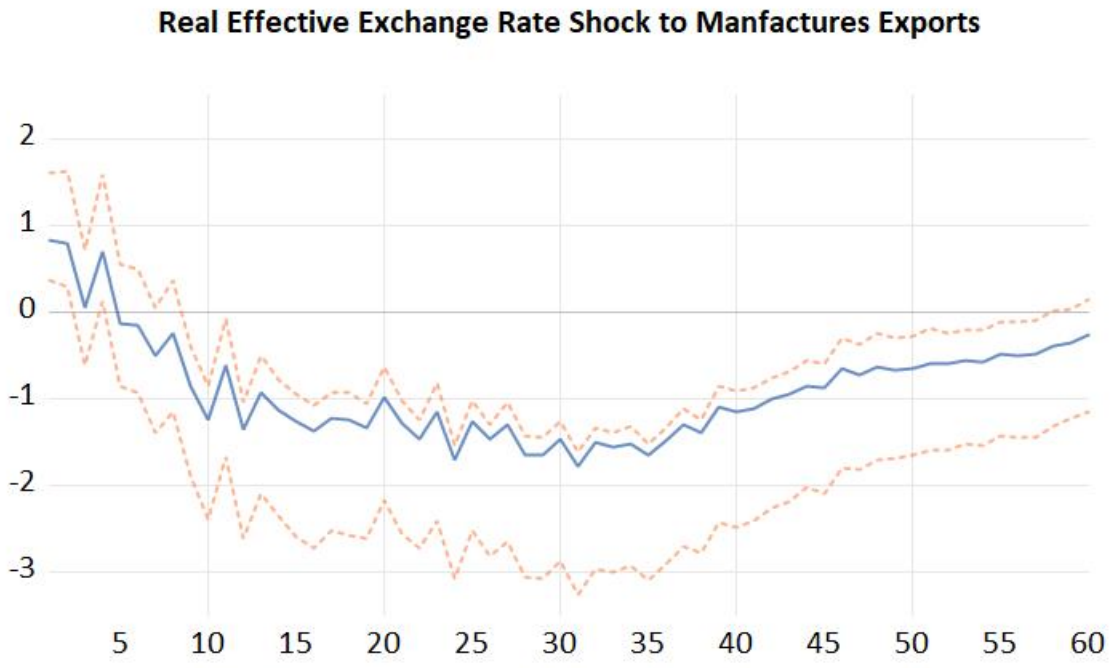


Figure 3.5.3: Impulse response of manufactures exports to a one standard deviation real effective exchange rate shock.

to services)[32]. And given the importance of the internal financing mechanism within the manufacturing sector they argue that a softer exchange rate has a key part to play in raising investment (and ultimately productivity) for UK manufacturing. Thus, whilst the exchange rate could not have restored the fortunes of British manufacturing independently, it would nonetheless have a very important role to play in the appropriate policy-mix.

3.5.4 Alternate Model - Terms of Trade and Net Exports

Another interesting avenue through which oil can manifest symptoms of Dutch Disease in the economy is via the terms of trade: a basic theoretical mechanism would suggests that increases in the terms of trade owing to high commodity prices can precipitate wealth effects

[32]The authors make some interesting observations regarding the experience of recent years, including the relative strength of sterling in the years leading up to the Global Financial Crisis. And then, despite a drop-off during the crisis itself, a strong recovery in the wake of the Euro crisis encouraged funds from Germany and other Northern European countries - previously destined for Southern European economies - to divert to the UK, thereby worsening competitiveness.

that may ultimately give rise to unsustainable external deficits (Frankel 2010). Indeed, this channel is suggested in the context of the UK economy by Coutts & Rowthorn (2013), who highlight the oil-induced increase in disposable income and shifts in the terms of trade as being reasons for the declining net exports of manufactures, and that this effect can exist quite independently of the real exchange rate channel.

To investigate further, we construct an energy terms of trade variable along the line of Spatafora et al. (2009) and augment our baseline VAR model - see Appendix for full details. We then estimate a six-dimension VAR for the period 1979m06 - 2005m12, lag order p(18), comprising: {Terms of Trade, Global Activity, RGDP, Mfg.Trade Balance, REER, Long i} including a dummy variable for the ERM interlude and a trend.

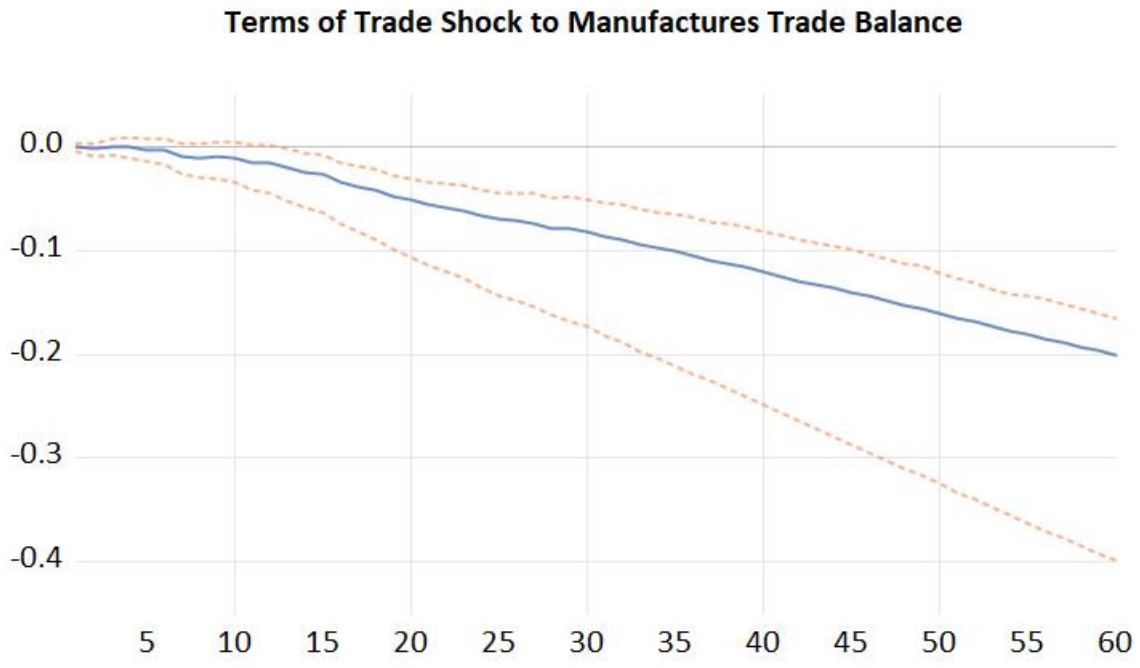


Figure 3.5.4: Accumulated Impulse Response of Manufactures Trade Balance to One Standard Deviation Terms of Trade Shock.

The accumulated impulse response in Figure 3.5.4 shows the progressive diminution of the manufactures trade balance following a one standard deviation terms of trade shock, i.e.

a rise in the terms of trade [33]. Furthermore, in the forecast error variance decomposition the terms of trade variable accounts for around 20% of perturbation to the manufactures trade balance at longer horizons: it is important to note that this effect occurs even having controlled for the exchange rate in the model, so we are not simply picking up the effects of exchange rate induced movements in the terms of trade. On the contrary, the literature appears to provide a compelling theoretical explanation as to why this phenomenon should occur.

It is instructive to begin interpreting our result with reference to the classic Harberger-Laursen-Metzler (HLM) effect, which is essentially a non-optimizing model for understanding the impact of autonomous changes in terms of trade on the external balance [34]. In this framework, a rise in the terms of trade elicits a corresponding increase in the trade balance, whilst a fall in the terms of trade produces a deterioration in the trade balance. The intuition for this result rests on the view that a deterioration (rise) in the terms of trade results in a decline (increase) in real income and saving, and assuming that investment and the government's budget balance are held constant then the change in saving will in fact be equal to the decrease (improvement) in the current account balance. There is a distinctively Old Keynesian feel to the HLM model, insofar as savings is posited as a function of current income, whilst there is a distinct absence of forward-looking or optimizing behaviours on the part of households, businesses, or government. What is clear is, however, is that the spirit of the HLM model seems highly incongruous with our empirical finding of a decline in the manufactures balance in response to a (positive) terms of trade shock and hence alternate theoretical approaches are needed to reconcile with the data [35].

[33]Recall that the accumulated impulse response is the sum of each of the individual point estimates h1, h2 ...hN, which can then be divided by the total number of periods (in this case, N=60) so as to gauge the average response of the dependent variable to the shock per unit time period.

[34]For the key original works see: Harberger (1950) and Laursen & Metzler (1950).

[35]It is worth pointing out of course, that this does not amount to a direct empirical test of the HLM model since we are interested in examining the dynamics of the manufactures trade balance, which is just one component (albeit a large one) of the overall current account balance. Nonetheless, we believe that its concepts readily applicable and its policy implications sufficiently instructive to warrant consideration in the

How best might we characterize response the impulse response function (IRF) of the manufactures trade balance given the apparent failure of the HLM model to be consistent with the data? Schmitt-Grohé et al. (2022) emphasize the importance of a view that emerged from the dynamic optimizing literature, which they term the Obstfeld-Razin-Svensson(ORZ) effect. The ORZ effect postulates that when the terms of trade are nonstationary, an improvement in the terms of trade induces a trade deficit, since the value of income is expected to grow over time and hence agents can afford to incur higher debts without foregoing future expenditures. This notion of forward-looking, consumption-smoothing households engaging in current borrowing against expected increases in future income is central to the intertemporal approach. A similar result is obtained by Servén (1999) who examines the impact of terms of trade shocks in an intertemporal framework focusing on investment: again he finds that a rising terms of trade elicits a deterioration in the current account balance[36].

Frankel (2010) points out that terms of trade induced current account deficits are a classic feature of Dutch Disease when they end up resulting in an accumulation of liabilities which may then prove difficult to service once commodity prices have fallen from current or expected levels. In this respect, terms of trade shocks can be seen as interacting with the imperfect information held by agents in the commodity economy, insofar as agents are compelled to form expectations about the persistence of the shock and the implied future path of the terms of trade [37]. When these expectations are not fulfilled, it can generate behaviour that appears odd ex-post, such as a large reduction in the savings ratio (and hence deterioration of the current account balance) to fuel a consumer-import binge prior to

theoretical discussion.

[36]It is important to recognise that not all investment will be beneficial for the current account in this regard: firstly, investing itself runs down national savings and is liable to give rise to a falling current account balance, and secondly, if there is a classic 'resource transfer' effect from manufacturing to services as posited by Dutch Disease theory, the heightened expenditure induced by the expansion of the non-internationally traded service sector is likely to place uncompensated strain on the trade balance.

[37]See Schmitt-Grohé et al. (2022, Ch.4) for a discussion on imperfect information and terms of trade shocks).

major drop in commodity prices. Muellbauer & Murphy (1990) cite oil as one of a number of factors contributing to a large rundown in UK household savings during the 1980s, and link this to the ensuing deterioration in the manufactures trade balance (specifically heightened consumption of manufactures imports).

3.5.5 Did the UK Suffer From a Bout of the Dutch Disease?

It is necessary to tie our empirical findings to some overall assessment of whether the UK was suffering from a bout of the Dutch Disease, broadly defined. The stark reality is that making such an assessment is highly subjective, and in particular it appears to hinge heavily on whether one regards the oil-induced increases in the exchange rate and terms of trade, and the ensuing deterioration of the manufactures trade balance as an *equilibrium* phenomenon, or rather a transitory period which will exacerbate a process of adverse structural transformation, leaving the economy significantly exposed once a commodity price crash or resource depletion occurs.

The interpretation of our empirical findings presents an interesting case, since there is an argument to be made for both an optimistic and pessimistic account of the seemingly adverse effects of oil on the non-commodity tradable sector [38]. A positive assessment would argue that the deterioration of the non oil trade account was merely the logical counterpart of discovering oil and gas, and as such our result concerning the appreciation of the real exchange rate was an entirely predictable and even desirable occurrence, since it helps prevent the commodity-exporting economy from being swamped by inflationary capital inflows. Similarly, the finding of a persistent reduction of net manufactures in response to positive terms of trade shocks merely reflects the fact that the gift of North Sea oil implies higher national wealth: enjoying the fruits of this good fortune with higher imports of manufactures is no bad thing and is a natural response to the nation's black gold. At any rate, structural shifts

[38] These are drawn from the discussion in Muellbauer and Murphy (1990) - Section 3.

had been at play in the global economy since the 1960s, which saw a progressive decrease in the price of consumer durables, in tandem with a high income elasticity of demand for manufactures - all that North Sea oil did was exacerbate the existing trend.

Conversely, the aforementioned findings can be viewed as a cause for real concern: the large appreciation of the nominal exchange rate induced by oil translates into a real terms decrease in the price competitiveness of the manufacturing sector, with all the attendant implications this carries for profitability and future investment. The terms of trade increases give rise to persistent deficits fuelled by elevated consumption of manufactures imports, and whilst the home manufacturing sector withers on the vine, the country amasses external liabilities on the back of a consumption-fuelled rundown of national savings. Worst of all, there is no strategy in place as to how the country will revive its tradable sector once the bulk of the (profitable) oil reserves have been depleted; essentially policy makers are left to cross their fingers and hope that manufacturing firms successfully internalize the costs of re-entering foreign markets - if they have even continued trading within the domestic market that is. Furthermore, to the extent that the manufacturing sector represents a valuable source of learning-by-doing and other increasing returns effects, whilst the commodity sector is characterized by decreasing returns to scale, the trend growth rate of the economy may come to suffer.

An intriguing and contentious issue that ties together the economics of Dutch Disease with the longer-term implications of North Sea oil for the UK economy relates to management of the oil windfall. Now on one level, widespread dissatisfaction with the management of the North Sea oil revenues actually transcends the debates regarding Dutch Disease, since economists favouring the Dutch Disease hypothesis, as well as those against it, were very critical of the way in which matters transpired regarding the windfall. The diagnosis regarding Dutch Disease still matters a lot, however, since it helps to inform the alternate

policy proposals regarding how the windfall should have been used - this constitutes the subject matter of Section 7.

3.6 Extensions and Robustness

3.6.1 Historical Decompositions of Selected Variables

In complementary fashion to the impulse response functions and forecast error variance decompositions presented in the main paper, it can be useful to view the information obtained from structural VAR systems through the lens of a historical decomposition. These notably allow for an examination of the relative importance of particular shocks on a dependent variable on a horizon by horizon basis - i.e. month by month for the models we have estimated. We produce historical decompositions for the real effective exchange rate, RGDP, and long-term interest rate respectively, for the period 1980m1-2005m12.

The decomposition of the real effective exchange rate (REER) brings to light a few interesting points. Firstly, during the UK's bruising experience with deep recession in the early 1980s, we can see that both Brent oil and the long-term interest rate had a role in accounting for the overall variation in the REER (that is, the blue vertical bars). This is consistent with existing historical accounts which emphasise the disinflationary monetary tightening, as well as the impact of North Sea oil in precipitating a sharp rise in the real exchange rate. Secondly, throughout the entire period the role of REER's own shocks in accounting for its dynamics is readily apparent and is consistent with the notion of an exchange rate disconnect from other key macroeconomic variables. A third and somewhat overlooked feature of the UK's recent macroeconomic history is the pronounced role played by oil in driving upward pressure on the real exchange rate during the early to mid-2000s period: indeed, we can see that from around the turn of the millennium, Brent oil shocks are overwhelmingly responsible for the upward movement of REER. This intriguing empirical finding is consistent with the sharp

increase in oil prices over the same period, which finally peaked in 2008 before the collapse in real output elicited by the Global Financial Crisis came to the fore. Indeed, Baumeister & Kilian (2016) characterise this episode as the 'Great Surge', which saw the most pronounced rise in oil prices since 1979, underpinned by a vigorous expansion of global demand that was not offset by commensurate increases in the supply of oil.

So far as the dynamics of RGDP are concerned, the historical decomposition doesn't indicate that great importance ought to be attached to oil shocks. Other factors, such as global economic activity and long-term interest rates are much more decisive in accounting for the ebb-and-flow of RGDP. This point is central to the more recent literature on modelling the effects of oil shocks, which emphasizes that it is not necessarily oil price movements themselves that directly affect RGDP, but rather responsibility lies with the underlying shifts in global supply and demand, which themselves affect oil prices, and are ultimately responsible for affecting a country's national output [39]. Finally, it is instructive to glean an insight into how oil shocks affect the long-term interest rate, the latter being of considerable importance for inflationary expectations and the cost of capital within an economy. The historical decomposition indicates that the effect of oil shocks has been -at best- very modest on the dynamics of long-term interest rates, indeed, domestic and global economic activity appear to be far more salient drivers in this regard. This finding is broadly consistent with those of Cologni & Manera (2008) who investigate the joint dynamics of oil prices, inflation and interest rates for the G-7 countries.

3.6.2 Monetary Shocks versus Oil Shocks: a Two Horse Race?

The preceding analysis has modelled the long-run rate of interest on account of its key theoretical link with the price of oil via the Hotelling rule, as well as its being of considerable importance for both manufacturing investment and output. A question of considerable in-

[39] For an authoritative and engaging survey of the current state of this empirical literature, see Kilian & Zhou (2023).

Figure 3.6.1: Historical Decomposition of Real Effective Exchange Rate (Various Shocks)

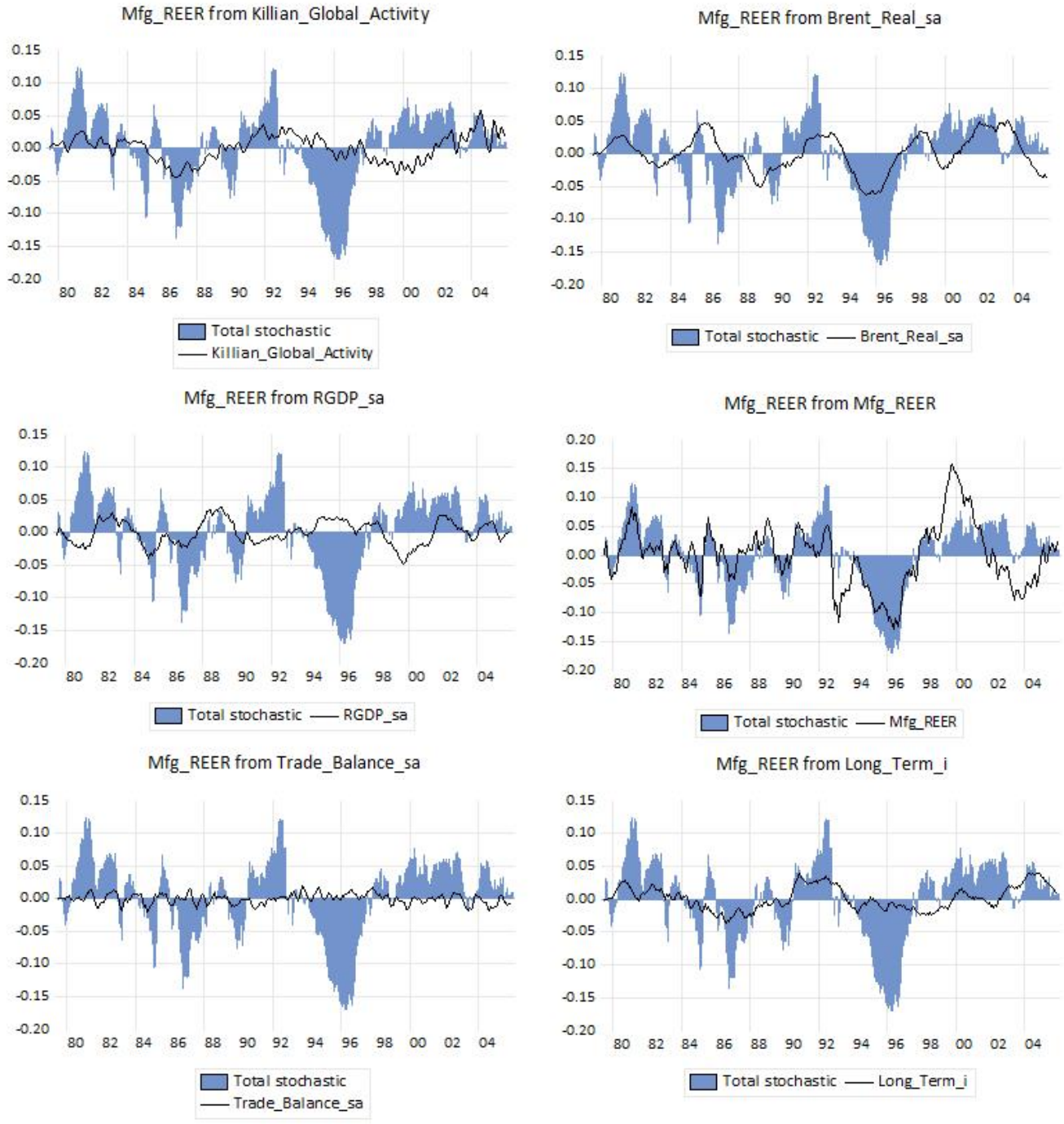


Figure 3.6.2: Historical Decomposition of Real GDP (Various Shocks)

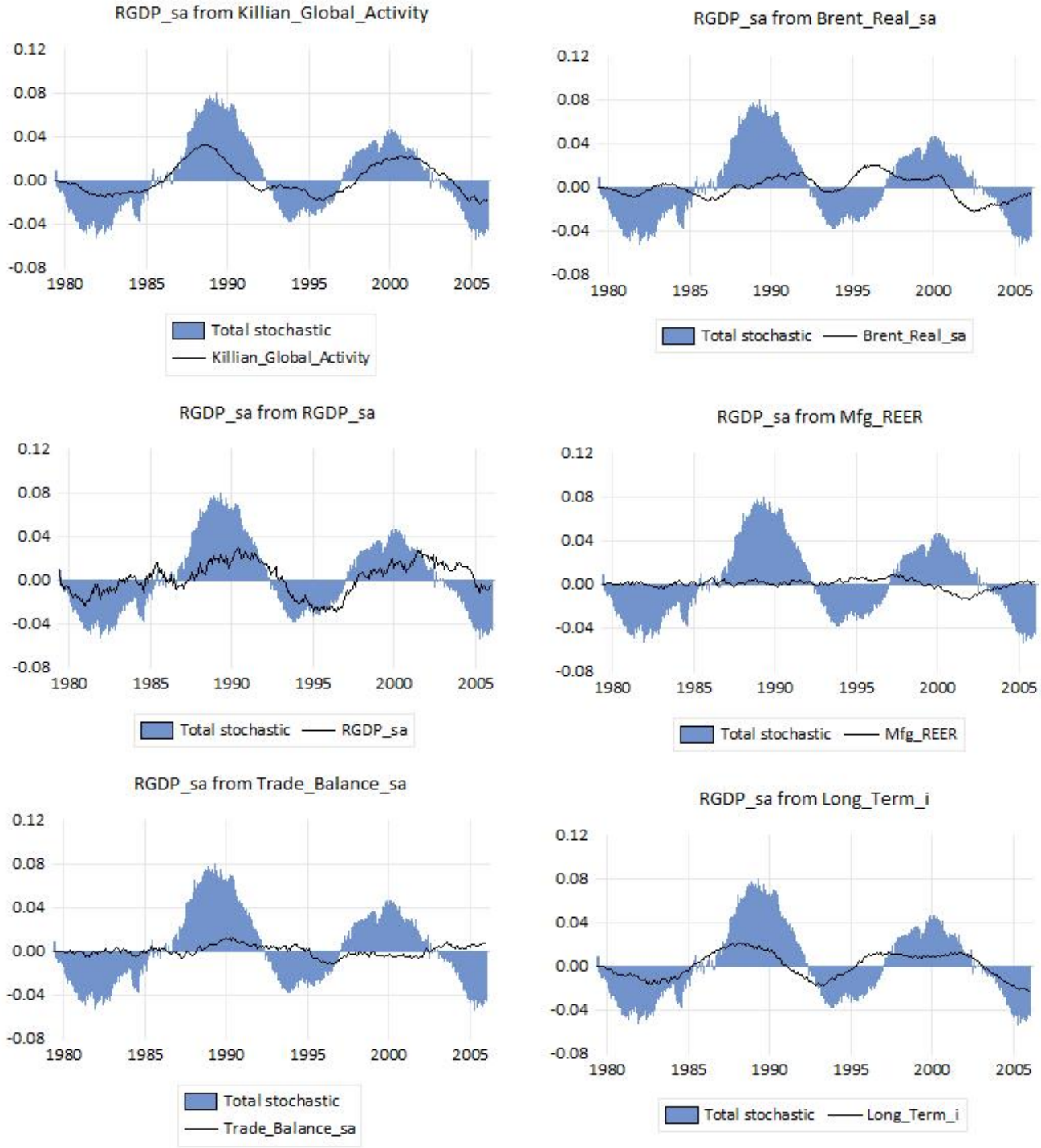
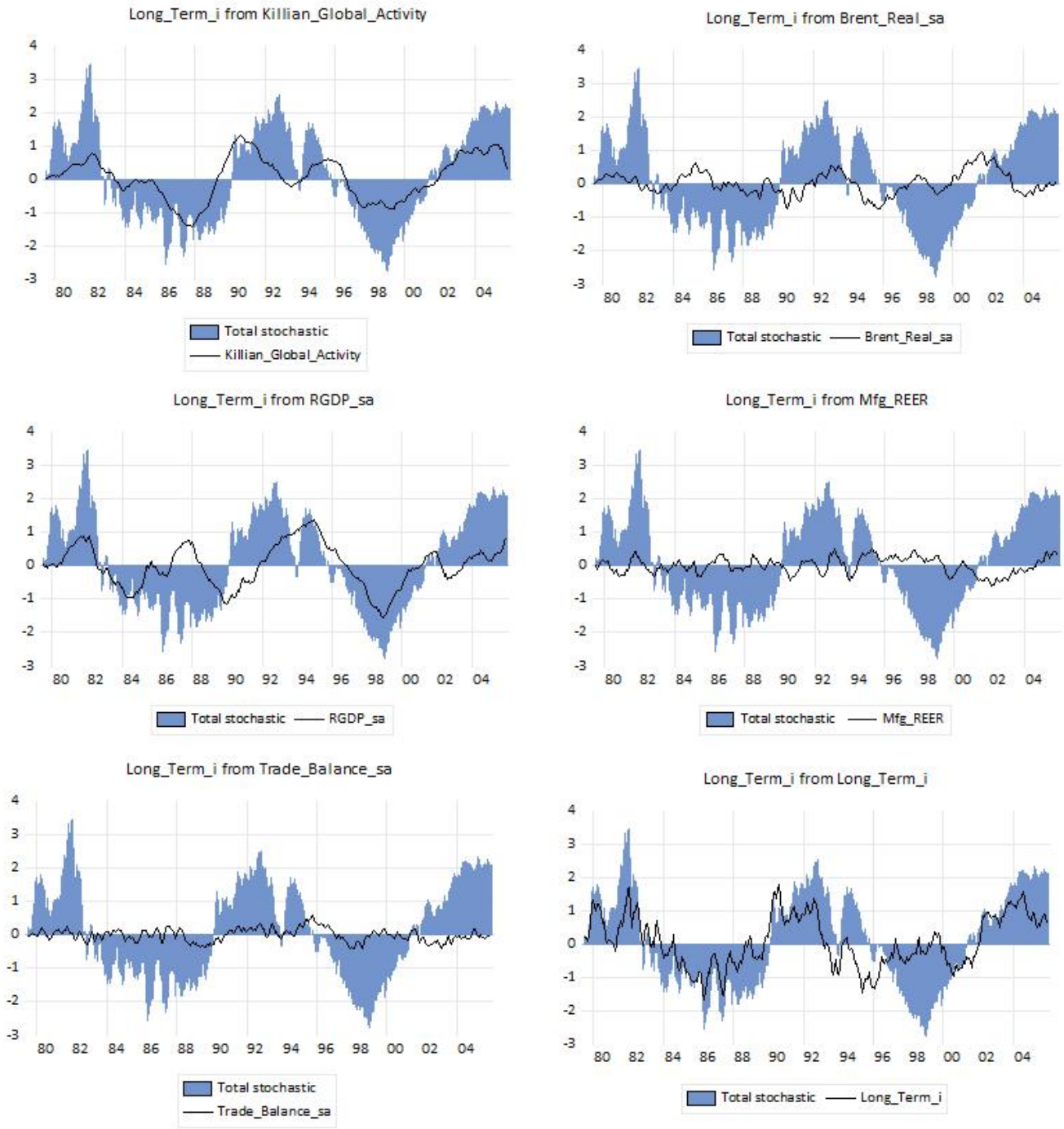


Figure 3.6.3: Historical Decomposition of Long Interest Rate (Various Shocks)



terest, however, centers on the relative importance the central bank's policy rate shocks in driving movements in the real exchange rate. This matter is of considerable theoretical, policy, and historical significance: on a theoretical level the seminal contribution of Dornbusch (1976) ascribed a core role for what are essentially monetary innovations driving nominal exchange rate movements, which in the face of sticky wages and prices, give rise to marked fluctuations in the *real* exchange rate [40]. The disequilibrium"approach a la Dornbusch stands in contrast to the prominent work of Stockman (1987) amongst others, who stress the importance of real shocks with large permanent components as being the decisive source of real exchange rate fluctuations (the "equilibrium" approach). The theoretical discord between the two camps continues to represent an important battleground for empirical research in international macroeconomics, and is an issue that our analysis can seek to speak to.

Meanwhile in matters of economic policy, it is well recognised that due to the inflationary impulse associated with oil price shocks, the monetary authority will often respond with contractionary policies so as to prevent large rises in the price level, or analogously to avoid missing their inflation target. Segal (2011) highlights the controversy surrounding the supposedly adverse impact of oil shocks: is it the oil shocks themselves that cause the real exchange rate to appreciate, with sharp losses in output and rising unemployment? Or rather, is it the heavy-handed policy decisions of the central bank which account for the ensuing economic turbulence? This question divided UK economists in the early 1980s and has continued to foment disagreement in the academic literature - see Barsky & Kilian (2004) and Baumeister & Kilian (2016) for an informative discussion. In this spirit, it would be of considerable interest to compare the relative importance of monetary and oil shocks as drivers of real exchange rate fluctuations in the UK economy during its time as a substantive exporter of oil.

[40]Such is the enduring appeal of the Dornbusch model that it continues to attract important contributions in leading journals - see for instance: Rüth (2020); Kim et al. (2017) and Bjørnland (2009).

In practise there are some considerable econometric difficulties to surmount when seeking to examine the impact of a central bank's monetary policy decisions. An obvious difficulty is that the policy rate is inherently forward-looking, in that policy makers exercise judgements about the future inflationary outlook and then seek to adjust policy in light of this. Viewed through this lens, interest rate movements can actually be seen as embodying policy makers' response to anticipated economic developments, as well as their subjective assessment of the likely path of the economy based on a broad reading of different economic indicators. The problem arises when these future expectations and beliefs are essentially unmodelled directly within the VAR system, which leads to a sharp difference in the information set being acted on by the policy makers versus the information set captured by the VAR system, an incongruity which can result in serious problems when seeking to uncover dynamic causal relationships. An early and well known example of this problem was the infamous 'price puzzle' in which VAR models seemed to suggest that an increase in the central bank's policy rate caused a rise in the rate of inflation - clearly a perverse outcome based on most macroeconomic reasoning. Sims (1992) provided a workable solution by incorporating a variable on commodity future prices: this helped to reconcile the informational disparity between the VAR model and the monetary authorities. The reason for this was that the commodity future prices contained valuable information regarding the future rate of inflation; information which the monetary authorities assimilated into their own decision making process, thus helping to bridge the gap between the model and the historical reality.

Other pertinent issues include the fact that monetary policy in the United Kingdom has undergone a number of marked evolutions in the years since the demise of the Bretton Woods system. These include the unique approach to monetary policy during parts of the 1980s (the "Monetarist experiment"); then came monetary policy under a fixed exchange rate during the Exchange Rate Mechanism (ERM) interlude, October 1990 - September 1992. Next was the era of formal independence of the Bank of England (1997 to present)

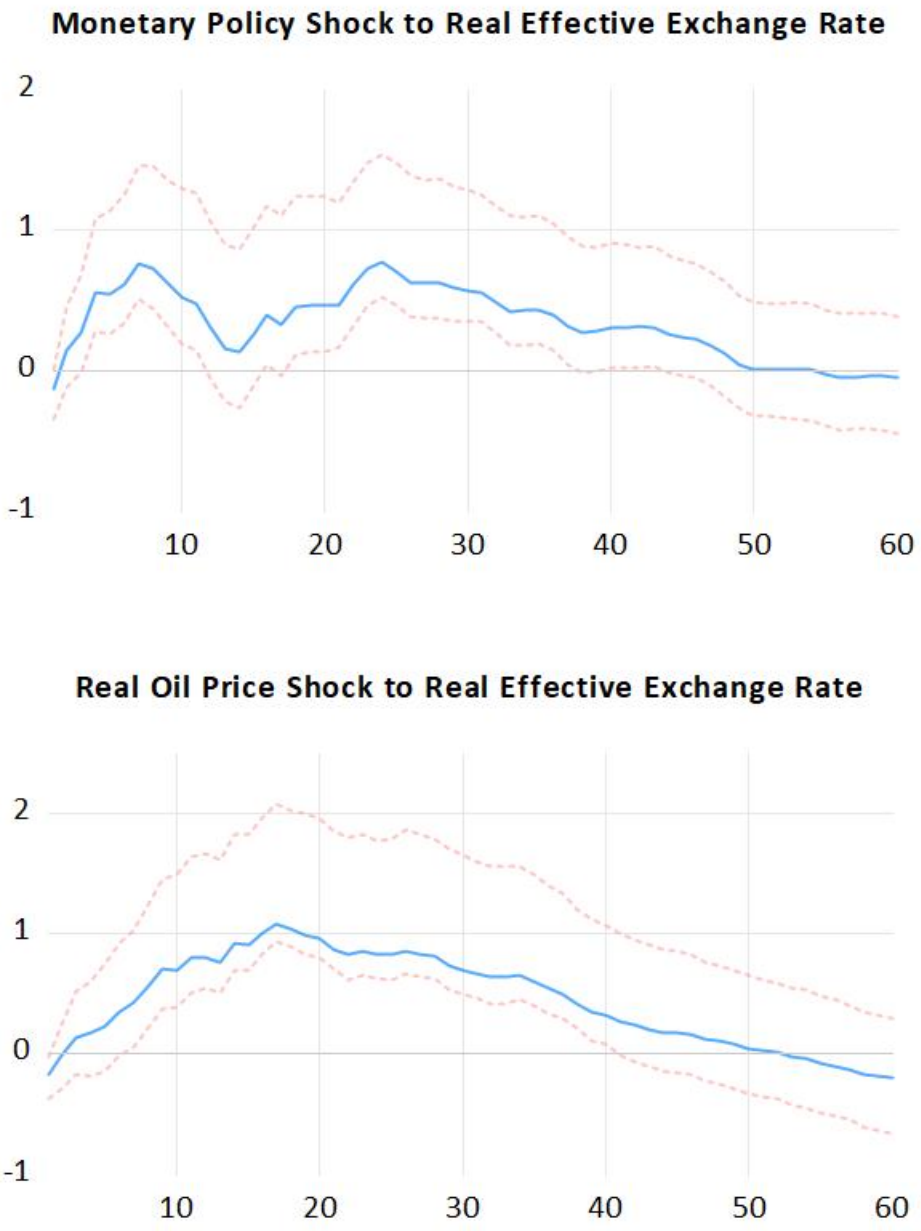
in matters concerning monetary policy. In other words, any modelling approach that seeks to derive causal inferences must be acutely sensitive to the evolving nature of UK monetary policy in its various guises. With this in mind, Cloyne & Hürtgen (2016) sought to construct a measure of genuinely exogenous monetary policy shocks for the United Kingdom based on the influential narrative approach of Romer & Romer (2010), which is capable of mitigating the aforementioned problems associated with modelling monetary policy.

Horizon	S.E.	Monetary	Global	Oil	RGDP	REER	Trade Bal
12	0.07	7	6	7	6	73	1
24	0.08	9	4	19	5	62	1
36	0.09	12	4	24	4	55	1
48	0.09	12	4	24	4	54	1
60	0.09	12	4	25	4	54	1

Table 3.6.1: Forecast Error Variance Decomposition of Real Effective Exchange Rate

We estimate a 6-dimensional VAR comprising the {Cloyne-Hurtgen monetary shock series; global economic activity index; real oil price; RGDP; REER; and Manufactures Trade Balance}. Full model details can be found in the Appendix. Figure 3.6.4 shows the response of the real effective exchange rate (REER) to a monetary policy shock and real oil shock respectively: both of the shocks elicit an almost immediate rise in REER, although the monetary shock peaks after just 7 months or so, with the exchange rate appreciating by approximately 0.75% and remaining elevated for a persistent period before slowly reverting to the pre-shock baseline by the 4-year mark. In terms of the oil shock, the exchange rate peaks after 18 months with an appreciation of just over 1%, before reverting slowly to the pre-shock baseline by around h-50. What is interesting about these results is the highly persistent response of REER to the monetary shock: appealing to the intuition of the Dornbusch model (Dornbusch 1976) this implies that wages and prices are highly sticky, hence sluggish downward adjustment following a contractionary monetary shock leads to a

Figure 3.6.4: Impulse Response Functions of Real Effective Exchange Rate to One standard Deviation Shocks of (i) Monetary Policy and (ii) Real Oil Price.



prolonged period of an elevated real exchange rate. The persistence of the oil shock, by contrast, is arguably easier to square with the equilibrium approach of Stockman, and the related findings of Chen & Rogoff (2003) regarding the efficacy of commodities in helping to buttress medium-term forecasts of the exchange rate. Finally, considering the forecast error

variance decomposition in Table 3.6.1, it is plain enough to see that the oil shock dominates the monetary shock at almost every horizon, with the former accounting for around 25% of REER variability and the latter at just 12%. The relatively smaller share accounted for by monetary shocks might be due in part to improvements in the way monetary policy was both conducted and communicated compared to earlier periods [41]. Conversely, the inherent volatility of oil prices and its production process (e.g. the Piper Alpha disaster) leads to relatively higher variance in the exogenous structural shocks, and thus a relatively larger share of the forecast error.

3.6.3 An Exchange-Rate Disconnect Puzzle in the post-Bretton Woods World?

A puzzling conundrum that has gripped international macroeconomics for several decades now is the so-called 'exchange rate disconnect' puzzle, first documented by Meese & Rogoff (1983), which in its simplest guise suggests there is a puzzling lack of responsiveness on the part of the exchange rate to the supposed 'fundamentals' suggested by economic theory as accounting for exchange rate movements. Similarly, the post-Bretton Woods monetary landscape has garnered considerable attention amongst economic historians, not least because of the disparate and sometimes ill-conceived paths trodden by the advanced economies as they sought to navigate the uncertainties following the closure of the gold window in 1971.

In the different VAR specifications we have estimated, the shocks of the real effective exchange rate variable tend to account for a substantive share of its own dynamics across most horizons (i.e. REER's own idiosyncratic variation, having controlled for other key economic variables). It is worth considering this fact in further detail, take the forecast error variance decomposition in Table 3.6.4 as an example: the global demand variable, RGDP, and the

[41] This "better monetary policy" hypothesis has been advanced as an explanation for the Great Moderation, though it has not gained unanimous acceptance. See Taylor (1999) and Cogley & Sargent (2001) for views sympathetic to this hypothesis.

trade balance account for just 13% *collectively* of the exchange rate perturbation at the 12 month mark. By the 36 month mark this has fallen further to just 9%. Conversely, at the same horizons the exchange rate's own idiosyncratic shocks account for 73% and 55% of its dynamic. The low explanatory power of key macroeconomic shocks in accounting for exchange rate movements is the essence of the exchange rate disconnect puzzle.

There is, however, one variable that consistently performs respectably across all of our model specifications in seeking to account for the variability of the exchange rate: that is the real oil price. On average, our analysis has indicated that real oil price shocks account for around one-quarter of exchange rate variation. In an influential contribution, Chen & Rogoff (2003) suggested that whilst the exchange rate disconnect and entrenched difficulties in forecasting exchange rates appeared to be alive and well, there was one category of economic variable that held at least some promise in surmounting these vexing difficulties: commodities. Their paper considered a group of OECD economies where primary commodities constituted a significant share of total exports, and found that commodity prices were a strong and consistent explanatory variable in exchange rate equations, and further still, enabled standard monetary variables to account for at least some of the shorter-term variation in real exchange rates. A more recent study, very similar in spirit, by Ayres et al. (2020) largely concurs with the idea of some uniqueness concerning commodities and exchange rate dynamics in advanced economies, demonstrating that shocks moving the price of just four key primary commodities can account for a substantive share variation in the real exchange rate. Our own analysis herein would seem congenial to both these papers, whilst nonetheless recognising that the longstanding puzzles regarding exchange rate fundamentals and forecasting difficulties remain largely intact.

Apart from considering the impact of oil on the exchange rate and associated matters relating to Dutch Disease, there is another reason why the drivers of real exchange rate fluctuations

are of key importance to UK macroeconomic policy in the post-Bretton Woods era. A country's choice of exchange rate regime should intimately depend on the nature of the shocks buffeting the economy: classical exchange rate theory suggests that an economy subjected to predominantly real shocks should select a floating exchange rate, whilst a preponderance of financial (or nominal) shocks warrants a fixed exchange rate Broda (2001). The significance of this finding is not inconsequential in light of major decisions taken, such as joining the European Exchange Rate Mechanism (ERM), which was made with a view to solidifying the UK's anti-inflationary credentials by tying policy to that of the highly inflation-averse German Bundesbank. Whilst it is beyond the scope of this article to appraise the decisions made therein, the key point is that the exchange rate has the potential to act as a shock absorber, or can end up becoming a source of instability itself. The nature of economic shocks, real versus nominal, matters substantially, and this intriguing period in the UK's modern economic history merits further research to provide a more granular insight into different shocks of interest and to (re)appraise the sagacity of key policy decisions.

3.7 Treating the Dutch Disease: To Help, or At Least to Do No Harm

Having empirically analysed time series data and established the presence of certain effects consistent with the Dutch Disease hypothesis, a natural next step is to consider which policies were advocated historically in order to counter any adverse impacts from Dutch Disease, as well as to optimally harness the windfall from North Sea oil [42]. There were two standout proposals advanced by James Meade and Nicholas Kaldor respectively: establishing a sovereign wealth fund or providing a large and immediate sector-specific fiscal stimulus to the manufacturing sector. Analysing these two proposals in further detail is of considerable

[42] Analysing those contemporaneous proposals is an important objective of the study, since it allows for an ex-post evaluation that is rooted in policies that were touted at the time, rather than retroactively imposing others.

interest since not only were they advocated in the early days of the UK being an oil producer, but a large corpus of academic literature has subsequently emerged that can help expand and elaborate on the merits and de-merits of the these distinctive policies. In this vein, we will engage in a comparative analysis of the Meade and Kaldor plans, unpacking the nature and scope of their respective proposals, and critically analyse their viability and efficacy in light of research undertaken in resource economics regarding the optimal management of resource rents.

3.7.1 The Kaldor Plan

A sharp and vocal critic of the government's handling of the North Sea oil windfall, Kaldor instead favoured aggressive and immediate action to shore up the manufacturing sector against the affliction of Dutch Disease (Kaldor 1983). In fact, his intentions arguably ran well beyond simply offsetting Dutch Disease; he saw the North Sea oil windfall as presenting an opportune moment to put right the wrongs of the previous decades, which had witnessed a progressive decline of British industry (the so-called 'British disease') and a painful and withering process of deindustrialization. Kaldor spoke of the need to recycle the petro-balances via a massive state-led investment program to rejuvenate industry, and to this end he advocated an expansionary fiscal policy of equal magnitude to the oil trade surplus. He believed this could restore the competitiveness of British manufacturing with the ultimate goal of ending the UK's beleaguered history of current account deficits and the external constraint on economic growth.

He decried the North Sea oil's role in the sharp appreciation of the exchange rate, although it should also be recognised that Kaldor was equally scathing of the Thatcher government's fiscal and monetary policies under the auspices of the Medium Term Financial Strategy. His critique also extended to the wider international domain insofar as the UK's large oil surpluses in the early 1980s were built directly on the backs of corresponding external deficits

in European countries; this in turn contributed to economic downturns in these countries and thus undermined the demand for UK exports. Kaldor argued that under his proposed investment-led fiscal expansion, the large volumes of imported capital goods from continental Europe, which were so vital to rebooting the fortunes of British industry, would also precipitate some measure of economic recovery in these countries, alleviating their external imbalances and thus allowing for a more pan-European economic recovery.

It is illuminating to assess the Kaldor plan against the criteria that has emerged from the literature on the optimal fiscal management of resource rents. Indeed, arguably its greatest strength is the plan's specificity in targeting policy efforts directly at the sector most adversely impacted by oil, namely the non-commodity tradable sector. This avoids the temptation of merely providing a palliative to the process of oil-induced deindustrialization, all too often comprising a boost to consumption or government spending, which may succeed in lifting short term aggregate demand but fails to fundamentally address the adverse structural changes that prove so deleterious for long-term economic performance. Secondly, and in a related vein, the plan does not propose an expansion of the public sector payroll or the direct creation of jobs, but rather targets its efforts towards increasing investment and improving the competitiveness of the internationally-traded private sector (manufacturing). A particularly appealing feature of this plan is that it does not involve recurrent expenditures, which means that there is less chance of encountering fiscal difficulties once the oil price drops or depletion occurs. This pro-cyclicality of fiscal outlays is a perennial issue in resource rich economies, and can seriously attenuate the volatility of the business cycle if not suitably managed by careful management of the public finances [43].

Runaway expenditures is arguably how the Netherlands came unstuck during the 1970s;

[43]In essence, current expenditures ought to be funded out of current taxes, and to the extent that commodity revenues are used for this purpose, it should only be the annuity payment from a commodity windfall financed investment fund that are utilised for said purpose.

when commodity prices (natural gas) fell sharply the government found it very difficult to curtail the generous expansion of the social security system that had taken place over previous years [44], thus giving rise to a "voracity effect" for excessive redistribution (Tornell & Lane 1999). The resulting inability of politicians to roll back the generous commodity-financed re-distributive measures (broadly defined) can thus act as a drag on economic growth even after the commodity boom has ended, due to the persistence of inefficient policies - such as a surfeit of public sector jobs or excessively generous social security payments. To be clear, however, this is not an argument against employment in the public sector or adequate social security provision per-se; but rather a cautionary note regarding the dangers of tying recurrent expenditures to revenues that are underpinned by cyclically-volatile commodity prices. In this regard, Kaldor's proposed investment appears promising, since it eschews the largesse associated with the "voracity effect" in commodity-financed public spending, and instead concentrates its efforts in shoring up private sector activity in manufacturing, based on a programme of investment rather than recurrent spending. Additionally, it is likely that the public finances will benefit in future to some degree from the preservation (and enhancement) of productive capacity in manufacturing, compared to say an enlargement of the public payroll.

Arguably the biggest criticism of the plan advanced by Kaldor is that it was not merely focused on offsetting the negative effects of Dutch Disease, but rather Kaldor perceived the oil windfall as presenting an opportunity to do something far bigger in terms of scale and ambition. Indeed, he saw the buoyant oil revenues of the early 1980s as an opportunity to rejuvenate the manufacturing sector, and essentially to put right the wrongs of the previous three decades or so, thus ending the long and sorry tale of relative decline in British manufacturing. His intentions here stretched well beyond Dutch Disease and any notion of oil-aggravated deindustrialization: Kaldor saw the oil revenues as presenting the opportunity

[44]For a short but engaging primer on the consequences of managing commodity revenues unwisely, including the Netherlands, see Ebrahimzadeh (2003).

to overturn manufacturing decline stemming from a much wider range of factors than oil alone [45]. Irrespective of whether Kaldor was correct or not in regarding his diagnosis and prescription concerning the beleaguered manufacturing sector, it is apparent that his plan went far beyond curing Dutch Disease and could perhaps justifiably be accused of "mission creep". A second line of criticism is that Kaldor was focused excessively on investment in manufacturing plant and equipment at a time when the economy -and the thrust of economic growth theory - were arguably moving towards other forms of intangible capital, such as skills acquisition (i.e. human capital) and research and development (intellectual capital) as the key drivers of increasing returns and the associated theoretical possibility of maintaining or even increasing growth rates as the economy matured [46]. In essence, this line of critique suggests that Kaldor's plan was the case of an old general seeking to fight the last war with his emphasis on the uniqueness of the manufacturing sector, as well as his favoured policies for shoring it up.

3.7.2 The Meade Plan

The esteemed British economist James Meade was a notable advocate for the establishment of a sovereign wealth fund in order to capture the fruits of a commodity windfall for the generations [47] (Meade 1995). A large corpus of subsequent academic research would seem to validate his instincts, as well as the oft-cited experience of Norway - whose establishment of a sovereign wealth fund stands in sharp contrast to the United Kingdom. Meade's proposal was informed by the basic intuition that revenues arising from a fortuitous commodity

[45]These factors include, but are certainly not restricted to: problems with the non-price competitiveness elements of the exports - such as quality, diversification, marketing and brand image, aftercare and service. A legacy of under-investment in plant and equipment; biases in the financial sector against financing manufacturing as opposed to more speculative ventures; weaknesses in the calibre of the managerial class in UK manufacturing firms.

[46]This abundant optimism embodied in some of the earlier works within endogenous growth theory stood in total contrast to the decreasing returns predictions of the neoclassical growth model, and was arguably jettisoned or moderated as the literature evolved.

[47]Meade gave a lecture in 1980 to the *Institut fur Wirtschaftsforschung - Hamburg* in 1980 on the subject of reconciling internal and external balance in the face of a commodity windfall, which was subsequently reprinted as part of an edited works in 1995.

export - the 'manna from heaven' as he dubbed it- would only prove to be a temporary phenomenon, thus it would be desirable to transform this transitory rise in income into a perpetuity that could sustain higher consumption on a permanent basis. The rudiments of this policy issue successfully identified by Meade have been extended by subsequent research regarding the appropriate policies for managing natural resource wealth, with (Venables & Van der Ploeg 2012, p. 316) noting that 'the fundamental economic problem faced by resource-rich economies is how to transform subsoil assets into a portfolio of other assets - human capital, domestic physical capital (both private and public), and perhaps also foreign financial assets—that yield a continuing flow of income to citizens'. A notable point is that the optimal policy response for a developing economy should be considerably different to that of an advanced economy, indeed, for the former the returns to basic elementary education (particularly for young girls) is so high that establishing a sovereign wealth fund would be a paltry investment by comparison. For an advanced economy like the UK, however, universal schooling has been an established norm for many years, and hence some of the proposals in the literature are clearly tailored towards lower income countries at a different stage of development.

Whilst Meade was quite clear about his support for a sovereign wealth fund, the precise nature of the fund was never definitively articulated. As will be made clear, not all sovereign wealth funds are the same; and this reflects far more fundamental differences than merely the asset composition of the investment portfolio. Therefore it is necessary to elaborate on some of the key differences in how such a fund might operate. In essence, there are two main approaches: first is the so-called 'bird in hand' approach, which is the method employed by the Norwegian sovereign wealth fund (Segal 2012). This directs all commodity tax revenues towards investments into overseas financial assets (i.e. the fund), which generates returns (dividends, coupon payments etc) that are paid into general government revenues. The alternative approach is known as the 'permanent income model': it seeks to convert the

finite stream of commodity tax revenues into a *constant* stream of payments to the Treasury over the indefinite future. This is achieved through siphoning off some of the current oil revenues for the government's coffers, whilst simultaneously investing an ever-increasing share of the oil revenue into a sovereign wealth fund [48]. The idea is that in the early years, much of the Treasury's income will come from current oil revenues, but over time as the sovereign wealth fund grows, a greater share of income will be generated from the asset returns, matched by a corresponding decline in income from the commodity revenues as depletion occurs. If executed correctly, this results in a constant annual income stream to the Treasury over time. The main trade-off between these two competing approaches to windfall management is that under the permanent income model the Treasury can expect to start receiving income a good deal sooner, whilst under the bird-in-hand approach there is an initially greater opportunity cost reflecting the forgone revenues being diverted into the sovereign wealth fund. But over the longer term the bird-in-hand generates a larger stock of assets (i.e. a bigger fund), generating a larger income stream into the indefinite future.

A key strength of Meade's plan was its desire to transform the flow of income from the country's commodity base into a stock of overseas assets representing national net wealth, thus offering a range of potential benefits. First and foremost, the using the oil windfall to amass a sovereign wealth fund would result in an annual flow of income to the Treasury in perpetuity: this would enable future generations to reap benefit from the nation's sub-sea natural assets (oil and gas) and also ensure that from an inter-generational equity standpoint, future generations would not miss out on the welfare benefits simply by virtue of being born at the wrong time. With that said, Meade was also careful to avoid excluding the current generation from partaking in the benefits oil by pursuing policies of excessive saving; he sought to strike a balance between the interests of the current and future generations respectively. In this sense Meade was prescient in anticipating future developments in the

[48]For a succinct overview of the two main kinds of sovereign wealth fund, see Segal (2012).

resource economics literature, which highlighted the potential risks arising from over-saving, such as a retardation of the accumulation of broad capital, as disadvantaging the current generation against future generations, the latter of whom can plausibly expect to enjoy superior outcomes over a range of economic and developmental indicators - see Hamilton & Hartwick (2014) for an insightful discussion of the conceptual issues involved.

From a public finance standpoint is that the presence of a sizeable sovereign wealth fund, to the extent that it improves a country's net foreign asset (NFA) position, can help to improve perceived creditworthiness and all its attendant implications for the ease of borrowing and debt servicing costs - in other words a lower cost of capital (Ali Abbas et al. 2019). The substantive boost to national saving embodied by the sovereign wealth fund may also have been of benefit with respect to the impending demographic pressures facing the UK, such as the anticipated rises in government outlays on social care and state pension provision: this point is not to be underestimated. Approaching the issue from life-cycle savings perspective, the potential to engage in large scale investments whilst demographics are favourable can yield a sizeable flow of income to support said individuals during their dotage, coupled with the possibility of decumulating the stock of assets to help cope with large unforeseen contingencies. There are also potential supply-side benefits through avoiding the need for large rises in distortionary taxation on the working age population, which distort incentives to work, save, and engage in entrepreneurship. Finally, Meade's sovereign wealth fund plan would also have helped in relation to one of the longstanding Dutch Disease problems: exchange rate overvaluation. If the UK government was actively selling large quantities of sterling in order to purchase the foreign currencies required for overseas investments, this would have helped to soften sterling and somewhat ameliorate the decline in competitiveness experienced by the manufacturing sector.

Arguably the key weakness in Meade's plan was his desire to fuel higher household con-

sumption on the back of income generated by the sovereign wealth fund. On one level this does not appear unreasonable, given that the ultimate aim of any investment is to generate a flow of future income, which can then be spent in a manner generating utility to its recipient. Nonetheless, given the UK's post-war history it is highly questionable whether greater consumption, as opposed to increased investment, ought to have been legacy of the country's oil wealth. Indeed, a secular feature of the post-war UK economy was one of significant under-investment as a share of national expenditure, paired with an excessively high share of consumption. Meade's proposal would only exacerbate this longstanding trend, whilst arguably missing a valuable opportunity to remedy longstanding deficiencies in areas as wide as skills and training (human capital formation); investment in plant and equipment (fixed capital formation); and a spatial distribution of economic activity excessively skewed towards London and the South-East (Kitson & Michie 1996).

Furthermore, Meade noted that the accrual of net foreign assets driven by oil revenues would permit a corresponding *reduction* in domestic investment, allowing these resources to be allocated towards supporting higher current consumption instead. In all likelihoood, however, substituting foreign investment for domestic investment in this manner would result in some highly undesirable consequences: the lower volume of domestic investment would probably result in a reduction in domestic job opportunities, since investment within the home economy is an important determinant of workers' job opportunities in the labour market (Smith & Zoega 2009). It is difficult to escape the conclusion that investing oil revenues in overseas investments with a view to reducing domestic investment to free-up resources for greater consumption is a prima facie case of Dutch Disease if ever there was one [49]. In this sense, Meade's plan risked exacerbating the worst of the economy's structural weaknesses via North Sea oil.

[49]In fairness to Meade he states quite plainly that whilst he was cognizant of the potential for frictional unemployment as ex-manufacturing employees were forced to find jobs in new areas, he regarded a withering of domestic production as the natural corollary of being a significant commodity producer, and was rather nonchalant about the effects of this structural transformation.

Second, there is a large body of academic research emphasizing the importance of agglomeration economies of scale, namely the spillover benefits arising from localized concentrations of specialized firms and skilled workers, as well as the complementarities and structural resilience that can be generated by diversification of economic structure. The two well-known externalities alluded to here are known in the spatial economics literature as the Marshall-Arrow-Romer ("specialization") externality, and the Jacobian ("diversification") externality attributed to Jacobs (1969) [50]. It is not hard to see why Meade's arguably excessive emphasis on overseas investment risks forgoing many of the key drivers of economic growth identified by this literature, and it is unlikely that the benefits could be generated by a domestic economic structure biased heavily in favour of consumption (propped up by overseas earnings), which tends not to comprise the sorts dynamic and high-valued added industries synonymous with success in these areas.

3.7.3 Can the Kaldor and Meade Plans Be Reconciled?

We have demonstrated that the key dividing line between the Kaldor and Meade plans centered on the former's desire for a major investment drive to revitalize the sector hit hardest by Dutch Disease (manufacturing), whilst the latter seemed more preoccupied with facilitating a permanent flow of income so as to sustain a higher level of consumption, underpinned by a sovereign wealth fund. One area of apparent agreement between the two is the notion that the current generation should not miss out on the potential benefits arising from the oil windfall: for Kaldor this would be realized via higher domestic investment and for Meade it would come via enhancing households' consumption opportunities with some sort of annual dividend payment [51]. An interesting line of inquiry is to ask whether there was

[50] For an overview of this voluminous literature, see various editions of the Handbook of Regional and Urban Economics.

[51] The big remaining difference of course, is that Kaldor would have chosen to use all of the revenues contemporaneously, whilst Meade seemed to envisage allocating some of the windfall to the current generation whilst saving the rest into a sovereign wealth fund.

potential for a reconciliation of these two seemingly disparate plans: would it be possible to devise a policy that embodied the strengths of both whilst jettisoning their weaker aspects?

Based on implementing a variant of the permanent income approach to a sovereign wealth fund, it does seem possible to envisage a compromise plan drawing on both Kaldor and Meade. This would entail a percentage of the current oil tax receipts being used to finance an investment drive in manufacturing, whilst making progressively larger payments over time into a sovereign wealth fund, the returns from which could help realise Meade's vision of supporting a higher level of consumption. There is potentially an interesting variation on this theme, which arguably affords higher importance on combating Dutch Disease than was the case for James Meade, but is also less aggressive than Nicholas Kaldor committing all of the oil revenues upfront to manufacturing. The proposed approach envisages using the permanent income approach, and using both the oil receipts and returns from the sovereign wealth fund to bolster the manufacturing sector up-and-until the depletion programme for the natural resource is largely completed. At this point, the income from the permanent income approach will exclusively be derived from the sovereign wealth fund returns, which can now be turned to the singular purpose of realizing Meade's vision for supporting higher consumption for the generations into the indefinite future. Admittedly, this approach would not result in a sovereign wealth fund as large as the bird-in-hand model, which invests all oil revenues into the sovereign wealth fund from the start, and allows only the investment returns to be fed into general tax revenues.

In motivating this discussion it would be helpful to consider a counterfactual estimate of the financial outcomes associated with the different kinds of sovereign wealth fund strategies. Atkinson & Hamilton (2020) provide useful simulations of how a British sovereign wealth fund might have materialized under the bird-in-hand model versus the permanent income approach. Their broad findings are summarized in the graph in Figure 3.7.1, which yields a

number of fruitful insights [52]. It is immediately apparent that the permanent income model (PIH) produces a constant annual income stream to the Treasury of around £6.75 billion per annum (in constant 2018 prices) - shown by the dashed black line [53]. By contrast, the bird-in-hand (BIH) model takes much longer to start yielding substantial fruits to the Treasury, since it takes time to build up a stock of assets capable of yielding large investment income. It takes until 1987 for the investment earnings from the bird-in-hand approach to finally equal, and then go on to surpass, the constant income stream obtained under the permanent income model. By 2013, however, the annual income being obtained under bird-in-hand is basically double the constant income stream from the permanent income model. Furthermore, whilst both approaches will result in the accrual of a stock of overseas assets (i.e. the sovereign wealth fund) this will be markedly larger under the bird-in-hand approach: Figure A3.2 in Atkinson and Hamilton (2020) provides a simulated estimate of the size of the fund under each approach. By 2013 the fund under the permanent income model would have been a little short of £150 billion (2018 prices), whilst under the bird-in-hand approach the fund would be around £350 billion; clearly the difference between the two is not small, with the latter being over twice the size of the former.

The big policy conundrum would appear to hinge on whether it is worth "abstaining" in the earlier years to build up a large bird-in-hand style fund, or whether the benefits of the permanent income approach - with its payments from the outset and correspondingly smaller sovereign wealth fund - are perceived as more appealing. An answer to this in the context of the British economy will necessarily depend on policy makers' assessment of the likely costs arising from decline in the manufacturing sector: if policy makers are broadly optimistic

[52] Thanks is given to Professor Giles Atkinson for kindly sharing data from the simulations, which appear in the graph produced here.

[53] What the PIH Oil Income and PIH Fund Returns show (the orange and grey curves respectively) is the composition of the annual income obtained under the permanent income model: in other words, the black horizontal line is the sum of the orange and grey curves. In the earlier years, most of the income is obtained from the oil revenues directly, but as time goes on this income dwindles and a greater share is obtained from sovereign wealth fund returns.

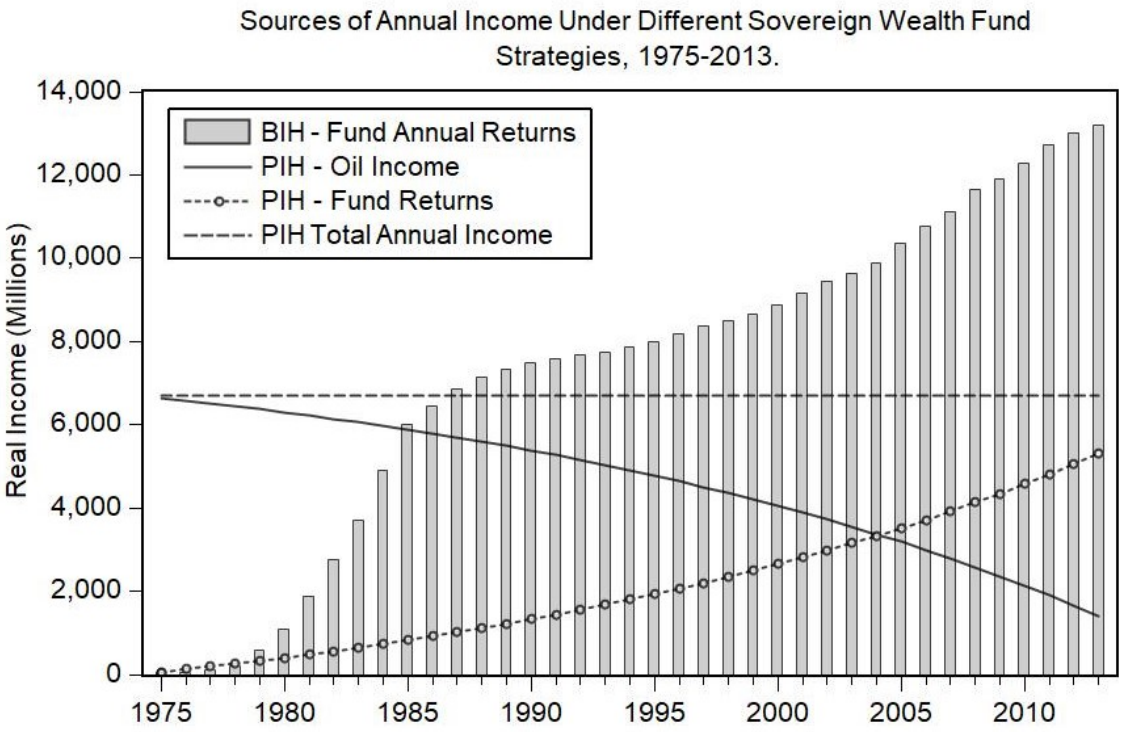


Figure 3.7.1: Graph of Annual Income Under Different Sovereign Wealth Fund Models: Bird-In-Hand (BIH) Versus Permanent Income Hypothesis Approach (PIH)

that any unemployed manufacturing workers will quickly be reabsorbed into other sectors of the economy, and that manufactures exporters will succeed in retaining market share in the face of competition, then the hysteresis or scarring effects from manufacturing decline are likely to be relatively small. However, if a large and persistent rise in unemployment is anticipated, or a significant loss of market share occurs leading to a permanent reduction in manufactured exports à la Baldwin & Krugman (1989), then the costs from hysteresis will likely prove substantial. The decision making calculus is further complicated by the subjective weights assigned to elevated unemployment in certain parts of the country, i.e. would policy makers be more inclined to intervene to protect manufacturing on account of the fact that failure might disproportionately affect less prosperous communities. Constructing plausible quantitative assessments of this policy dilemma would probably have proved challenging (though not impossible), whilst separating out the value-judgements from the more positivist aspects of the decision making process would likely have been fraught with

difficulty [54]. Many of these questions have been considered in the context of industrial policy, in particular so-called 'defensive' industrial policy as opposed to a more proactive and expansive kind, see Crafts & Hughes (2013)for further discussion.

In summarising our discussion of the Kaldor and Meade plans, the aim was to demonstrate the alternate policy options open to politicians regarding the North Sea windfall, and to provide some constructive challenge to the notion that the path the UK ended up taking was the only one available, or was somehow inevitable. There is no strictly right or wrong answer in determining which approach ought to have been pursued, and the plans of both Kaldor and Meade involved a significant amount of conjecture regarding the future performance of the economy. If Kaldor's instincts were correct regarding manufacturing being the 'engine of growth' in an economy; coupled with his damning assessment of oil's impact therein, and the restorative capacity of government policy to help engineer a major revival in performance, his plan would have an obvious level of appeal. And whilst it is certainly legitimate to query or contest Kaldor's judgement on those points, his overarching concerns regarding structural unemployment, regional balance, and weaknesses in investment as path-dependent phenomena were surely well-founded, and the significant social costs of such problems deserved to be considered when weighing up the optimal approach to managing the windfall.

James Meade was far more ambivalent in his assessment of oil-aggravated manufacturing decline, and it would probably be more accurate to say that he regarded the process as one of structural adjustment and dynamic reallocation across sectors, rather than a malign influence. The Meade approach to building up a substantive sovereign wealth fund using the oil windfall might make sense provided there was sufficient flexibility in the economy

[54]The nature of these quandaries is limited only by the imagination of politicians and their officials: for instance, should financial support be given to support growth of the most promising firms in a reasonably affluent part of the country such as the West Midlands, or instead focus on preventing less productive firms from going under in depressed parts of say Wales or Northern Ireland, on account of the fact that the firms in question are key local employers.

to successfully re-allocate former manufacturing workers into other sectors, and that a decline in net exports of manufactures was the logical counterpart to the oil surpluses. The sovereign wealth fund route had further appeal if one saw the demise of UK manufacturing as a foregone conclusion that reflected fundamentals such as a comparative (and perhaps absolute) advantage in financial and business services, which would successfully replace the manufacturing sector. It also presented options in terms of inter-generational equity and ensuring that the fruits of North Sea oil could be fairly distributed through time. But it is worth keeping in mind from the previous discussion that there is no single kind of sovereign wealth fund model, and that it is possible to combine a level of upfront interventionism with the longer-term saving and net asset accrual, thus drawing on elements of both Meade and Kaldor.

There is no strictly right or wrong answer in determining which approach should be pursued in terms of the Kaldor and Meade plans: the decision necessarily entails value judgements as well as a degree of conjecture regarding the likely long-term impacts of hysteresis - both with respect to export markets as well as unemployment, as well as potential variability in the performance of a sovereign wealth fund. For all of the ostensible long-term gains generated by the bird-in-hand (i.e. Norwegian) approach, it is important to recognise that having large numbers of unemployed ex-manufacturing workers entails high costs - direct in terms of the foregone income tax revenues and higher social security payments, as well as the indirect such as higher prevalence of ill health; greater incidence of crime; and inter-generational persistence such as lower educational attainment amongst the offspring of long-term unemployed workers. This plethora of social costs would lend weight to Kaldor's emphasis on using the oil revenues contemporaneously, and to the extent that the demise of the manufacturing sector was not a foregone conclusion (Kitson & Michie 1996) then policy interventions financed by the commodity revenues could have proved useful in ameliorating (though not entirely solving) the UK's notoriously "hard landing" deindustrialization process

[55]. Whether this was worth pursuing at the expense of a large sovereign wealth fund of overseas assets (net wealth) with its resultant dividend payments to the Treasury (real income flow) remains a thorny and vexing question. The consensus viewpoint outlined in this chapter provides an opportunity to try and reconcile the two positions; providing upfront revenues for immediate investment but still allowing for a sovereign wealth fund and a longer term boost to consumption - though whether this would have proved satisfactory to the two protagonists Messers Kaldor and Meade remains conjectural.

3.8 Conclusion

This study has set out to examine the UK's experience as a net oil exporter and to ascertain whether allegations of Dutch Disease in the manufacturing sector are substantiated. Our empirical analysis finds support for the notion that oil price shocks were an important driver of real exchange rate variability from the late 1970s to mid-2000s. The analysis suggests that tradeable manufactures were hit on two fronts: firstly, exports of manufactures were sensitive to movements in the real exchange rate, with appreciation leading to a persistent decline therein. Second, increases in the energy terms of trade also contributed to a prolonged decrease in the manufactures trade balance, which theoretical work ascribes to a surge in consumption due to oil-induced wealth effects. Taking care to control for potentially confounding factors, our analysis explicitly modelled monetary shocks to examine their (potentially) significant impact on the real exchange rate, but found that they were only half as important as oil shocks in accounting for real exchange rate variation - an area of significant historical and theoretical contention. Finally, the empirical work also spoke to ongoing debates regarding an 'exchange rate disconnect puzzle', with our analysis indicating that although the puzzle appears to be alive and well in the UK, commodities (in this case,

[55]To be clear, this is not to suggest there would have been no adverse structural changes impacting manufacturing in terms of both employment and its share of gross value added (GVA). But rather the deindustrialization would not have been such a "hard landing" in terms of job losses; the negative impact on output; and resultant poor performance in international trade.

oil) do appear to have some success in accounting for the dynamics of the real exchange rate, which is consistent with some important contributions in this literature. This goes some way to reaffirm the uniqueness and importance of oil in the UK economy.

The paper has advanced a multifaceted explanation as to why a concerted policy response against Dutch Disease was not forthcoming: the apparent inertia on the policy front is ascribed to key ideational shifts in both macro and micro-economic thinking, with attitudes towards the balance of payments and a new (diminished) role for the exchange rate being key factors. Indeed, in the brave new world post-1979, the effects of Dutch Disease were seen as simply speeding up the supposedly inevitable decline of UK manufacturing, and were not regarded as a substantive cause for concern within the broader macroeconomic landscape. Policy makers had become relaxed about current account deficits in a world of liberalised capital flows, whilst a strong pound helped to dampen the impact of exogenous cost-push pressures regardless of the adverse impact on export competitiveness. Fundamentally, inflation control had become the golden fleece of UK macroeconomic policy and this precluded meaningful action regarding Dutch Disease, with such policy measures too closely resembling the ancien macroeconomic régime of pre-1979. The diminished role of industrial policy is also considered, however, we repudiate the conventional view that industrial policy simply "went out of fashion" and instead posit a more nuanced explanation, namely that by the late-1990s a newer incarnation of industrial policy had taken hold, which was 'horizontal' in outlook rather than sector-specific. Hence, policies designed specifically to augment the manufacturing sector were not concordant with this new economic zeitgeist which favoured the 'new' or 'weightless' economy built around knowledge-based services. We highlight some of the conceptual shortcomings of a supposedly 'horizontal' approach to industrial policy and suggest that in spite of its intentions, a sector-specific bias was still very much implicit in favour of the services sector, whilst a tough-love approach was given to manufacturing.

In assessing the economic legacy of the North Sea oil windfall, we highlight the peculiar route taken by the UK in terms of its fiscal management of the oil revenues, and elaborate on the considerable difficulties in actually pinning down precisely how the funds we disbursed. Nicholas Kaldor and James Meade's distinctive and largely overlooked policy proposals are then analysed as the leading beacons of what an anti-Dutch Disease policy could have looked like, had the balance of political power fallen differently [56]. Drawing on more contemporary work in resource economics, we evaluate the potential costs and benefits of each approach, and suggest that both plans had appeal in ensuring that the bounty of North Sea oil was harnessed in ways that helped to nullify some of the worst manifestations of Dutch Disease. But neither plan was without shortcomings, and the suitability of Kaldor and Meade's respective approaches required policy makers to take a hard and accurate stand on vexing policy issues such as the conceivable extent of economic scarring arising from deindustrialization, and the degree to which manufacturing decline reflected fundamentals such as a comparative advantage in other sectors, with an appropriate role for policy being to facilitate this structural adjustment rather than to push back against it. Drawing inspiration from the literature concerning the optimal fiscal management of commodity windfalls, we suggest that a reconciliation of the two plans was in fact possible, and could have helped to stave-off the oil-aggravated component of deindustrialization, whilst still allowing the accrual of a sovereign wealth fund and the option to directly raise consumption and living standards once the oil depletion schedule had run its course.

All-in-all this study suggests that those voices warning of an adverse impact of North Sea oil on the fortunes of the UK's non-commodity tradeable sector were not without reason. The results from the empirical analysis do suggest that oil had some role to play in causing manifestations of the maligned Dutch Disease. To this extent, the UK's deindustrialization

[56]Recall that Kaldor argued in favour of investing the oil revenues contemporaneously to help revitalize the manufacturing sector, whilst Meade supported establishing a sovereign wealth fund and using it to finance an annual dividend payment to lift household consumption and living standards.

was arguably oil-aggravated, but this can by no means be touted as the sole or dominant cause of the UK's longstanding woes in the manufacturing sector. Our analysis of the wider policy decisions surrounding North Sea oil suggests that there was room for considerable improvement in both blunting the negative effects of oil on manufacturing, and also harnessing the vast windfall revenues so as to maximize the long-term amongst successive generations. The fact this didn't occur appears to be the result of an unfortunate conflation of ideational factors that captured both the left and right of the political spectrum, which ultimately doomed any concerted attempt at combating the Dutch Disease.

Appendix

3.A Model Specifications

In this section we provide details of those VAR models, which for reasons of space and brevity, were not reproduced in the main body of the paper. Note that the variables inside curled parentheses also denotes the ordering of the recursive identification scheme, e.g. {X, Y, Z}.

Section 5.2: Corroborating Evidence From Oil News Shocks

- {Oil News, REER}
- 1979m06 - 2005m12, p=24
- For REER Eqn: $trend^2$, dummy = 1 during Exchange Rate Mechanism membership (Oct 1990 - Sept 1992) or 0 otherwise
- Oil News Shock regressed on own lags; REER regressed on own lags and oil news shock.

Section 5.3: The Real Exchange Rate and Tradeable Manufactures

- {Global Activity, Real Oil, RGDP, REER, Mfg Export, Mfg Import}
- 1979m06 - 2005m12, p=18

- $trend^2$, dummy = 1 during Exchange Rate Mechanism membership (Oct 1990 - Sept 1992) or 0 otherwise.

Section 6.1: Monetary Shocks versus Oil Shocks: a Two Horse Race?

- {Monetary, Global Activity, Real Oil, RGDP, REER, Mfg Trade Balance}
- 1979m06 - 2005m12, p=18
- $trend^2$, dummy = 1 during Exchange Rate Mechanism membership (Oct 1990 - Sept 1992) or 0 otherwise.

3.A.1 Historical Decomposition of REER

We show a historical decomposition of REER in response to the oil news shocks used in one of the alternate VAR specifications.

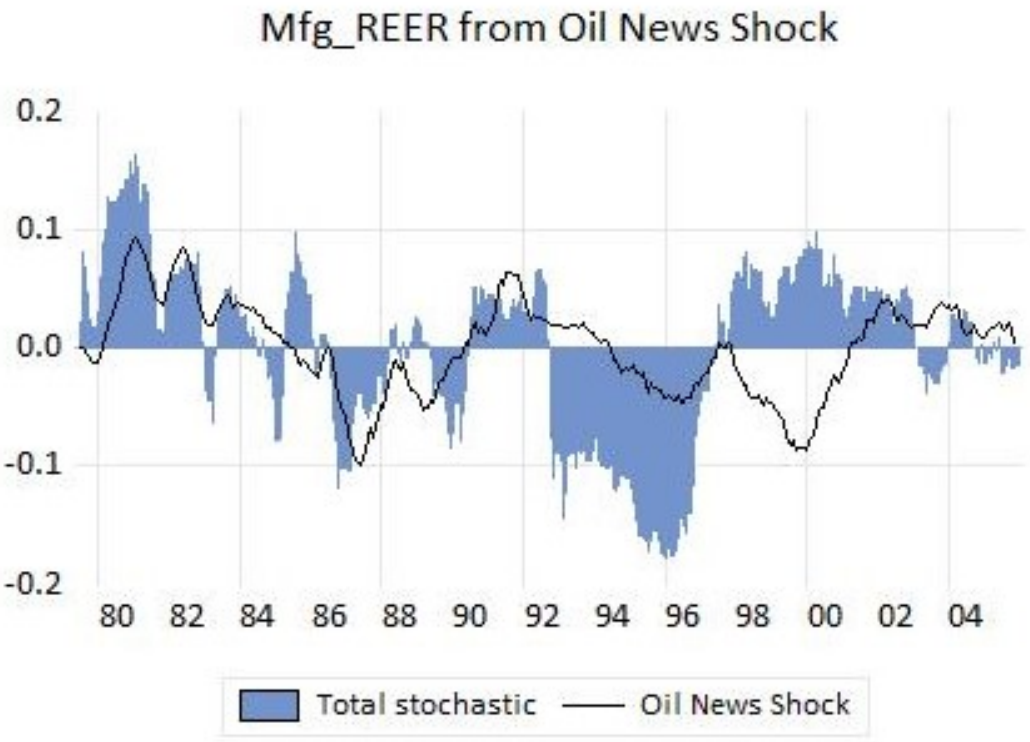
3.B Data and Sources

1. Oil News Shocks - based on the paper of Diego Kanzig (2021), and downloaded from the author's website: https://www.diegokaenzig.com/research

2. Global Economic Activity Index - based on the work of Lutz Kilian (2018) and Kilian and Zhou (2018), downloaded from the author's website: https://sites.google.com/site/lkilian2019/

3. Monetary Shocks - based on the paper of Cloyne and Hurtgen (2016), downloaded from the relevant page on the website of *American Economic Journal: Macroeconomics*: https://www.aeaweb.org/articles?id=10.1257/mac.20150093

Figure 3.A.1: Historical Decomposition of Real Effective Exchange Rate (Oil News Shocks)



4. Oil - nominal crude oil price sourced from IMF International Financial Statistics (Code: 11276AAZZF...), UK Brent. Note that the series is in nominal US dollars, so was therefore converted into GBP and deflated into real terms using the CPI. Finally, we take the logarithm of the data.

5. Real Effective Exchange Rate - Real Effective Exchange Rate Based on Manufacturing Consumer Price Index was downloaded from Federal Reserve Economic Data website (sourced originally from OECD Main Economic Indicators). We take the logarithm of the data. https://fred.stlouisfed.org/series/CCRETT01GBM661N

6. Long Term Interest Rate - Redemption yields on British government securities: 20 year. Taken from: Bank of England - A Millennium of Macroeconomic Data (sheet M10. Monthly

long-term rates).

7. Manufactures Trade Data - Export and Import series of SITC categories 6 & 8 (manufactured goods), sourced from OECD Monthly Statistics of International Trade (trade in value classified by sections of SITC).
https://www.oecd-ilibrary.org/trade/monthly-statistics-of-international-trade_22195041

8. RGDP - Real GDP at market prices based on the work of Mitchell et.al (2012), obtained from *A Century of UK Economic Trends* data set (sheet 1.2M). We take the logarithm of the series. https://www.escoe.ac.uk/research/historical-data/headline-macro-data/

9. Terms of Trade - the ToT data was constructed using unit values based on the SITC classification system, and time-varying weights were constructed to account for their evolving trade share of different categories over time [57]. The data was sourced from the OECD's Monthly Statistics of International Trade (unit values of SITC).

We base our conceptual approach on the method of Spatafora and Tytell (2009):

$$CTOT_{jt} = \prod_i (P_{it}/MUV_t)^{X_{ij}} / \prod_i (P_{it}/MUV_t)^{M_{ij}}$$

Where P_{it} are the unit values of the respective SITC categories; MUV_t is a manufacturing unit value index used as a deflator, X_{ij} is the share of exports of commodity i in country j's total trade, and M_{ij} is the share of imports of commodity i in country j's total trade. This weighting helps to account for the relative importance of the particular commodity class with respect to overall exports and imports. Since we are concerned with the impact of changes

[57] The weight for each year was computed by calculating the mean based on the previous two years, i.e. $W_t = \frac{W_t + W_{t-1} + W_{t-2}}{3}$ in order to smooth the annual weights and prevent the introduction of spurious volatility into the resulting terms of trade series owing to abrupt changes in the time-varying trade weights.

in the energy terms of trade our numerator is the unit value for the category 'mineral fuels and lubricants' whilst the denominator is 'finished manufactures'.

10. Balance of Payments Components Graph (Figure 3.2.1) - The graph showing the different components of the balance of payments as a percentage of GDP contains data from a number of sources: (i) the manufactures trade balance data was sourced from the same place as point (7) in this list of data sources. (ii) the services balance and overall current account balance were obtained from the Office for National Statistics (ONS) Pink Book. All values were expressed as a percentage of GDP.

Chapter 4

A Keynesian Controversy Over Business Cycle Dynamics: Insights From Spectral and Wavelet Analysis.

Abstract

Movements in autonomous investment driven by the elusive concept of entrepreneurs' "animal spirits" have been a mainstay of Keynesian economics ever since Keynes published his magnum-opus. However, the pioneering contribution of Roy Harrod a few years earlier advanced an alternate theory, in which exports acted as the ultimate source of autonomous demand. The matter exploded into internecine warfare in the 1970s when the influential 'New Cambridge' group adopted a distinctively Harrodian view of the UK economy, and sidelined the orthodox Keynesian approach in their quest to transpose demand-oriented theory into the open-economy setting. This study harnesses the toolkit of frequency domain analysis to empirically analyse the claims made by leading protagonists in the debate, and to shed light on whether the dynamics of the UK economy over nearly 200 years are better characterized by Harrod or Keynes. The results ultimately suggest that there is merit to both paradigms, and that the sources of autonomous demand have not been constant in the

face of marked structural changes in the economy. Our analysis of the policy implications of the Harrodian view, however, point to some apparently inescapable supply-side corollaries of this ostensibly demand-led theory.

4.1 Introduction

Understanding the nature and causes of economic fluctuations has been a mainstay of macroeconomics ever since Keynes published his seminal General Theory in 1936. Perhaps not surprisingly, such fluctuations have occupied the minds of generations of British economists and public officials in light of their impact on the social condition of the nation, as well as their potential to exert permanent effects on the long-run growth path of the economy. Whether in the academic domain or in the arena of public policy, the question of business cycles has generated fierce debate and controversy throughout the decades; although the theories and empirical methods have evolved along the years, the intrigue, salience, and contention generated by economic fluctuations as a field of study remains undimmed.

This paper takes up a largely forgotten controversy that emerged in the post-war era between some of the most prominent British Keynesian economists of the day. The debate centered on a somewhat heretical doctrine that emerged from the works of Roy Harrod and latterly Nicholas Kaldor, which drew significant ire from the mainstream body of Keynesian opinion for their apparent dethroning of animal spirits and investment instability as the root cause of macroeconomic fluctuations. Indeed, during the mid-1970s, Kaldor and the economists of the Cambridge Economic Policy Group (which included the enigmatic Wynne Godley) began to advance the view that exports were the primary source of autonomous demand in the UK economy, whilst contending that fluctuations in private investment were not central to understanding the instability that had affected the economy during the preceding decades. Needless to say, these claims were viewed as incendiary, but Kaldor doubled-down and began

a significant offensive on the academic front, which lasted in earnest until his death in 1986.

The debate is of profound interest for both historical and economic reasons. It represented largely British affair, insofar as the main protagonists were all British-based Keynesian economists; this stands in contrast to the more widely remembered 'capital theory controversies' fought between the University of Cambridge (UK) and the Massachusetts Institute of Technology (MIT) in the US. Whilst the minutiae of the capital theory controversies have been explored in painstaking detail [1], the Harrod-Kaldor hypothesis and the ensuing backlash have received considerably less attention from both economists and economic historians. This is surprising in some respects since the capital theory controversies resulted in arguably very limited impact on the way in which economics is practised in both policy terms as well as theoretically; yet the Harrod-Kaldor hypothesis presented a sharp and conspicuous challenge to the extant mode of Keynesian thinking and was advanced alongside a clear set of implications for the conduct of economic policy.

It can also be said the particulars of the debate ignited by Harrod and Kaldor represent a welcome change from the main thrust of business cycle analysis, both contemporaneously as well as in more recent times. Indeed, much macroeconomic research during the 1960s was directed towards the relative efficacy of fiscal versus monetary policy instruments (as captured by the famous AM-FM debate) [2], whilst in the 1970s the question of whether the (allegedly) destabilizing impact of policy-induced monetary shocks were the main driver of cyclical instability came to the fore. In the present day meanwhile, much contention rests on whether productivity shocks with a large permanent component, as opposed to transitory nominal expenditure shocks, are the key to understanding macroeconomic fluctuations in advanced economies, as well as the potential for news-driven business cycles [3]. By contrast,

[1] For an accessible introduction to this extensive literature, see Cohen & Harcourt (2003).

[2] See McCallum (1985).

[3] Some helpful survey articles from recent years include: Cerra et al. (2023); Mian & Sufi (2018); Beaudry & Portier (2014).

the current study focuses squarely on two real components of aggregate demand (investment and exports) and harnesses the analytical insights of more recent developments in frequency domain analysis to probe the data novel ways whilst still remaining true to the iconoclastic spirit of the original debate. In this sense the study offers something quite unique in relation to the existing corpus of publications.

The empirical approach adopted in the present study has a level of originality, since most analysis of cyclical fluctuations in the UK economy (and more generally) tends to concern itself with time-series econometrics rather than the application of frequency domain techniques. Although frequency domain analysis is not new in itself, most of the extant literature utilises spectral analysis to transform data from the time domain to the frequency domain: by contrast, this study combines the insights of the newer (and in some regards superior) technique of wavelet transforms, in addition to the more established spectral methods. The resulting empirical outputs enable a far richer analysis of UK cyclical phenomena than is typically the case, and provide a welcome contrast to the pervasive empirical studies conducted using time series approaches such as vector autoregression, cointegration techniques, and dynamic stochastic general equilibrium (DSGE) models.

The implications of this intriguing debate are not without consequence for the historical conduct of economic policy, or potentially for the soul of Keynesian economics on a more theoretical level. Both Harrod and Kaldor made no secret of their views regarding the UK economy's lack of export orientation, although they differed quite markedly in terms of the appropriate measures to remedy this. But supposing that the cyclical dynamics of the UK economy were in fact better characterized by the orthodox Keynesian view emphasizing animal spirits and investment instability: this would surely present substantively different implications for the appropriate course of UK economic policy compared to the mantra advocated by the Cambridge Economic Policy Group. In this vein, the paper seeks to shed

light on one of the forgotten debates of post-war macroeconomics; to probe the empirical validity of the key propositions that were advanced, and to provide a rounded discussion of what this implied in terms of counter-factual policy proposals. As will become clear, there is much to commend with regard to Harrod and Kaldor's "heretical" reasoning, however, as is so often the case in macroeconomics, causation is seldom unidirectional, and the orthodox Keynesian view demonstrates a continuing relevance that finds credence within the most modern vintage of international trade theory.

4.2 Historical Context and Theoretical Background

In the years immediately following the Second World War, exports were pushed to front and center stage in UK economic policy: this was not something that was borne out of any deep-seated economic theory or political doctrine, but because of the simple necessity to maintain national solvency. Indeed, due to the sheer costs necessitated by the country's wartime effort, Britain had been forced to sell off vast amounts of her foreign assets, meaning that she could no longer rely on substantive net foreign investment income to help shore up the balance of payments. Matters were complicated further by a desire to maintain a 'cheap money' policy - whilst this was clearly beneficial for undertaking large scale investment projects such as construction of public housing, there was also the precarious new task of managing the enormous national stock of national debt, which had ballooned to around 250% of national income. This all reduced down to the simple fact that if Britain were to be able to pay for the vital imports she so desperately needed, the country would have to generate roughly equivalent earnings from its own export of tradable goods and services. Even after the hardships of the immediate post-war years (the re-conversion period) had subsided, the realities of life under a fixed exchange rate system coupled with a renewed commitment by the advanced economies to promote trade liberalization, meant that exports assumed an integral position in economic affairs. For a trading nation such as the UK who had a high

share of imports and exports in GDP, exports were an inescapable fact of economic life.

An idea that held substantive influence throughout the post-war decades was the idea that changes in domestic economic activity would actually affect a country's real exports; namely that reductions in domestic demand would release goods for exports, thus leading to the so-called 'demand pressure hypothesis' King (1997). A notable instance of this line of thinking can be seen in the immediate years following WWII as the government faced the daunting task of re-converting the economy from a wartime footing to peacetime activity, whilst simultaneously weathering challenging external economic conditions: the government was forced to reduce government consumption spending whilst at the same time designating increasing quantities of output as being marked for overseas sales, rather than for domestic consumption (Bean & Crafts 1996, pp.140-142). The obvious opportunity cost arising from such a drive to increase the proportion of tradeable output was that the requisite policies infringed on domestic consumption opportunities, and by extension adversely affected living standards. Two popular mantras that captured the economic zeitgeist were 'export or die' and 'Britain's bread hangs by Lancashire's thread' - a reference to the key role played by the textile industry in generating the necessary exports to acquire the foreign exchange needed to cover the country's import costs (Tomlinson 2004). Similarly, following devaluation in late 1967, Chancellor Roy Jenkins passed an extraordinarily tight budget package in March 1968, which had the explicit goal of clearing consumers out the way of industry so that the UK could drive up its export volumes in quick time. This was exemplified by Jenkins response to fellow Labour MP Michael Foot during a debate in the House of Commons:

'As the export demand builds up, we have to make room for it in the economy. Some room has been made already, but almost certainly not enough, and this is intentional. We do not want to dig a hole and leave it empty. We want it to be there only when the export demand is ready to fill it, and we think that the Budget is likely to be about the right time for this

further excavation'[4].

The theoretical basis for such a view is probably best expounded by the so-called 'absorption' approach to the balance of payments pioneered by Alexander (1952) The absorption approach regards the determination of the external balance as resulting from the difference between a country's national expenditure and national income. It suggests that policy will only result in an improvement to the balance of payments to the extent that expenditure is reduced relative to income, or that income is raised relative to expenditure. The approach is encapsulated by the accounting identity $B = Y - E$, where Y is national output and E is total domestic expenditure. As with all accounting identities, caution is needed when seeking to infer causal relations: suppose for example that ex-ante Y and E are in balance, but emerging logistics problems mean that some sectors experiencing excess supply are unable to ship their goods for export. In an ex-post sense, this would show up in the national accounts as $Y < E$, however, the reason was not that planned expenditures exceed income, but rather that income itself had fallen due to the logistics issue.

4.2.1 Harrod and Kaldor on the Uniqueness of Exports

Having considered the potential for induced rises in the level of exports, engineered largely by contractionary government policies at times of economic difficulty, we now consider what might be dubbed the 'Harrod-Kaldor hypothesis', which focuses on the role of *autonomous* exports as the ultimate source of demand in the economy. Central to understanding this is Harrod's key theoretical contribution of the so-called 'foreign trade multiplier', but before delving into this it is helpful to examine the basis for the determination of the equilibrium level of national income within a standard Keynesian framework:

$$Y = C_p + I_p + X_p - M_p \tag{4.1}$$

[4]Quoted from Dell (1996, p.352).

And:

$$Y = C_p + S_p$$

In a closed economy the condition for equilibrium income is the well known Keynesian condition $I_p = S_p$. In an open economy setting the condition for equilibrium income becomes:

$$S_p = I_p + X_p - M_p \tag{4.2}$$

Or:

$$S_p + M_p = I_p + X_p \tag{4.3}$$

In essence, plans to save and import must equal planned investment plus the demand for exports. If plans to save and purchase foreign goods (which do not generate income at home) exceed plans to invest and foreigners' purchases of exportable goods, income will correspondingly fall and thus reduce savings and imports until equality is once again restored between both sides of the equation. By contrast, if plans to save and import fall short of plans to invest and export, then income will rise, thereby raising saving and imports until equality is again restored with plans to invest and export.

The mechanism through which plans to save and import are brought into line with plans to invest and export following a disturbance, is the so-called multiplier: it is the relationship between a change in planned (i.e. autonomous) expenditure and the resulting change in income [5]. In order to derive the multiplier one must first derive an expression for the equilibrium level of income in an open economy. It is typical to assume here that planned

[5]In contrast to autonomous expenditures, there are 'induced' changes in expenditure which result from some initial (autonomous) disturbance.

investment and exports are autonomous - i.e. they are not dependent on income- whilst planned saving and planned imports are both functions of income. Thus we have:

$$I_p = \bar{I}_p \tag{4.4}$$

$$X_p = \bar{X}_p \tag{4.5}$$

$$S_p = \bar{S_{ap}} + sY \tag{4.6}$$

$$M_p = \bar{M}_{ap} + mY \tag{4.7}$$

Where the bar above a variable indicates 'autonomous', and s is the marginal propensity to save; m is the marginal propensity to import. Substituting these equations into Eqn.(4.3) gives:

$$\bar{S_{ap}} + sY + \bar{M}_{ap} + mY = \bar{I}_p + \bar{X}_p \tag{4.8}$$

With rearrangement and solving for the equilibrium level of income:

$$Y = \frac{\bar{I}_p + \bar{X}_p - \bar{S_{ap}} - \bar{M}_{ap}}{s + m} \tag{4.9}$$

From Eqn.(4.9) one can derive the multiplier (i.e. the relation between a change in autonomous expenditure and the resulting change in income) for any of the elements in the numerator.

Having established the basic macroeconomic rationale underpinning the concept of a multiplier and how it relates to the determination of equilibrium national income in the open economy, we can now examine Harrod's key contribution of the foreign trade multiplier. In the first instance, Harrod (1933) posited a simplified open economy framework with no

saving or investment, and no government spending or taxation. Clearly these assumptions (which he later relaxed) were for expository purposes rather than as a satisfactory guide to reality; hence why we began this section with a review of the determination of equilibrium national income in its entirety. In Harrod's framework, income (Y) is generated by the production of consumption goods (C) and exports (X), such that: $Y = C + X$. It is assumed that all income is spent on consumption and imports (M), whereby $Y = C + M$. It is further assumed that the real terms of trade remain fixed and that trade is balanced, i.e. $X = M$. Taking a simple linear import function such as $M = mY$, where m is the marginal propensity to import, some simple algebraic manipulation gives:

$$Y = \frac{1}{m}X \tag{4.10}$$

Eqn.(4.10) represents what has become known as the static version of 'Harrod's foreign trade multiplier'; this simple equation shows that the primary constraint on the determination of national income is the level of export demand in relation to the propensity to import. It leads to the key insight that changes in exports brings the balance of trade back into equilibrium through changes in *income* and not through relative price adjustment, and this way Harrod's trade multiplier provides an alternative to the more familiar Keynesian investment multiplier for the determination of national income.

Clearly the Mark I version of Harrod's framework sacrifices a degree of realism in favour of parsimony - such as the deliberate omission of investment and government. A particularly notable contribution by McCombie & Thirlwall (1994) relaxes these assumptions and thus provides a firmer theoretical footing by by integrating Harrod's multiplier with the key insight of Professor John Hicks (Hicks 1950), namely the Hicks 'super-multiplier' [6]. Taken

[6]The ensuing overview of the Hicks super-multiplier is based substantively on the relevant chapters in McCombie & Thirlwall (1994) and McCombie & Thirlwall (2004).

together, we can see how the short-run increase in national income driven by the foreign trade multiplier can lead to expansive effects in the long-run via the Hicks super-multiplier.

In the short-run, an increase in income through the foreign trade multiplier is given by:

$$\Delta Y = (1/k)\Delta X \tag{4.11}$$

Where: $k = (1-c+ct+m)$, in which c is the marginal propensity to consume; ct the marginal propensity to tax; m is the marginal propensity to import. Collectively, these terms embody leakages from the Orthodox Keynesian model.

The increase in imports induced by the expansion of income is given by the marginal propensity to import:

$$\Delta M = m\Delta Y, \tag{4.12}$$

Substituting Eqn.(4.11) into (4.12) and rearranging yields:

$$\Delta M = (m/k)\Delta X \tag{4.13}$$

As $k > m$, the increase in imports will be less than the increase in exports and there will be an improvement in the balance of trade (i.e. a surplus emerges), equal to:

$$\Delta X - \Delta M = \frac{k-m}{k}\Delta X > 0 \tag{4.14}$$

In the long-run, however, the super-multiplier operates meaning that the level of economic activity increases until the *induced* increase in imports equals the initial increase in exports. Essentially, income will increase until the balance of payments is brought back into equilibrium. This demonstrates that the direct impact of the foreign trade multiplier on short-run growth is only one avenue through which an increase in exports facilitates economic expansion; in the long-run the relaxation of the balance of payments constraint due to the incipient trade surplus will permit other autonomous expenditures to be increased until the induced rise in imports offsets the initial increase in exports. But what might cause the second-round increase in expenditures? It could be a rise in investment due to entrepreneurs' buoyant expectations; an increase in government expenditure; or perhaps the wealth effects arising from the acquisition of overseas assets (as a result of the trade surplus) elicits an increase in private consumption.

Hence, as $\Delta M = \Delta X$, it follows that:

$$\frac{\Delta Y}{Y} = \frac{1}{m}\left(a_X \frac{\Delta X}{X}\right) \tag{4.15}$$

$$= \frac{1}{k}\left(a_X \frac{\Delta X}{X} + a_E \frac{\Delta E}{E}\right). \tag{4.16}$$

Where: E is the sum of all other autonomous expenditures (consumption, investment, government), and a_X and a_E are the relative weights of exports and other autonomous expenditures in GDP respectively.

The two above equations represent the Hicks super-multiplier in action: apart from the direct increase in output through the foreign trade multiplier, the relaxation of the balance of payments constraint permits an increase in 'autonomous expenditure' given by:

$$\frac{\Delta E}{E} = k\left(\frac{1}{m} - \frac{1}{k}\right)\left(\frac{a_X}{a_E}\right)\left(\frac{\Delta X}{X}\right) \tag{4.17}$$

This export-led relaxation of the balance of payments constraint does not automatically cause such an increase in expenditures, however, and if the resulting increase in aggregate demand (and by extension, domestic absorption) is less than the amount implied by the above equation, then the final increase in output will be correspondingly diminished and a persistent balance of payments surplus will ensue.

Harrod published his insights regarding the importance of exports about three years before the arrival of Keynes' General Theory, although it would prove to be the Keynesian view on autonomous investment (driven by entrepreneurs' animal spirits) that captured the attention of the economics profession and policy makers. To understand the relative obscurity of Harrod's contribution it is necessary to recognise that Harrod developed his analysis with a view to understanding the open-economy mechanisms at play under the classical gold standard. Indeed, Nicholas Kaldor, delivering the Keynes Lecture of the British Academy in 1982, mused that the economic circumstances prevailing when Harrod's insights were published (in 1933) were rather unfortunate: the world economy had started to retreat inwards amidst the economic and political tumult of the 1930s, which was of course a sharp contrast to the climate of peace and economic openness prevailing during the late 19th century (Kaldor 1982). Similarly, the particulars of the Great Depression presented a set of challenges that were far more amenable to Keynes teachings on depressed animal spirits, subdued investment, and the potential role of the state in driving up government spending (G) as a means of overcoming a serious lack of effective demand.

The resurrection of the foreign trade multiplier as an explanation for cyclical dynamics, as well as for economic growth in the long-run, was initiated in large part (thought not exclu-

sively) by Nicholas Kaldor. Indeed, Kaldor sought to combine a number of concepts such as effective demand, structural change, and open-economy dynamics into a coherent theoretical framework. His emphasis on the uniqueness of exports as the only true autonomous source of demand appears to have began with an address to the Scottish Economic Society (Kaldor, 1970), which emphasized this point in the context of regional economic development, though he would spend the rest of his career developing its implications for the national economy.

4.2.2 The Foreign Trade Multiplier in the Treasury

The role of exports as the ultimate source of autonomous demand really came to the fore in a policy setting during the 1970s, particularly when the so-called 'New Cambridge' group, formally the Cambridge Economic policy Group (CEPG), were at the peak of their influence, holding senior advisory positions to the Labour government of Harold Wilson (1974-76) and then his successor James Callaghan (1976-79). Wynne Godley and Nicholas Kaldor were in close proximity to the Chancellor of the Exchequer Dennis Healey, whilst their fellow economist Francis Cripps advised the Secretary of State for Industry, Anthony Wedgwood ('Tony') Benn. As will become apparent, CEPG's proposed macroeconomic policy framework had strong overtones of the foreign trade multiplier and its influence helped to shape not only their polemic assessment of what had gone wrong with British economic policy over the previous two decades or so, but also what ought to be done in order to extricate the UK economy from the doldrums following the OPEC oil shock.

New Cambridge's support for an export-oriented approach to understanding the nature of autonomous demand in the UK economy was centered on two key facets: first, that the private sector had not - for the most part- been a destabilizing feature of the British economy. This served to rule out investment and consumption shocks as drivers of macroeconomic fluctuations. Second, they proffered that in the medium term it was exports that acted as

the engine of autonomous demand [7]:

'We assert that in the medium term the foreign trade performance of the economy is the main determinant of the level of domestic spending, output and income ... At any given time there is a certain level of domestic spending at which ... the balance of payments on current account would be in balance. We may call this the level of spending 'warranted' by the country's performance in foreign trade. While swings of fiscal and monetary policy ... have influenced the level of spending from year to year, in the longer run the main determinant was the spending level 'warranted' by the economy's performance in foreign trade'. (Godley et al. 1981, pp.10-11)

The quotation is taken from CEPG's very own mouthpiece - the Cambridge Economic Policy Review, and underscores the level of importance they attached to the foreign trade multiplier in characterizing the forces driving fluctuations of the British economy. It is also consistent with their opinion that the domestic private sector tended to maintain a small but stable surplus in terms of its sectoral financial balance, hence autonomous movements in investment were not responsible in the main for instability in the economy (Smith 2016, pp.3-4).

This offended the sensibilities of more orthodox Keynesians, with Richard Kahn and Michael Posner of Cambridge University being particularly public and vocal about their unease in a succession of letters to *The Times* newspaper. The various charges levied against the New Cambridge group were manifold, and not all of them directly related to the issue of exports as the ultimate source of autonomous demand. Needless to say, however, the apparent demotion of investment was seen as a particularly egregious slight against the longstanding Keynesian view that entrepreneurs' animal spirits drove their investment intentions, and by

[7]It is necessary to point out, however, that despite being closely affiliated with the New Cambridge group, Kaldor was not necessarily in step with all of their views. Indeed, the role of autonomous exports is a case in point, since Kaldor explicitly bemoaned the fact that exports had ceased to act as the engine for investment in the post-war period, see for example Kaldor (1971).

extension the business cycle. A journal article by David Vines seems to capture the basis of the criticism quite aptly:

'Indeed, the instability of expectations is the very basis of the Keynesian "investment determines saving" doctrine; saving adjusts to whatever investment entrepreneurs' animal spirits give rise to, via changes in the level of economic activity' The New School appear to deny this ... From this denial of Keynesian doctrine, the New School derive their claim that fiscal policy policy should not attempt to compensate for short-term changes in private sector expenditure' (Vines 1976, p.227).

The criticism by Vines can be taken as emblematic of the disdain for New Cambridge's dethroning of investment in favour of exports, and the attendant relegation of fiscal policy as a consequence. Vines makes the point that traditional Keynesian doctrine (which New Cambridge essentially eviscerated) had formed the basis of the macroeconomic models of leading organisations such as the National Institute of Economic and Social Research, as well as the Treasury itself. It was this tradition of empirical work along with its attendant policy implications that New Cambridge were basically consigning to history. The article also goes on to make a methodological point that New Cambridge's invocation of a super-multiplier or accelerator was explicitly criticized by Keynes in chapter 18 of the General Theory, as well as in an extensive written disagreement with non other than Roy Harrod himself, a full account of which can be read in the collected correspondence of Keynes (Keynes 2013, p.320-350). Similar sentiments were expressed by Robert Dixon, who pulled no punches in claiming that 'readers will perceive that this (virtual monetarist) vision of income determination and the causes of income instability constitutes a total rejection of Keynes views on economic policy' (Dixon 1982); he goes on to specifically denounce the New Cambridge view regarding fluctuations in private investment.

One of a number of contentious propositions advanced by New Cambridge was that that business cycle instability in the UK was predominantly caused by ill-judged fiscal policy and disturbances to exports (i.e. negative shocks). The former point was arguably more closely associated with Wynne Godley and the latter with Kaldor, nonetheless the pushback against both by orthodox Keynesians was substantial. The overarching policy proposition advanced by the group was that the budget balance (i.e. fiscal policy) ought to be assigned to achieving external balance, whilst access to foreign markets and commercial policy would produce the necessary growth in exports so as to achieve internal balance (growth and low unemployment). Statements such as 'changes in exports, import prices etc., make a lot of difference to real income and output, but none at all to the balance of payments, however paradoxical' provides a good flavour of the ostensible heresy being peddled by the New Cambridge group. In a similar vein, they purported that instability in the economy did not stem from the domestic private sector but from '... foreign influences, particularly export demand and commodity prices'.

4.2.3 Fluctuations in the Open-Economy

The discussion so far has considered the historical dimensions of exports in the post-war UK economy, and provided an overview of the Harrod foreign trade multiplier and the associated Hicks 'supermultiplier'. It would also be conducive, however, to consider the substantive literature within open-economy macroeconomics that examines the issue of international business cycle co-movement, indeed, the old aphorism states that "when America sneezes, Europe catches a cold". The discussion will necessarily be brief and fashioned with a view to elucidating the two key theoretical positions that have emerged from the literature, rather than seeking to provide an in-depth survey of the topic [8].

[8]There is an extensive body of empirical research that seeks to test the broad implications arising from the theoretical models, but this fragments depending on geography and time period. For instance, in the build-up to the European economic and monetary union (EMU) there was a great deal of interest in the degree to which European economies were sufficiently synchronized to warrant such a close degree of economic integration. Likewise, during the early 2000s there was considerable debate regarding prospective British

On the one hand, there is a longstanding tradition which predicts that open economies, i.e. economies with a high share of exports and imports in national income, will experience a greater degree of business cycle co-movement with the economies of their key trading partners. Greater trade linkages give rise to the potential for both demand-side and supply-side spillovers between countries: it is easy to envisage how an investment or consumption boom in one country will increase their demand for imports from another country, whilst on the supply side a positive productivity shock in the tradeable output sector will lead to lower prices and thus cheaper imports for trading partners. If one imagines a multiplicity of highly open-economies that are deeply intertwined with cross-border flows of goods and services it gives rise to the possibility of a common business cycle, such as a European business cycle for instance (Foreman-Peck et al. 2010, pp367-374). Trading relations alone, however, are not the full story, and it has long been recognised since the seminal contribution of Mundell (1961) that in order to sustain business cycle co-movement a wider range of pre-requisites are needed: openness to capital movements; wage and price flexibility; labour mobility between economies. Another prominent explanation is similarity of industrial structure - see Baxter & Kouparitsas (2005) for further discussion of candidate variables.

The case is far from unanimous in favour of greater business cycle co-movement, however, and strong trade linkages can actually give rise to forces of divergence. In an important contribution, Krugman (1993) argued that if industry-specific shocks are the key driver of business cycles then it follows from the simple principle of specialization in international trade that business cycle co-movement between countries is likely to decrease (owing to the idiosyncratic nature of the industry-specific shocks). Similarly, although one might expect deeper financial linkages to promote tighter business cycle co-movement, the effect

membership of the Euro; in particular a heightened interest in whether the UK's significant trading relations with the Eurozone had resulted in sufficient business cycle co-movement to make joining the single currency viable.

can actually run in the opposite direction: to the extent that cross-border financial linkages facilitate more specialized production structures (as envisaged by most trade theories) via flows of investment capital, then the resulting diversification of investment portfolios between countries - and hence industries- results in more efficient risk sharing with respect to country-specific output fluctuations (Kalemli-Ozcan et al. 2001).

Whilst this study does not seek to test the extent of UK business cycle co-movement per-se, a consideration of the aforementioned issues are important for context - particularly in relation to concepts such as autonomous export demand and induced-investment arising due to the workings of the Hicks supermultiplier, for example. Likewise, later discussion will invoke concepts such as the exogenous versus endogenous determination of income elasticities in the tradable sector, hence a cursory overview of the mechanisms underpinning cross-country cyclical fluctuations will prove instructive.

4.3 Frequency Domain Analysis in Economic History

The analysis of cyclical fluctuations in economic variables has long been an established feature of the macroeconomics literature, although its appeal has ebbed and flowed along the years as competing theoretical paradigms have ascended and fallen. It has largely been characterized by two key features, namely *business cycle* fluctuations (typically understood to lie within a 4-12 year window), and for the most part the analysis has been undertaken within the *time domain*, using techniques from time series analysis. This study proposes an alternate avenue of inquiry, namely to analyse cyclical fluctuations in the frequency domain, which opens up the possibility of obtaining new insights into cyclical phenomena that fall outside the typical business cycle window.

The use of frequency domain analysis is not a new emergence in economics or economic

history, though its application in both disciplines has not been particularly widespread. The seminal contribution in economics was provided by Granger (1969) who noted the use of frequency domain techniques in the natural sciences and provided the first concrete demonstration of their potential in analysing economic cycles.

Within economic history, a few notable contributions stand out. In a succession of publications, the Russian economist Nikolai Kondratiev posited the existence of a long-wave fluctuation in economic activity (Kondratiev 1925), falling within the window of roughly 45 - 70 years, and suggested that it could be explained by the emergence and diffusion of major technological changes. This is interesting since, when viewed through a conventional time series lens, it would be typical to ascribe era-defining technological advancements (such as electricity, for instance) as examples of a structural change and to model it as such. In the world of frequency domain analysis, however, Kondratiev located such developments as part of a far longer tapestry in which economic activity undergoes low-frequency cyclical fluctuations, upon which the regular business cycle essentially "sits atop" [9].

There have been some earlier contributions employing frequency domain analysis in the study of the British economy, which includes the work of Solomos Solomou (Solomou 1990, 1998), who applied the technique of spectral analysis to both the study of historical fluctuations in various series, with a particular focus on Kondratiev waves. Chadha & Nolan (2002) analyse a range of UK macroeconomic aggregates from roughly the late 19th century to 2000, again using spectral analysis. Whilst by no means obsolete, spectral analysis has been superseded somewhat by the newer and arguably superior technique of wavelet analysis. Nonetheless these studies represent notable early attempts at bringing frequency domain analysis to the study of British economic history.

[9] What is meant here is that there can be two (or more) simultaneous cyclical fluctuations occurring in an economy: one that operates over the very long horizons as posited by Kondratiev, whilst the typical business cycles happens concurrently. The overall fluctuations in economic activity can be decomposed into the relative oscillations at different frequency windows.

4.3.1 Multiresolution Analysis of Signals

Signals often consist of several meaningful components, indeed, this is very true of the types of data often encountered in economics, finance, and economic history. Often, the researcher will want to analyse one or more of these components separately whilst still retaining the time scale of the original data (i.e the time span of the data sample). Multiresolution analysis is the process by which a researcher can deconstruct a signal into its constituent components, which often allows for more meaningful interpretation of the cyclical dynamics as well as revealing insights not visible in a more aggregated form.

When considering multiresolution analysis on a more technical level, the multiscale analysis of this kind is an approximation operation through a dense vector space (Hilbert space) with empty intersects from the coarsest to less detailed information. Based on the accessible discussion in Crowley & Hudgins (2015), let the value of a variable x at time instant k, x_k, be written as follows:

$$x_k \approx S_{J,k} + d_{J,k} + d_{J-1,k} + ...d_{1,k} \tag{4.18}$$

Where: $d_{j,k}$ are detail components (i.e wavelet crystals), $j = 1, ...J$; $S_{J,k}$ is a trend component known as the 'wavelet smooth', and J stands for the number of scales (that is, the frequency bands).

A variable x_k is filtered by a low-pass filter (l) and a wavelet (high pass) filter at each step. Essentially this entails filtering out information across a range of frequencies in each step until we obtain an approximated variable containing only the trend. Hence in the first step x_k is decomposed into $d1_k$, the high frequency component, and S_1, k, the low frequency component. It follows that the decomposed signal at scale 1 ($J = 1$) may be written as:

$$x_k \approx S_{1,k} + d_{1,k} \tag{4.19}$$

The same process is then performed on S_1, k with the signal being subsampled at scale 2 so that:

$$S_{1,k} \approx S_{2,k} + d_{2,k} \tag{4.20}$$

This recursive estimation continues until reaching J, at which point we have obtained a set of detailed crystals, in addition to the wavelet smooth.

In this multi-resolution analysis, we utilize Maximal Overlap Discrete Wavelet Transform (MODWT) as the method of time-frequency decomposition, which possesses a few key advantages over the alternate approach: Discrete Wavelet Transform (DWT) (Crowley & Hudgins 2015, p.503). Particularly important is the fact that MODWT is 'shift invariant' meaning that the decomposed frequency scales can be aligned with the time domain in order to provide a picture of how different cyclical fluctuations evolved in relation to each other over specific historical periods. DWT also suffers from the drawback of dyadic data requirement, meaning that the number of observations needs to be a power of 2 in order to adequately resolve the frequency scales, which often results in the researcher being forced to arbitrarily shorten the series of observations[10]. By contrast, MODWT does not suffer from this dyadic data requirement. Finally, on a theoretical level, it should be noted that the MODWT estimator produces a more asymptotically efficient wavelet variance estimator than the DWT (Crowley 2007, p.226).

[10]There are some procedures one can implement to try and work around this requirement, such as "padding" the observations using the mean value or zeros, but this is generally held to come at the cost of undermining the transformation.

4.3.2 Variance Decomposition By Frequency Scale

The orthonormality of the DWT generating matrix ω has some significant implications, not least the possibility of performing an energy decomposition on a scale by scale basis, such that we can ascribe relative energies to different frequency scales and thus account for the importance of different cycles in characterizing the dynamics of the aggregate series. Indeed, this is closely related to the multiscale decomposition outlined above, and both provide valuable insights into the frequency domain properties of the data. The procedure can be considered more closely à la Percival & Walden (2000, Ch.8):

$$\| y \|^2 = \sum_{j=1}^{M} \| W_J \|^2 + \| V_M \|^2 \tag{4.21}$$

Where $\|\|$ is the Euclidean norm; hence $\| W_J \|^2$ quantifies the energy of $\| V$ accounted for at scale λ_j

The energy decomposition is known as the wavelet power spectrum (WPS) and represents what is probably one of the most important properties of the DWT. (It is also reminiscent of the spectral density function used in Fourier analysis).

The total variance in y can be decomposed as:

$$\sum_{j=0}^{\infty} \nu^2(\lambda_j) = var(y) \tag{4.22}$$

Where ν^2 is the contribution to $var(y)$ due to scale λ_j, and is estimated as:

$$\hat{\nu}^2(\lambda_j) = \frac{1}{T} \sum_{t=1}^{T} W_{t,j}^2 \tag{4.23}$$

Since $\nu^2(\lambda_j)$ is the contribution to the sample variance of y_t at scale λ_j.

Due to the presence of boundary coefficient this estimate is biased, however, hence the boundary coefficients should be dropped from consideration in order to derive an unbiased estimate. As such, an unbiased estimate of the variance contributed at scale λ_j is given by:

$$\tilde{\nu}^2(\lambda_j) = \frac{1}{M_j} \sum_{t=k_j+1}^{T} W_{t,j}^2 \tag{4.24}$$

Where $M_j = T - k_j$ and k_j represents the number of coefficients affected by boundary conditions.

4.3.3 Empirical Output for Multiresolution Analysis and Variance Decomposition

RGDP

Examining the cyclical dynamics of RGDP for our two sub-periods gives rises to some interesting observations[11]. Firstly, in both periods, the overall variation accounted for by the combined shares of the 2-4 and 4-8 year cycles account for the dominant part of fluctuations in RGDP: in other words, this is where most of the action can be found in terms of cyclical dynamics. For period 1 (1831-1939) the combined share is 73% and for period 2 (1955-2019) it is 61%. The 8-16 year cycle contributes 24% and 17% of variation respectively, whilst the lowest frequency scale captured by the analysis, 16-32 year cycles, contributes a meagre 4% in both periods. A commonly accepted definition of business cycle frequency is typified by

[11]In light of the large volume of empirical outputs being produced here, the tables containing the variance decompositions by scale can instead be found in the Appendix - but will actively feature in the discussion in this section. These tables also show the correspondence between the wavelet frequency scales and their corresponding cycle lengths in the time domain.

Prescott (1986), who defines business cycles as falling within a 3-8 year window, meaning that the bulk of the cyclical behaviour exhibited by our RGDP series in both periods falls squarely within the commonly accepted window of business cycle activity.

On the whole it seems that the differences in the cyclical dynamics of RGDP across the two periods is not markedly different; perhaps the most salient difference is the relative importance of the 8-16 year cycle (W3 and W5 band respectively), which is around 50% more significant in relative terms during the 1831-1939 period. Having sketched out the power spectrum distribution for RGDP as a whole, it will now prove particularly interesting to see how our results for investment and exports fare in comparison.

Investment

With investment we see a key finding from our analysis of RGDP repeat itself, namely that the majority of the overall cyclical variation is derived from fluctuations in the 2 - 8 year range (i.e. the 2-4 and 4-8 frequency bands): 64% for the earlier period and 58% for the the latter. The key area of difference seems to be (once again) the relative importance of the 8-16 year cycle, which appears to be a significant driver in the earlier period, accounting for slightly short of 30% of overall variation. By contrast, this figure stands at just 13% for the later period. This amounts to a fairly notable difference in the cyclical dynamics of the two periods, since it could imply that some economically interesting or meaningful phenomena are contributing to more pronounced long-horizon investment cycles in the earlier period. Finally, we note that the 16-32 year frequency band remains very similar across both periods, but relatively trivial to the overall variation in the series.

Exports

The variance spectra distributions for exports produce a particularly striking contrast to the previous analyses for RGDP and investment, because the higher frequencies such as 2-4

Figure 4.3.1: Multiscale Decomposition of RGDP, 1956-2019

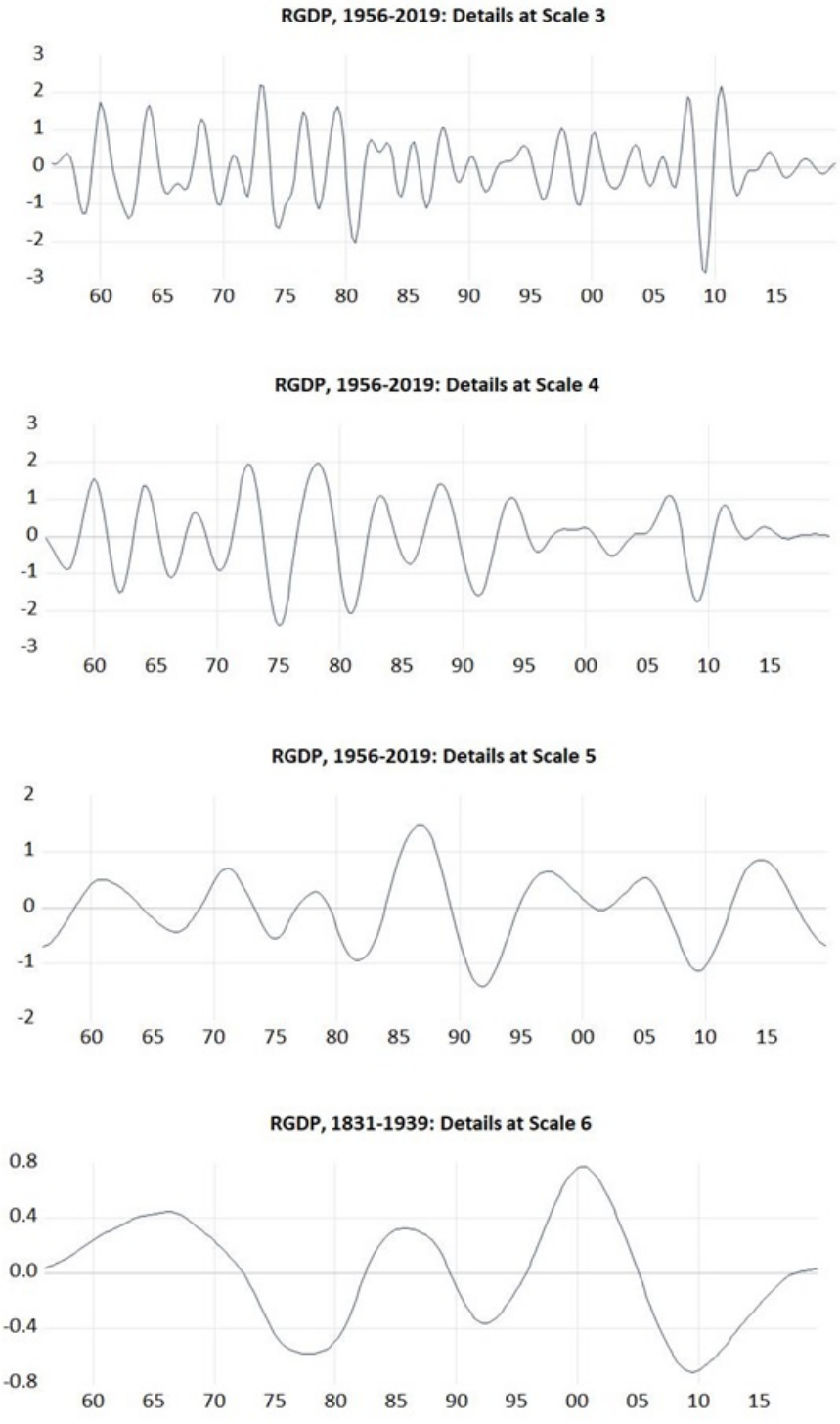


Figure 4.3.2: Multiscale Decomposition of RGDP, 1831-1939

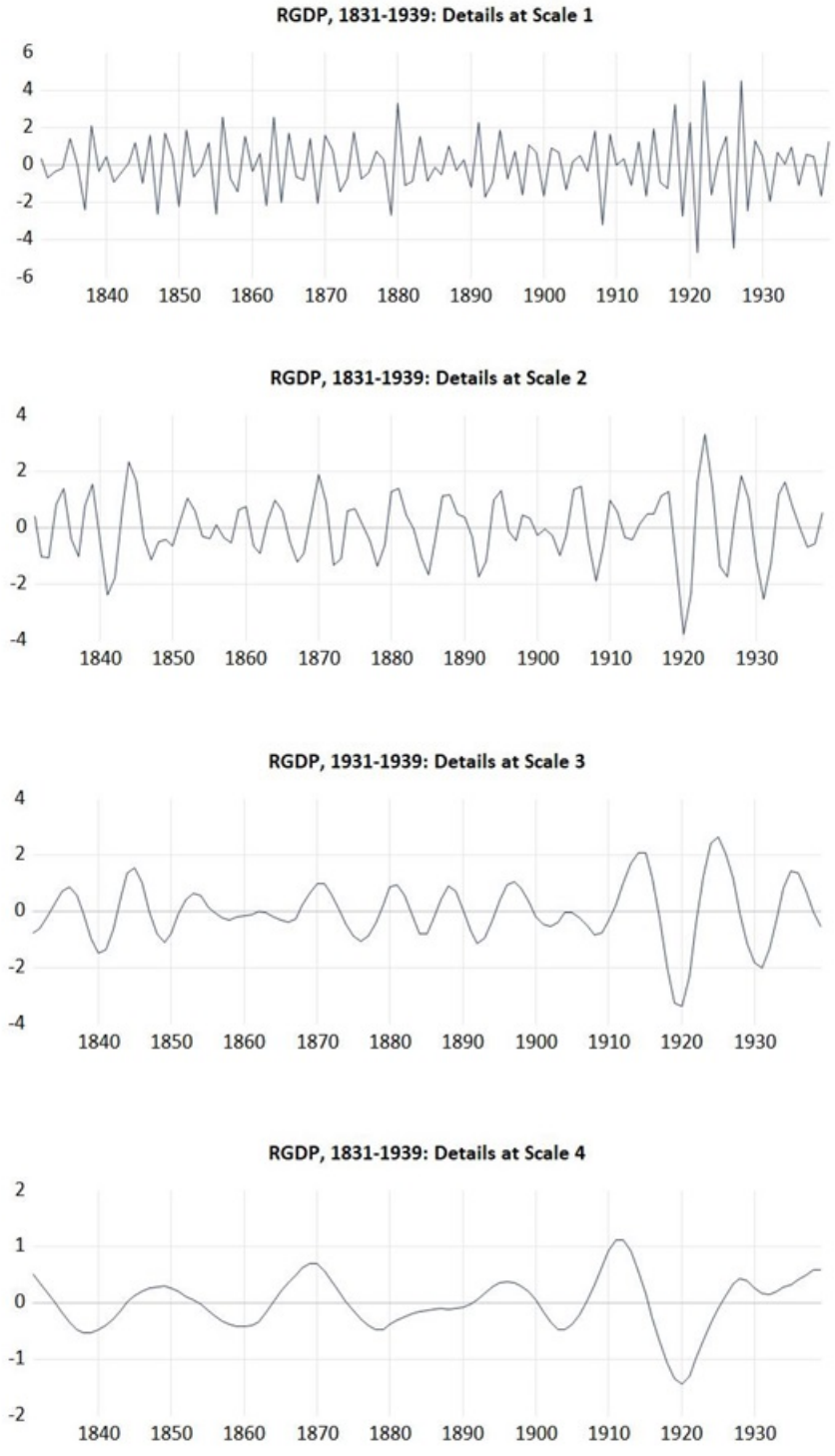


Figure 4.3.3: Multiscale Decomposition of Investment, 1956-2019

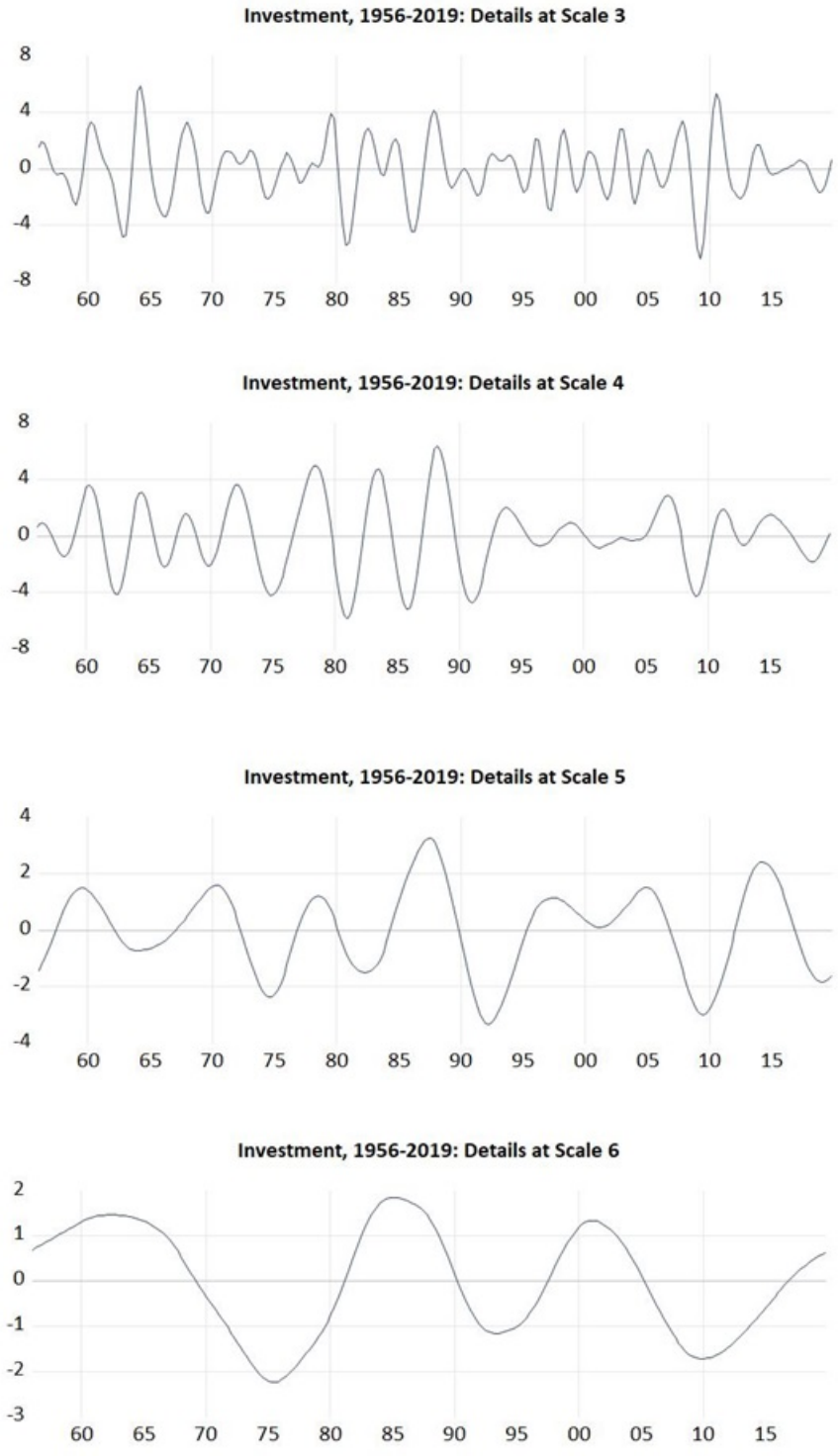


Figure 4.3.4: Multiscale Decomposition of Investment, 1831-1939

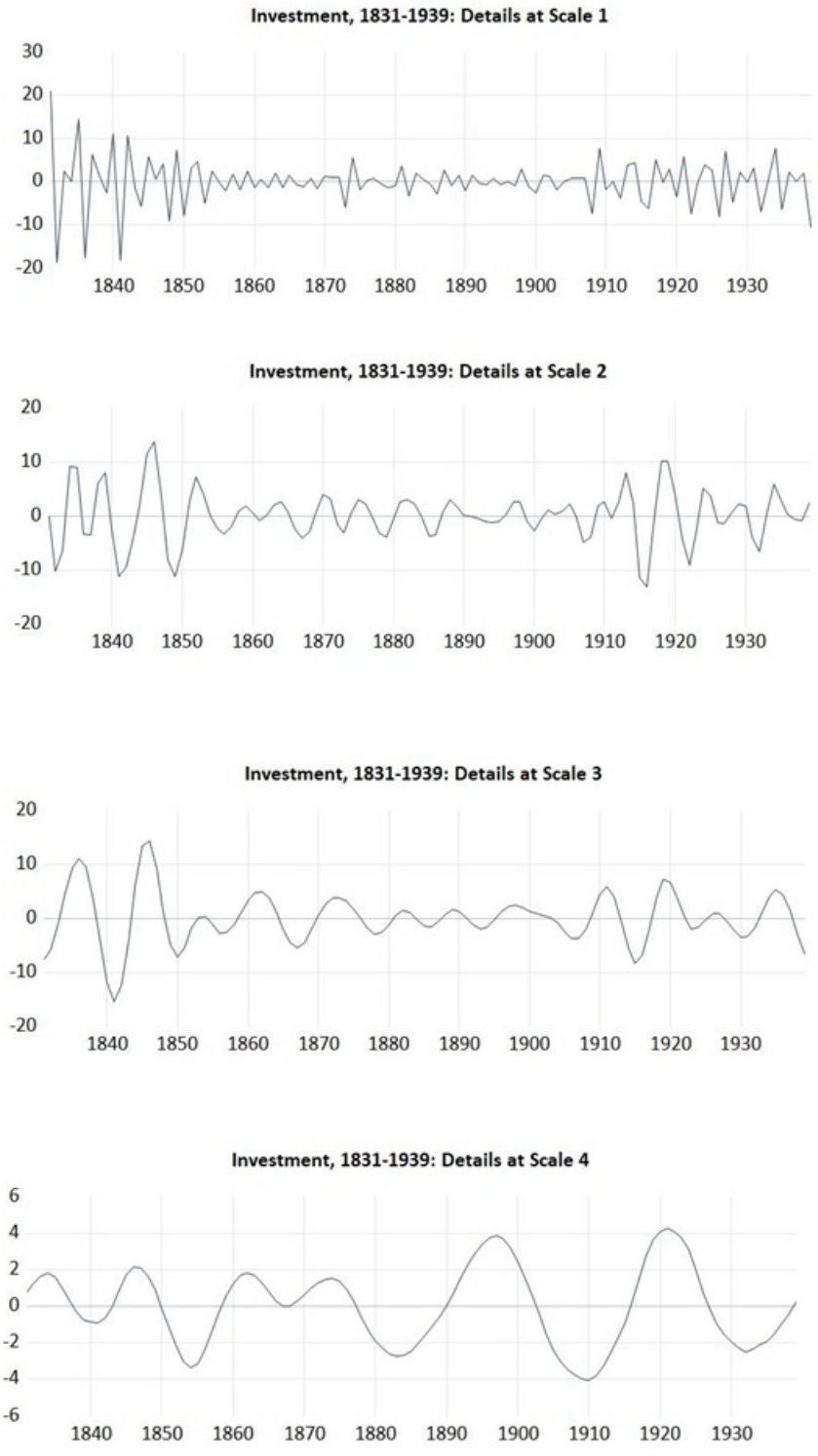


Figure 4.3.5: Multiscale Decomposition of Exports, 1956-2019

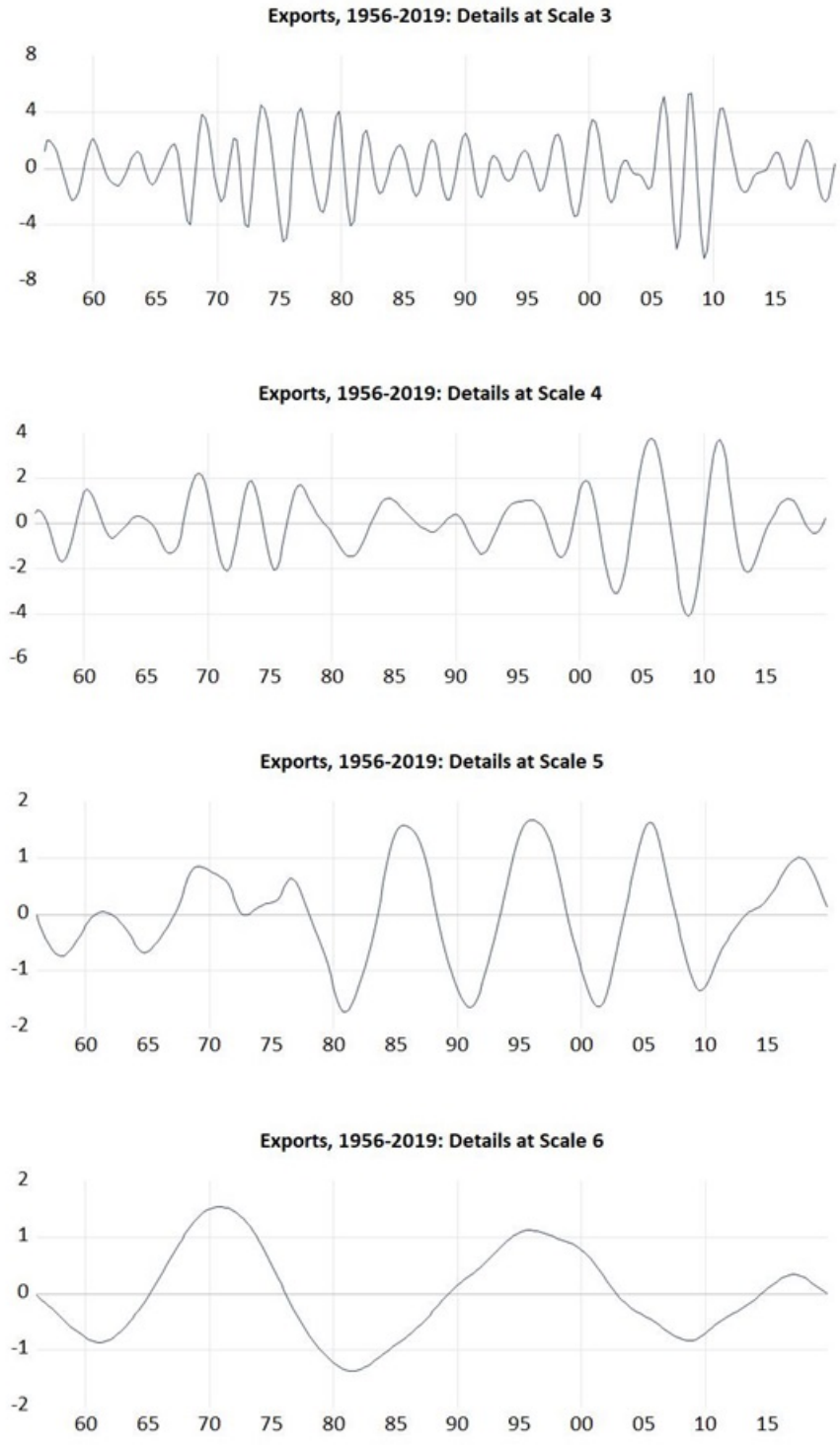
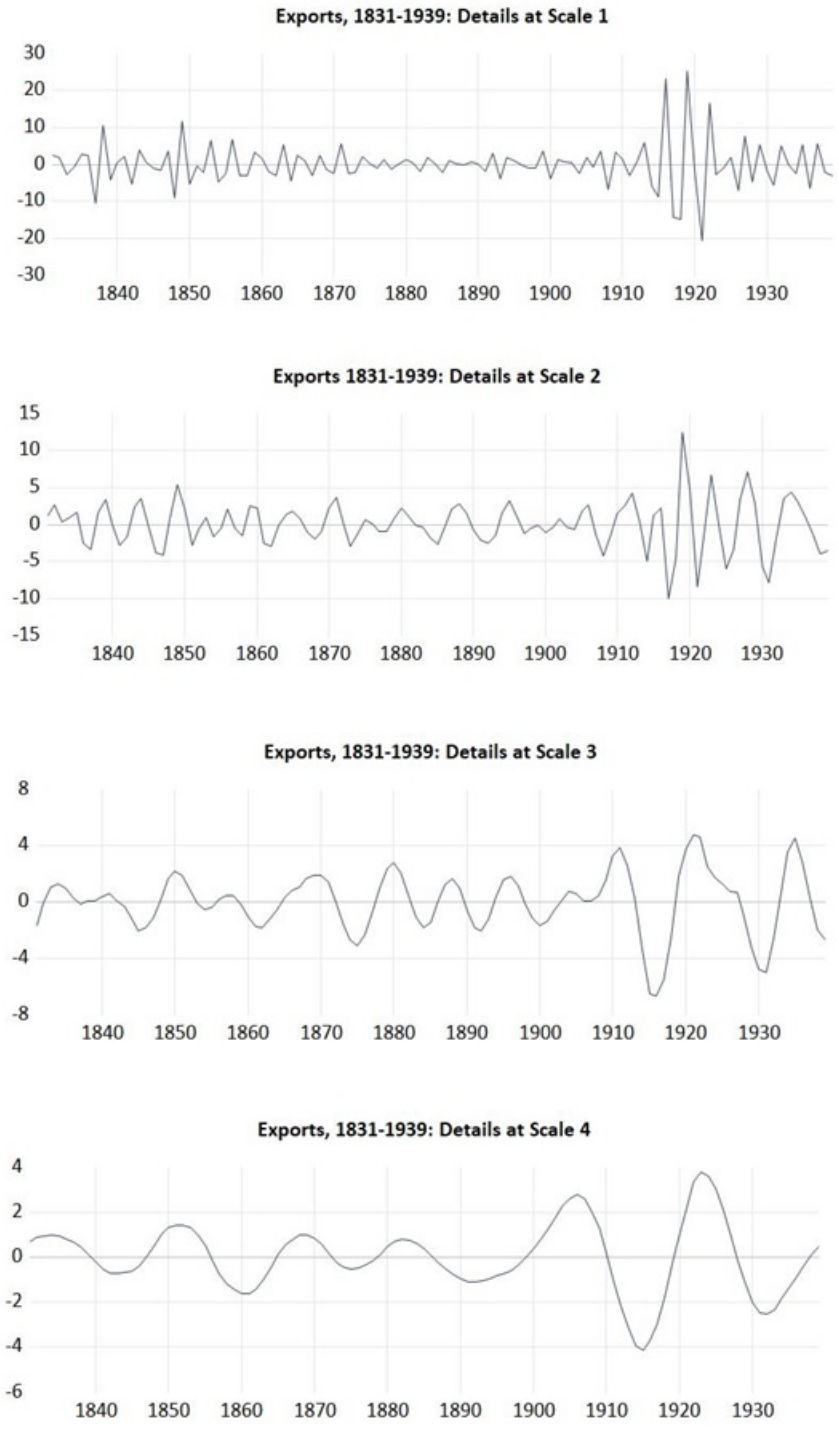


Figure 4.3.6: Multiscale Decomposition of Exports, 1831-1939



year cycles (or shorter still in the case of the later sub-period) seem to be where most of the variability is found, with the later frequency bands assuming a less prominent position.

Figure 4.3.7: Multiscale Decomposition of Government Consumption, 1956-2019

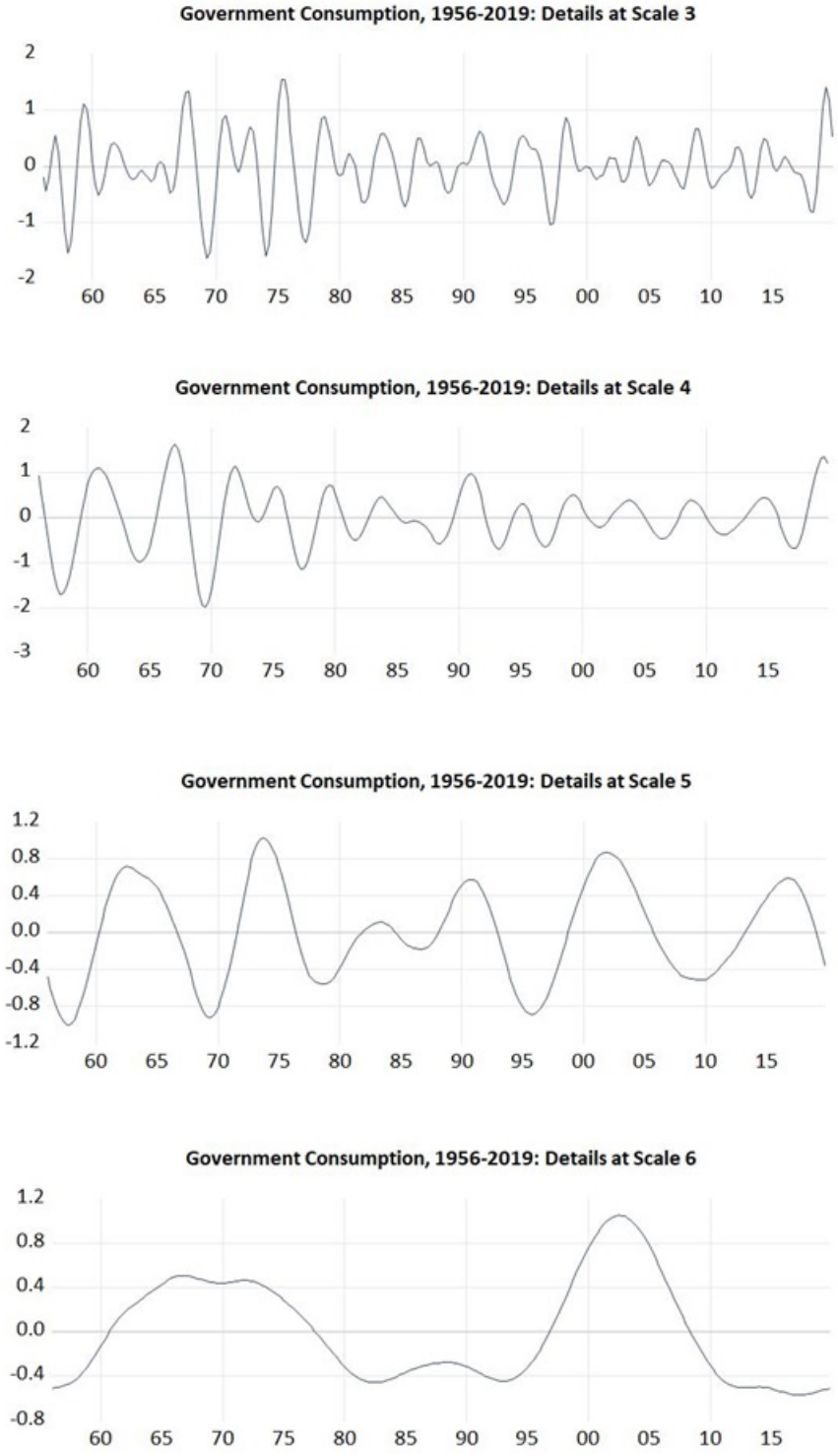
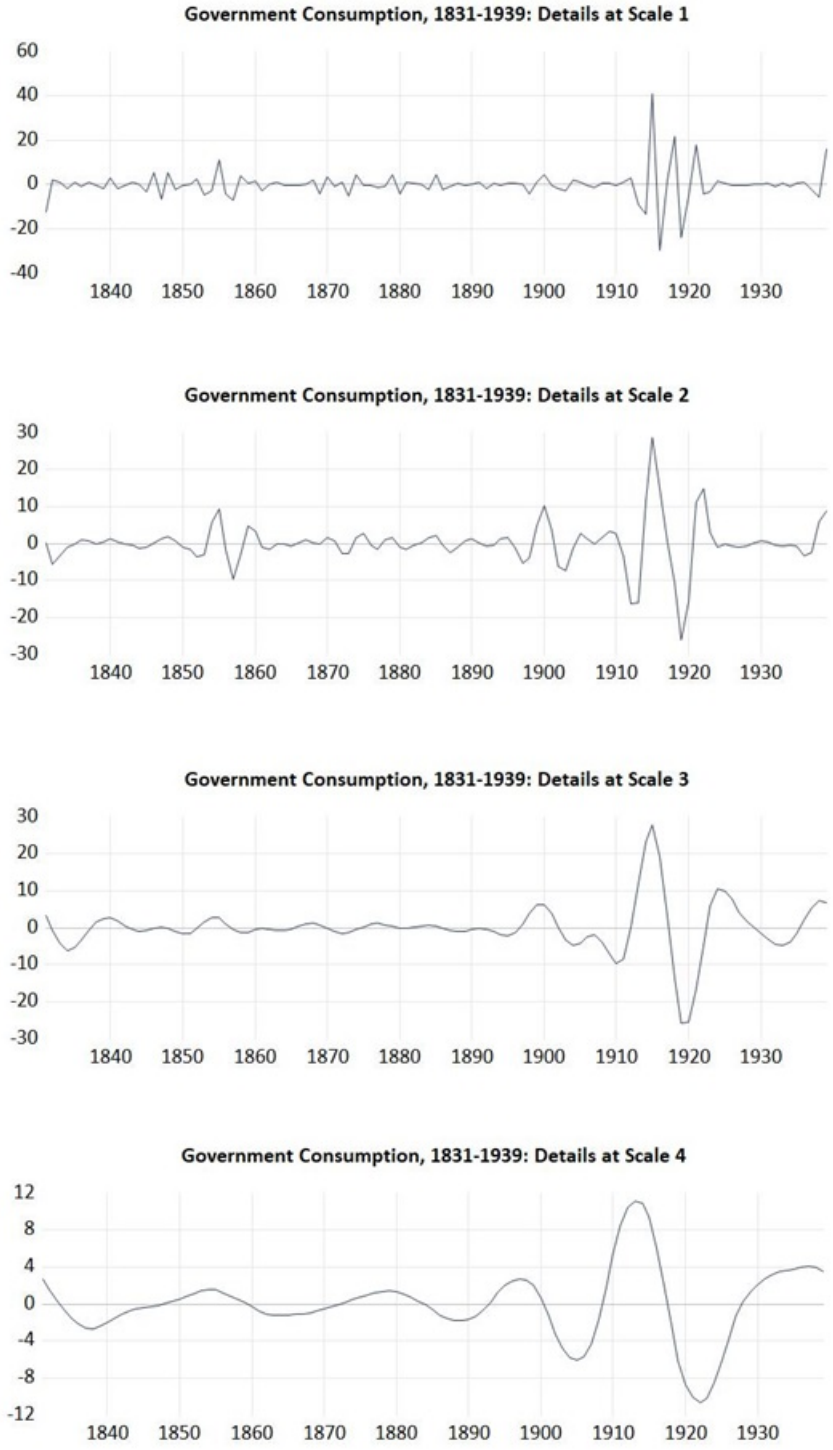


Figure 4.3.8: Multiscale Decomposition of Government Consumption, 1831-1939



Indeed, 70% of overall variation for the 1955-2019 period is attributable to cyclical fluctuations in the region of 2-4 years; 1-2 years, and 0.5 – 1 years. Of this, just under 40% can be ascribed to 0.5 – 2 year cycles alone. A similar finding is obtained for the earlier sub-period, with the lowest frequency band of 2-4 years accounting for 57% of overall export variability. Interestingly, the 4-8 year cycle, which has tended to make an important contribution during both periods in the preceding analysis, seem to have dropped off in importance for the later period (now accounting for just 17% of variation) where as for the earlier period it still retains greater importance accounting for 28% of overall cyclical variation. The combined contributions of the 8-16 and 16-32 year cycles remains pale during both periods, which is consistent with our previous findings regarding cyclical phenomena at the lower frequencies.

Government Consumption

The increasing role played by the government in terms of its direct contribution to economic activity is also an ancillary proposition of the Harrod-Kaldor hypothesis, with Kaldor explicitly mentioning the enlarged role for government in the post-WWII era compared to earlier periods (such as the inter-war years or the Victorian era). From a frequency analysis standpoint, government consumption also produces an interesting point of difference between the two periods we study: in the 1955-2019 period, cyclical fluctuations within the 2-4 bands or lower account for 52% of overall cyclical variability, whereas in the earlier period the lowest frequency band is responsible for just 25%. The differences do not stop there, since in the earlier period there is evidence of a pronounced 8-16 year cycle (37%) compared to just 18% in the later period. Finally, the relative contribution of the 4-8 year cycle is reasonably similar across sub-periods, as is the very low frequency 16-32 year cycle, which contributes a paltry share of overall variation.

4.4 Unpacking the Links: Co-Movement by Frequency Scale

The use of straight-forward correlations to gauge relevant information from macroeconomic series has played a significant role in helping to shape the academic research agenda in relation to business cycles. Indeed, since Kydland & Prescott (1982) initiated the modelling of real business cycles, it has been commonplace to judge the success of a calibrated model by assessing how well it matches the actual economy's characteristics as captured by the correlations, moments and standard deviations [12]. But in some ways, however, this approach could be judged as unsatisfactory and potentially misleading. Macroeconomic series are composed of cyclical fluctuations across a number of different frequency scales, and the traditional notion of "business cycle frequency" may only succeed in capturing limited insights regarding the variables' dynamics.

A richer and more illuminating analysis can be performed in the frequency domain by examining the correlations between variables across a range of frequency scales, encompassing high frequency through to low frequency fluctuations. Previous studies have made the salient point that variables exhibiting seemingly little correlation in the time domain actually exhibit significant co-movement in the frequency domain, whilst conversely other variables that might appear to be closely correlated in time are actually much less intimately related upon a more granular examination in the frequency domain [13]. Although wavelet covariance decomposes the covariance between two stochastic processes for a given range of frequency scales, the normalization of wavelet covariance by the variability of the observed wavelet coefficients is required in order to provide us with the wavelet correlation [14]:

[12] See Smets & Wouters (2007) for a typical example of this in a seminal paper within the DSGE literature.

[13] See, for example, Crowley & Hallett (2014).

[14] For the complete and comprehensive treatment, from which this discussion is drawn, see Whitcher et al. (2000).

$$\rho_{xy}(j) = \frac{cov(W_x(j,s)W_y(j,s))}{[Var(W_x(j,s)var(W_y(j,s))]^{1/2}} \equiv \frac{\gamma_{xy}(j)}{\upsilon_x(j)\upsilon_y(j)} \tag{4.25}$$

Where: $\rho_{xy}(j)$ is the wavelet correlation between time series x_t and y_t at scale j; υ_x^2 and $\gamma_{xy}(j)$ denote wavelet variance and covariance respectively. The wavelet correlation estimator utilises the definition of wavelet correlation expounded in the above equation, such that:

$$\hat{\rho}_{xy}(j) \equiv \frac{\hat{\gamma}_{xy}(j)}{\hat{\upsilon}(j)\hat{\upsilon}_y(j)} \tag{4.26}$$

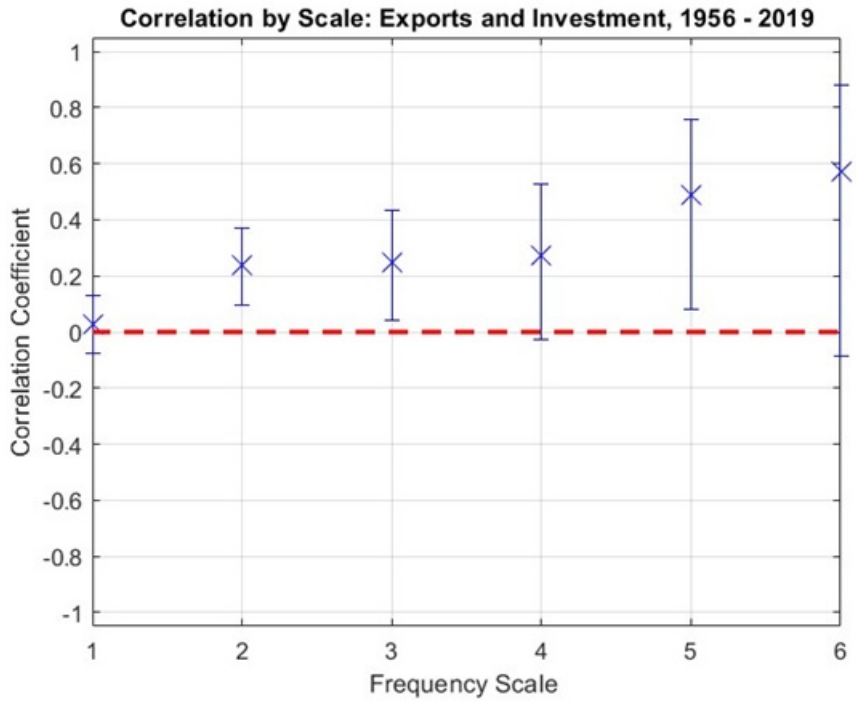
$\hat{\rho}_{xy}(j)$ denotes the wavelet covariance estimator, and $\hat{\upsilon}_x(j)^2$ and $\hat{\upsilon}_y(j)^2$ are estimators of wavelet variance at scale j for time series x_t and x_y.

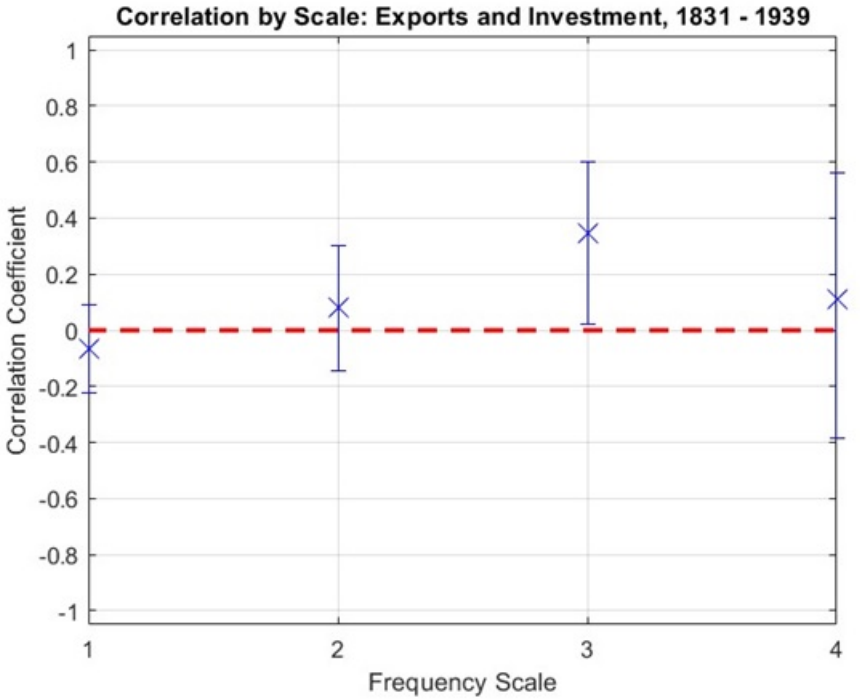
This form of wavelet cross correlation is typically presented in empirical applications as a plot of the wavelet correlation statistic against the corresponding frequency scales, and as-per typical correlation metrics $|\hat{\rho}_{xy}| < 1$. Confidence intervals can be constructed to provide a measure of estimation uncertainty and to ascertain whether the reported correlations are statistically significant at the chosen confidence level - see Whitcher et al. (2000) for a technical exposition.

4.4.1 Exports - Investment

An integral part of the Harrod-Kaldor hypothesis was the notion of a strong link between exports and investment in the pre-WWII era, which was then diminished post-1945 owing to the significantly enlarged role of consumption-led growth. Hence in Figure 4.4.1 we might expect to see evidence of a fairly strong export-investment correlation across at least a few frequency scales in our 1831-1939 sample, which would then diminish in the latter sample,

Figure 4.4.1: Frequency Scale Cross Correlation - Exports and Investment, 1831-1939 and 1956-2019





1956-2019 [15].

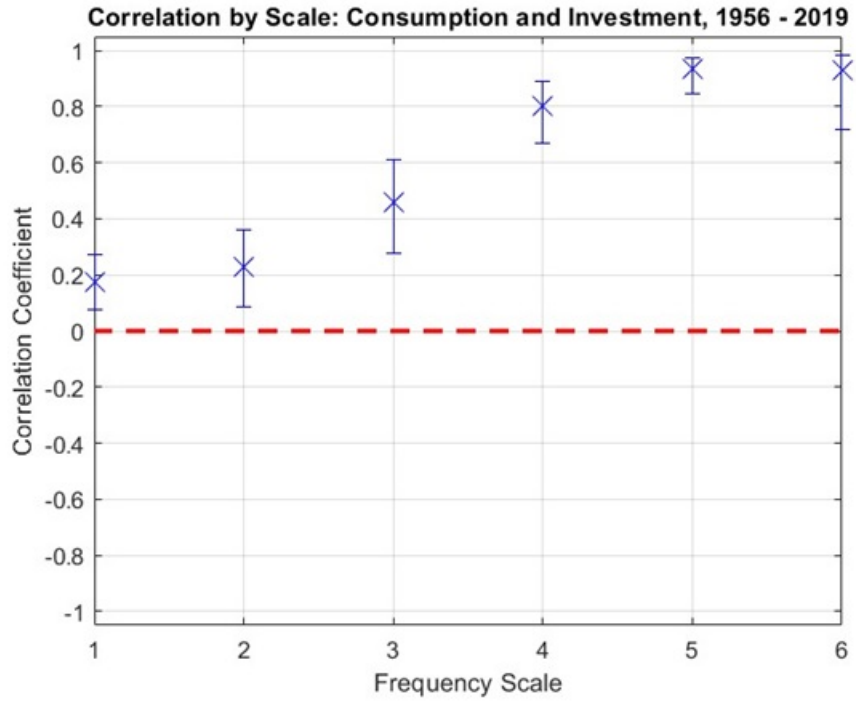
The results from our multiscale correlation analysis paint something of an opposing picture to the one proffered by Kaldor, since the investment-export correlation is weaker in the earlier period than in the latter one. Indeed, a peak correlation of 0.34 is obtained in the earlier period (at a cycle of 8-16 years) compared to 0.49 for the same scale in the latter period, and a peak of 0.57 at the 16-32 year cycle. Similarly, the investment-export correlation is even mildly negative (-0.07) in the earlier period at a cycle of 2-4 years. Further examination of the graphs reveals that across all comparable frequency scales (S3-S6, and S1-S4 respectively, i.e. the 2-4 year cycle onwards) the export-investment co-movement is stronger in the earlier period than in the later one. Whilst correlations alone cannot be used to advance causal relationships, these intriguing findings cast some doubt over Kaldor's contentions regarding the export-investment relationship in the UK economy - at least with regard to the relative the strength of the relationship between the two periods he highlighted.

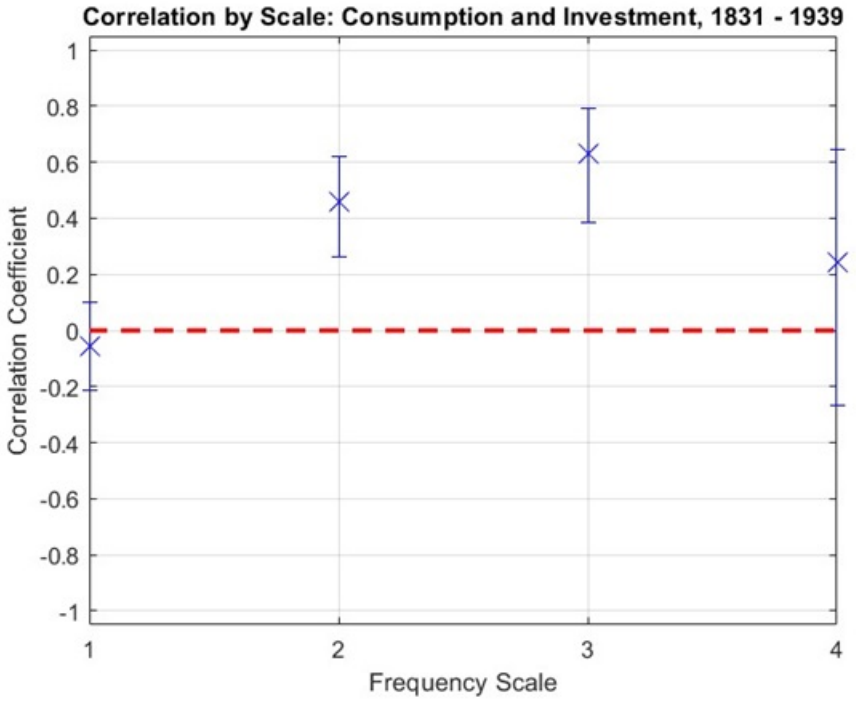
4.4.2 Consumption - Investment

The supposed weakening of the exports-investment relationship post-1945 was supposed to be due to a more consumption-oriented growth model, which was buoyed on by active fiscal stabilization so as to raise aggregate demand through increased consumption. By Kaldor's reckoning, this resulted in a strengthening of the link between consumption and investment in the post-1945 period, compared to the previous eras in which this particular policy regime was not operative. Based on this reasoning, in Figure 4.4.2 we would expect to see a stronger consumption-investment relationship in the latter period than the earlier one. The results here seem to bear out Kaldor's intuition in terms of the stylized fact, i.e. the consumption-investment correlation is indeed stronger in the latter period than the earlier one. The correlation at S4-S6 for the 1956-2019 period jumps out as being particularly strong, even

[15]Note that the correlation estimates presented in this section are bounded by a 90% confidence interval.

Figure 4.4.2: Frequency Scale Cross Correlation - Consumption and Investment, 1831-1939 and 1956-2019





breaking the 0.9 mark at the lower frequency scales. Conversely, the maximum correlation in the earlier period of 0.63 is obtained at the 8-16 year cycle, before a sharp reduction at the 16-24 year cycle, down to 0.24.

Interestingly, Kaldor's own theoretical model of economic growth (Kaldor 1955, p.96) famously predicted a close relationship with between wages and investment, namely that "workers spend what they get and capitalists get what they spend", i.e. the volume of investment occurring out of profits is integral to determining the wage-share in national income and hence the level of effective demand for the capitalists' output. The analysis of Eichengreen (2008) also attaches considerable importance to consumption and wages post-1945, arguing that a social contract in which wage moderation occurs in return for a high share of investment was key to the relatively higher growth rates seen in the post-1945 period.

It is worth drawing attention to the fact, however, that during the classical gold standard era in particular, Britain was much more disposed towards generating large current account surpluses than was the case in the decades following WWII. In this vein, high net national savings rates were invested overseas in a whole range of different investments, for which the UK enjoyed significant invisible earnings on the balance of payments. This combination of higher national saving and a greater share of overseas investment earnings might help to account for the correspondingly weaker link between consumption and investment in the earlier period.

Indeed, as the UK's vast stock of net external assets increased (with a correspondingly large flow of net income from overseas) the UK was able to substitute foreign investment for domestic capital formation. This argument is not necessarily new, and much ink has been spilled amidst talk of a late-Victorian 'climacteric' in which relatively low domestic investment ranks as an important culprit behind the slowdown. But more than that, it

suggests an explanation as to how citizens were able to earn income to finance consumption expenditure without this correlating quite so closely with domestic investment. Rowthorn & Solomou (1991) emphasize the importance of such absorption effects in the analysis of the Britain during this period, in which it exhibited characteristics of a 'rentier nation', financing a sizeable share of its consumption bundle through earnings on accumulated net (foreign) assets.

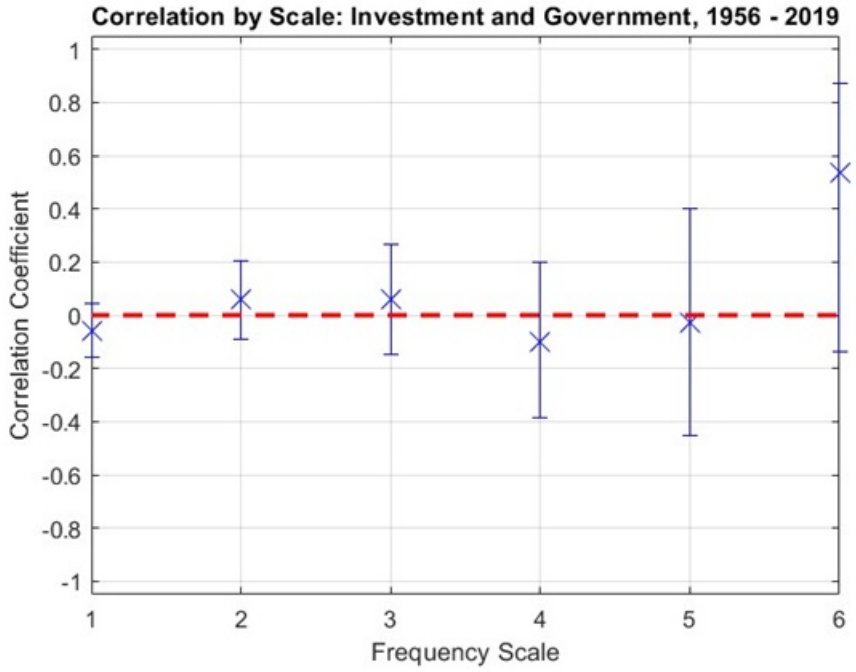
4.4.3 Government Consumption - Investment

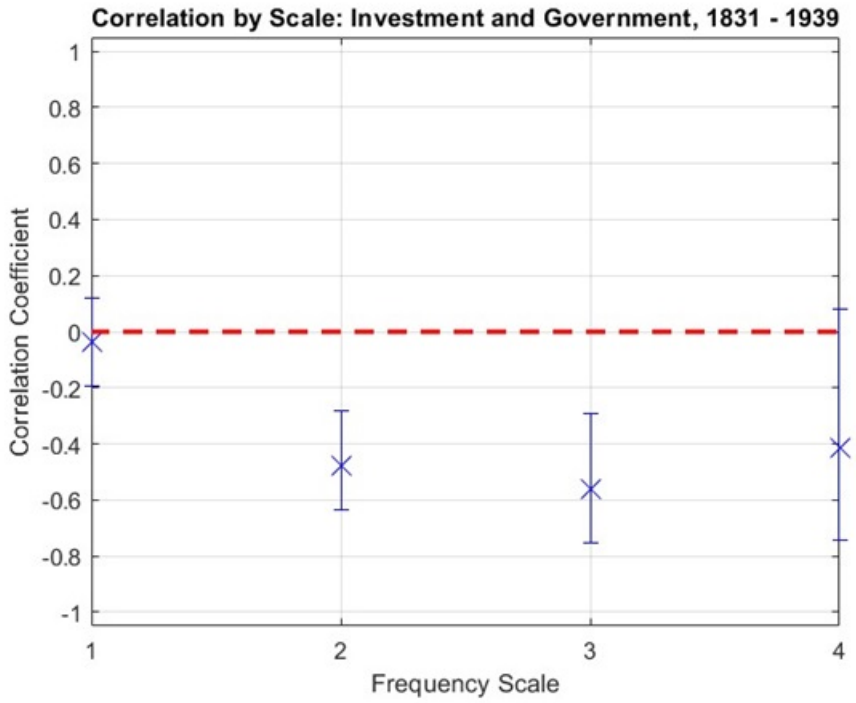
The rise of government as as serious actor in the economy post-1945 was actively considered by Kaldor as a reason for potential changes in the nature of the relationships between key macroeconomic aggregates (compared to the pre-1945 economy). Indeed, Kaldor sometimes appeared to blow "hot and cold" as to whether the more active attempts at macroeconomic stabilization and the overall expansion of the state in economic life had been beneficial for economic performance (Kaldor 1971). In this spirit, it is worth examining the co-movement of government consumption and investment spending in both sub-periods to see whether pronounced changes in relation to the size and scope of government produced any substantive differences - shown in Figure 4.4.3.

The results for the government-investment relationship are particularly intriguing, since they indicate a largely a-cyclical relationship in the post-1945 period, whilst exhibiting a moderately negative pattern of co-movement 1831-1939. For the latter period, the absolute value of the correlation coefficient does not exceed 0.1 at any business cycle frequency, nor were any of the estimated values statistically significant. This contrasts sharply with the earlier period, which exhibits a statistically significant negative relationship across almost all periods, with a peak (negative) correlation coefficient of -0.56 at the 8-16 year cycle.

A potential explanation for the negative relationship seen in the earlier period is the presence

Figure 4.4.3: Frequency Scale Cross Correlation - Government Consumption and Investment, 1831-1939 and 1956-2019





of crowding out effects, where a rise in government expenditures elicits a decrease in private sector investment (although this is posited in a suggestive rather than a definitive sense). Meanwhile, the relative absence of co-movement during the 1956-2019 period likely pertains to the fact that although government consumption grew substantively following WWII, and whilst during certain decades there was a proclivity to engage in counter-cyclical fiscal policy, this tended to take the form of tax reductions and transfers, rather than spending increases. Indeed, many of the substantive items of government consumption, such as healthcare and education expenditure, were largely impervious to the cyclical swings of the economy (unlike investment) therefore giving rise to the lack of any distinct correlation between the two.

4.5 Causal Inferences in Frequency Domain Analysis: Spectral Granger Causality

Clive Granger's seminal concept of causality between two variables is based on two key logical propositions, namely that: (i) cause occurs before effect, and (ii) the cause contains information about effect that is unique (Granger 2004). Following from this, the concept of Granger causality implies that a causal variable y_t can be used to forecast future values of the effect variable x_t, such that y_t Granger causes x_t given all the information at time t for both series. In essence, the past of y_t has predictive power for the future value of say x_{t+1}.

Granger causality tests were originally applied in the time domain, however, it turned out that the key insights were also applicable in the frequency domain, thus presenting a powerful opportunity to move beyond simply characterizing or describing the data within the frequency domain and instead to move towards inferring causal relationships. Whilst frequency domain analysis generally seeks to decompose variability in a series into its periodic components (thus enabling the researcher to assess how fluctuations at specific scales contribute towards the overall dynamics of the series) the spectral Granger causality (SGC)

allows for deeper insights into how the causal relationship between two variables may itself vary according to frequency (i.e. in the short-run versus the long-run). Spectral measures of feedback are defined using the spectral density of the effect variable, which is based on the moving-average representation of a VAR model; as a result frequency-wise measures and the resulting Wald statistics are complicated nonlinear functions of the parameters estimated model (Tastan 2015). It is further noted that this serves to complicate statistical inference for feedback measures in the frequency domain since the researcher must apply numerical approximation methods that can be very computationally demanding.

The notable contribution of Breitung & Candelon (2006) developed a frequency-domain Granger causality test that overcomes some of the potentially thorny computational difficulties associated with earlier approaches and is more robust on a conceptual footing. Essentially, the test allows the researcher to assess whether a specific component of the cause-variable at frequency ω is helpful in predicting the corresponding component of the effect-variable at the same frequency one period ahead. A particularly appealing feature of the Breitung & Candelon (2006) approach is that it helps to guard against indirect causality by enabling generalization to higher dimensional systems, hence the frequency test can be computed conditional on an additional control variable [16]. In this vein, we estimate a trivariate VAR system for each of our sub-periods in the spirit of Lütkepohl (2005) comprising: {RGDP, Investment, Exports} [17]. Conditioning investment and exports on the control variable RGDP offers a powerful way to control for changes in aggregate demand, thus mitigating against the potentially confounding effects of lagged changes in the state of the macro-economy when seeking to discern the causal relationship between investment and exports.

[16]These authors were not the first to suggest this approach within the frequency domain, however, with previous contributions by Geweke (1984) and Hosoya (2001) also seeking to tackle the problem. Nonetheless, the Breitung & Candelon (2006) approach offers a superior treatment for overcoming some of the inadequacies inherent in previous approaches - see Tastan (2015) for further explanation.

[17]Lag-order p was determined with reference to statistical information criterion, using 3 lags of annual data for the earlier sub-period and 9 quarterly lags for the latter.

Figure 4.5.1: Spectral Granger-Causality Test of Investment and Exports, 1831-1939

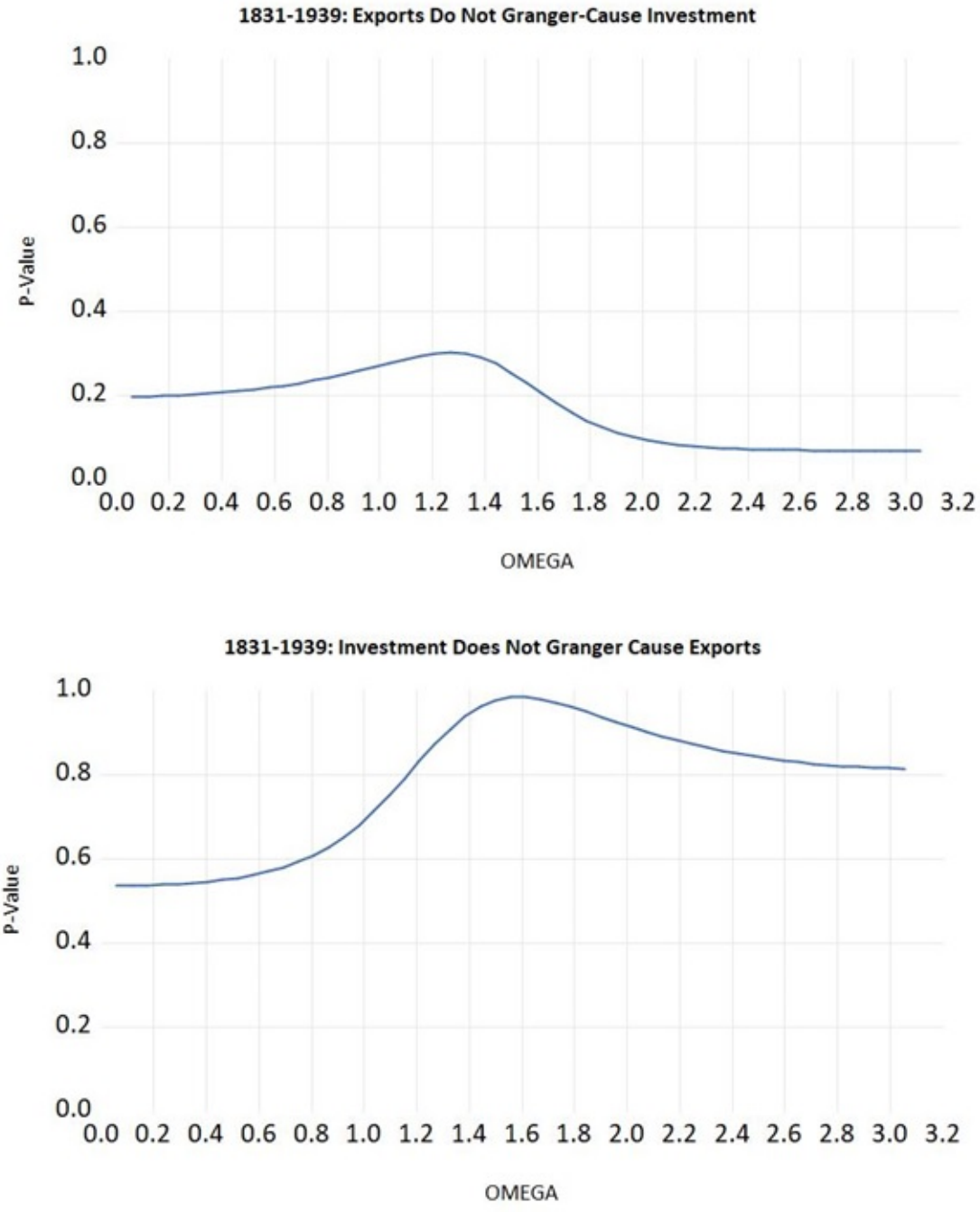
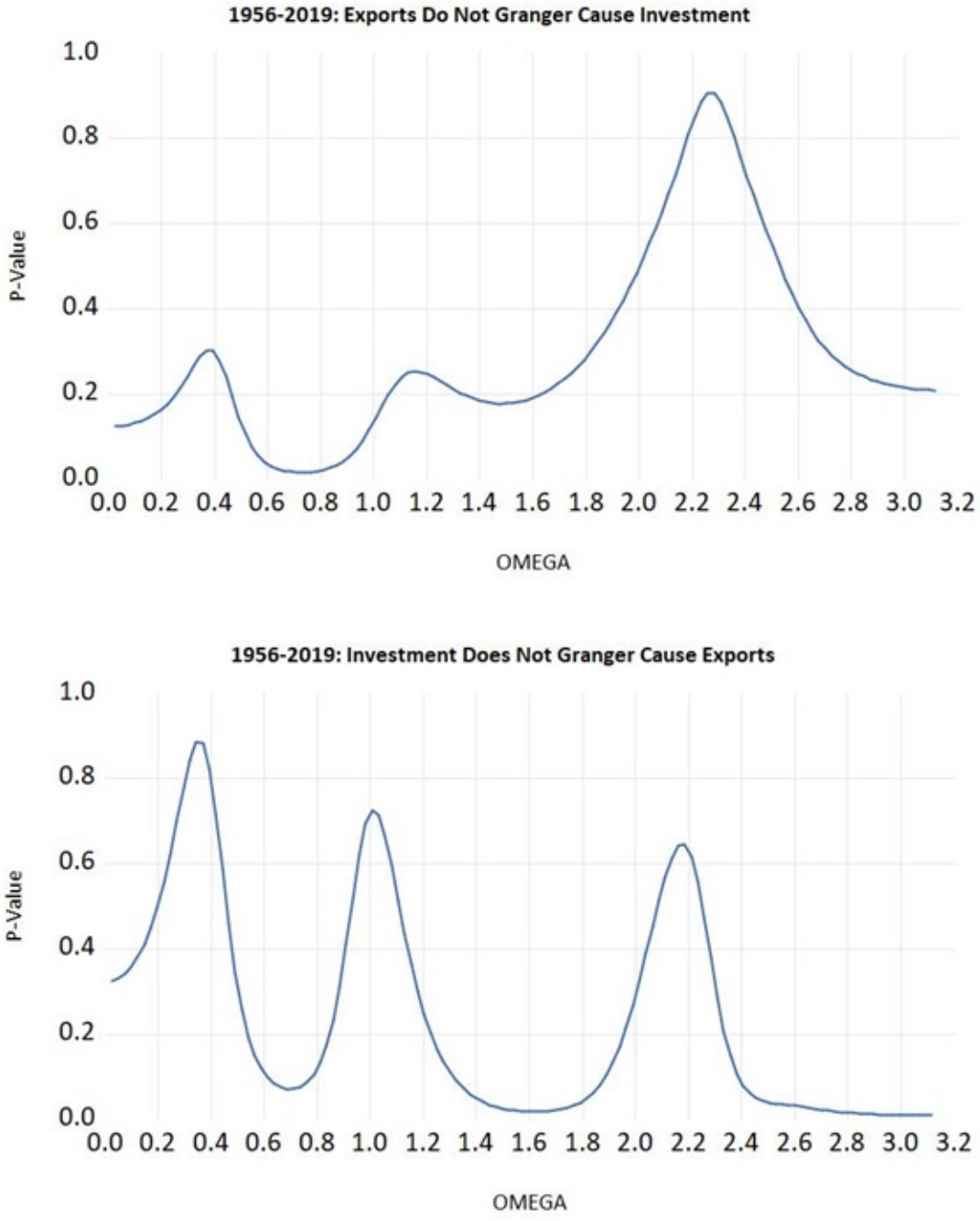


Figure 4.5.2: Spectral Granger-Causality Test of Investment and Exports, 1956-2019



Spectral Granger causality tests are presented for each of the sub-periods in Figure 4.5.1 and Figure 4.5.2 respectively. As usual, it tests a null hypothesis that variable (A) does not Granger cause variable (B): in those instances where the p-value enables us to reject at the null hypothesis at the appropriate significance level, we reject a null of no relationship and find evidence in favour that variable (A) Granger-causes variable (B). Since this test is conducted in the frequency domain, rather than the usual time domain, the x-axis ("omega") denotes the frequency window, moving from low-frequency to high frequency along the length of the axis, whilst the y-axis displays the associated p-value. Hence, it is perfectly possible to find evidence supporting the notion of Granger-causation within certain frequencies but not in others.

Beginning with the period 1831-1939, it is readily apparent that at no frequencies can we reject the null hypothesis of no Granger causation from investment to exports. By contrast, ranging from omega values 2.2 - 3.1 we find evidence of Granger causation from exports to investment, which corresponds to a cycle length of around 1.96 - 2.85 years. Arguing in favour of causality running from exports to investment under the gold standard, Kaldor (1983, pp.268-269) argued that 'variations in exports regularly preceded variations in the level of investment in manufacturing industry by two to three years' - clearly this is very close to the region of statistical significance obtained from the spectral Granger causality test. Furthermore, his dismissal of the autonomous nature of investments as a driver of exports would seem to derive support from the lack of evidence in favour of causality from investment to exports.

What of the period 1956-2019? In the same lecture, Kaldor argued that the mechanics of the Harrod foreign trade multiplier broke down significantly post-1945 on account of a more consumption-led pattern of growth, which was buttressed by the now significantly

enhanced role that the government had come to play in economic affairs. As is clear from the graph in Figure 4.5.2, there is now substantive evidence to support the idea that investment Granger causes exports: indeed, we reject the null of no Granger causation within frequency ranges corresponding to cycles of 3.5 - 4.5 quarters and 1.96 - 2.5. Contrary to Kaldor's assertions, however, there is also evidence in favour of exports Granger-causing investment corresponding to a cycle of around 8 – 12 quarters, i.e. 2-3 years, thus indicating the presence of a medium-frequency cycle running from exports to investment, whilst the investment to export dynamics seem to center at higher frequencies of around 0.5-1 year.

The results can thus be summed up as saying that we find evidence in favour of the notion that investment danced to the tune of exports during the earlier period 1831-1939, but in the latter period causation becomes a much more bilateral affair that is distinguished by different frequency scales. The flaw in Kaldor's thinking concerning the post-WWII era seems to be his contention that growth had become insufficiently export oriented; that it was too driven by consumption and government spending, hence exports would essentially lose the ability to induce investment as they did during the earlier period. Whilst this does not in itself invalidate his wider belief that the UK economy would have benefited from a greater concern with export competitiveness, it does suggest that – perhaps not surprisingly- in the medium-run exports mattered for investment, and similarly investments themselves possessed explanatory power for exports albeit at a shorter horizon. The question now is how these empirical findings can be squared with economic theory.

4.6 Historical Discussion and Analysis

4.6.1 Heterogeneous Firms in International Trade

There would tentatively seem to be two cheers for the Harrod-Kaldor hypothesis, insofar as exports appear to have Granger-caused investment during the earlier period. In the

latter period, however, there is evidence of investment Granger-causing exports at higher frequencies, whilst the pessimistic predictions that exports would cease to act as an engine for investment does not come to pass in the data. How then do we reconcile all of these empirical findings with a cogent theoretical framework?

Whilst the Harrod-Kaldor intellectual apparatus was geared towards exports as the autonomous source of demand (to which investment and consumption were endogenous), it is clear that a theory is needed to rationalize autonomous investments as the impetus for exports - a view arguably more consistent with the traditional Keynesian view of exports as the independent driver of economic activity. Therefore, in order to make sense of our findings it is necessary to interpret our results in light of a newer research paradigm within international economics, namely the latest incarnation of international trade theory known as 'heterogeneous firms in international trade' [18]. Within this theoretical and empirical corpus of publications, the established norm is for investment to precede exports. A number of stylized facts emerge from the empirical literature on heterogeneous firms in international trade (HFIT), which was driven in no small part by granular analyses of plant and firm-level datasets that began to yield a remarkably consistent similar set of stylized facts across countries.

Arguably one of the most important findings to come out of the third generation of international trade literature was the finding that exporting firms possess a productivity advantage *before* they start exporting, and not as a result of exporting. This is because only the most productive firms are able to overcome the costs of entering export markets: when commercial policy barriers are diminished or removed and transportation costs decline, it is the high productivity exporters that survive and grow, while lower-productivity non-exporting firms are more likely to fail. This Darwinian survival of the fittest results in a reallocation of economic

[18]For an insightful overview, see Melitz & Redding (2014).

activity across firms, thereby increasing average productivity, but crucially there is little to no evidence to support the idea of improved productivity as a *consequence* of exporting. (Bernard et al. 2007) are unambiguous in their contention that this sort of microeconomic heterogeneity can influence macroeconomic outcomes.

Heterogeneous firms in international trade produces some important implications regarding the determinants of exports: an important finding was that the majority of firms within a country are *not* involved in the business of exporting, and even of those firms that do make the jump, there is a particularly high attrition rate insofar as the probability that a significant fraction of exporters active at time T will have ceased exporting at time $T + 5$ years is found to be high (Melitz & Redding 2014). These insights were formalized by Melitz (2003) in a model where firms face the uncertainty of a so-called 'death shock' in each period that occurs with probability $\delta \in (0, 1)$, and firm survival is a function of relative productivity as well as the various sunk and fixed costs payable each period that are associated with continued presence in the export market. In relation to the current study, the key insight is that both initial firm entry and continued survival in the exporting arena is dependent on the undertaking of investments; which can also give rise to hysteresis mechanisms arising from the ebb-and-flow of regular business cycle activity (Ottaviano & Melitz 2008).

4.6.2 A Circular and Cumulative Causation Growth Model

Whilst the heterogeneous firms in international trade framework represents a well developed body of thought that is capable of accounting for the causal precedence of investment over exports (in the latter period at least), the Harrod-Kaldor hypothesis also has an extensive theoretical apparatus which it invokes to justify its prediction of exports holding causal priority over investment. It is a body of theoretical thought with a distinguished pedigree that spans Adam Smith, Allyn Young, Petrus Verdoorn, and Gunnar Myrdal and help to elucidate the logic of 'vicious' and 'virtuous circles' that seems to characterize the experience

of so many countries with respect to their major export industries [19].

Circular and cumulative causation (CCC) models of growth and development suggest that understanding the emergence of entrenched industrial dynamism that seems to characterize key industries in certain countries (think Japan's meteoric rise in the decades following WWII; or the ascent of Germany from the late 19th century) requires an understanding of the joint interplay between exports and investments - though initial primacy is typically afforded to exports. To understand the basis of this theoretical approach it is necessary to identify the key individual building blocks, contributed independently by a number of distinguished economists along the years, which are then fused together into a circular process that can (in principle) account for the industrial dynamics of capitalist economies.

The dynamic forces comprising the CCC framework are such that (i) vigorous growth of demand gives rise to buoyant productivity growth; (ii) productivity growth in turns generates high price and non-price competitiveness of output; (iii) highly competitive output results in commercial success and product acclaim, which then feeds back into stage (i). And thus we close the circle in this self-reinforcing and dynamic process. The system can, however, work in reverse too, and the experience of Britain during the post-war long boom is held up as a textbook example of this vicious spiral of decline, whereby relatively low growth leads to lacklustre productivity performance; this feeds through to weaknesses in investment and innovation thus undermining the products' competitiveness, and (iii) declining product reputation and the presence of high sunk-costs to recapture market share means that low growth becomes an entrenched reality.

How then can the theory of circular and cumulative causation provide theoretical underpinnings to the Harrod-Kaldor contention that exports ultimately generate investment? It is

[19] A highly readable account of cumulative causation models is given by Toner (1999).

important to note that so far, nothing in the framework we have outlined relies *exclusively* on exports as a source of demand. Indeed, it is perfectly possible to assume that demand emanating from households (who are employed in the services sector) spend their income on domestically produced manufactures, with the process of circular and cumulative causation discerning which of those firms become market leaders whilst the rest ultimately fade into obsolescence. Similarly, certain vintages of CCC models -notably that of Allyn Young (Young 1928) - incorporate classical assumptions whereby supply creates its own demand (Say's law) and on that basis it is possible to enjoy self-sustaining manufacturing growth within a closed economy, based on the fruits of intra-industry trade and the non-manufacturing domestic sector as the source of demand for final output.

Perhaps unsurprisingly, the Harrod-Kaldor approach to CCC vehemently rejects the validity of Say's law, and also refutes the idea that a process of circular and cumulative causation growth can be self-sustaining in the closed-economy setting. Kaldor (1978*a*) drew a sharp distinction between the endogenous demand within a sector, which is automatically generated by the productive process, and the exogenous demand emanating from outside the sector. Kaldor notes that in a money economy demand can be a function of supply, but without the two necessarily being equal, and that to make the two equal it requires the additional of an all-important exogenous component:

Although the expansion of industrial production itself provides an element of this growth of demand, since part of the income generated by the industrial activities is spent on goods produced by the industrial sector, this self-generated component of demand cannot alone be sufficient to make an increase in production profitable. The growth in demand, which has a determining influence on the pace of expansion - both of the growth of production and employment and of productive capacity - must be external to the industrial sector. (Kaldor 1978*a*, pp.141-242)

Kaldor took Keynes to task on this point: for essentially conjecturing a closed economy consisting only of industrial enterprises with financial resources that were in excess of their projected capital outlays, such that decisions concerning investment became the decisive autonomous component of demand, which themselves hinged on the uncertainty of entrepreneurs' 'animal spirits' (Kaldor 1982). This resulted in the autonomous role of exports being condemned to the sidelines. The Harrod approach, by contrast, took the growth of output to be determined by $Y = \frac{1}{m}X$ (where: X = the level of export demand; m= the propensity to import), and under this latter approach it becomes quite easy to see how autonomous changes in X, or alternately shifts m could elicit fluctuations in the growth of output. The argument for the primacy of exports is further bolstered by the fact that Harrod was skeptical of the supposedly equilibrating role to be played by the adjustment of prices and exchange rates (at least in the short and medium term). Thus within a framework in which saving occurs as a function of income, it is straightforward enough to see how an autonomous decrease in exports would ultimately precipitate lower saving and investment within the economy [20].

Whilst we have provided here a necessarily selective overview of the rudiments of CCC models, the approach does seem to provide the Harrod-Kaldor hypothesis with an internally-consistent framework for conceptualizing the interplay between exports as the autonomous source of demand, and the resulting changes in output, investment, and potentially product competitiveness and market share over longer-horizons. Internal consistency is not the same as being externally consistent with the data of course, but it is still a necessary condition for producing a genuinely satisfactory model that is capable of providing a true characterization of the economic forces at play.

[20]Similar insights to this can be obtained from the later emergence of the Harberger-Laursen-Metzler effect in the 1950s, which considers a decrease in export income due to an adverse terms of trade shock.

4.6.3 Harrod and Kaldor - Masking Over the Differences?

Whilst most of the academic literature quite rightly attributes the notion of exports being the ultimate source of autonomous demand as the joint product of Harrod and Kaldor's respective endeavours, the discussion of a 'Harrod-Kaldor hypothesis' somewhat overlooks the fact that these two economists actually differed quite substantially on a number of key policy issues. Hence any meaningful analysis of the HK hypothesis and its associated implications for economic policy must try to do justice to the non-trivial areas of discord between Harrod and Kaldor. Perhaps one of the most stark areas of disagreement between the two centers on their respective attitudes towards the matter of international trade: Harrod was a lifelong free trade man, whilst Kaldor had a more complex position that evolved over time but was much more sympathetic to the use of protectionist instruments such as import controls:

'So what I am trying to say is that, if you want to get rid of unemployment, there is only one way of doing it. But when you hear what it is you may be uncertain whether the remedy is worse or better than the disease. To get rid of unemployment, all you have to do is restrict imports to the percentage which would be compatible with an equality of imports and exports at the full employment level'(Kaldor 1985).

It is debatable whether Kaldor advocacy for the use of import controls was in some ways a measure of last resort, rather than a go-to policy instrument of choice. Indeed, throughout much of his career Kaldor had spent much time espousing the virtues of exports within the growth process: the static and dynamic increasing returns arising from the competitive stimulus of producing goods for a global market, and the need for active policy measures to ensure that competitiveness of exports (of both the price and non-price variety) was maintained. He had even gone so far as to express a preference for export subsidies rather

than for import restrictions on account of the boon to competitiveness that went hand-in-hand with an outward looking economic strategy, and his experimentation with the 'selective employment tax' (SET) in the 1960s was a manifestation of his thinking on such matters [21]. Thus before considering Harrod's views on the matter it is important not to set up a strawman (inadvertently or otherwise) regarding Kaldor's views on import controls, and to note that his advocacy of them as an instrument of policy came fairly late in the day in his career.

By contrast, Harrod states his free trade credos quite unambiguously, even singling out Keynes for criticism when he commented:

'I have been a lifelong Free Trader [sic] and was not fully sympathetic to Keynes during his protectionist period in the thirties. I hope that my little book on 'International Economics' made some contribution to the cause' (Harrod 1969, p.218).

Harrod's intellectual output seems to be as good as his word in this regard: for instance, as early as 1933 he made clear that he was not in favour of export subsidies on the grounds that they were unneighbourly; they incited retaliatory measures, and aggravated economic downturns in the global sense (Harrod, 1933). He also contended that subsidies interfered with the allocation of productive resources on the basis of relative prices.

A related area of marked disagreement -particularly relevant to the matter of exports - were their respective views on the theoretical foundations of international trade theory. Throughout his life, Harrod remained a stalwart believer in the relevance, applicability, and conceptual coherence of Ricardian comparative advantage, even going so far as to state that

[21] One can of course debate the effectiveness of SET in meeting its stated objectives, but rather the point here is that it typified Kaldor's approach to boosting exports rather than restricting imports in the first instance.

he regarded it as the best introduction for students to the study of foreign trade:

'I remain convinced, despite all that has happened during the last quarter of a century, that an introduction to the subject through an understanding of the law of comparative costs brings to the student's attention those things which it is most important that he should know about foreign trade ... the comparative cost law in the form in which I have presented it is conceptually impeccable' (Harrod 1957, p.viii).

In contrast to Harrod's embrace of free trade and its Ricardian gospel, Kaldor established himself as remorseless critic of free trade and dedicated a number of publications and lectures over a period of years to the wholesale destruction of said doctrine - see for instance Kaldor (1980). The scope of Kaldor's disdain for what he saw as the religiosity of free trade spanned numerous areas including economic growth, fluctuations, and income distribution, and his lines of theoretical rebuke were similarly broad and far reaching. It is fair to say that Kaldor's economic worldview, which emphasized the importance of increasing returns; the uniqueness of the manufacturing sector; and an active role for the state in shaping the productive structure of the economy was largely inimical to the practise of free trade along Ricardian lines.

It would seem that the differences between Harrod and Kaldor actually run as deep as their respective conceptualizations of exports as the ultimate source of autonomous demand. In an illuminating contribution, Palumbo (2009) makes the argument that Kaldor's co-opting of the foreign trade multiplier (for which Kaldor duly gave credit to Harrod) actually resulted in him introducing his own variation on the original Harrodian theme. Perhaps most importantly, the original Harrodian export mulitplier was essentially a short-period construction, with Harrod conceiving it in order to understand the process of external adjustment under the gold standard - in particular to emphasize the role of a contraction in national income in

restoring balance- but he did not go on to equate the zero-balance-of-trade level of output and the equilibrium level of output. By contrast, Kaldor went on to draw long-run implications from Harrod's original theory, namely that the zero-balance-of-trade level of output would end up acting as a ceiling on the growth performance of the economy, even if there was still excess capacity in terms of unemployed labour and capital; in this sense he introduced the notion of a balance of payments constraint as a bind on long-run economic performance [22].

4.6.4 A Supply-Side Masquerade?

The notion of the foreign trade multiplier (whether in its Harrodian or Kaldorian incarnation) is billed very much as a demand-side theory that accounts for economic fluctuations and/or long-run economic performance when considering a balance of payments constraint on growth. There are, however, potentially serious grounds for doubting the ostensibly demand-side orientation of the theory, with the clear implication being that this is essentially a supply-side theory masquerading as a demand-led framework. The issue is not just a matter of theoretical semantics; the implications for economic policy are quite stark.

This point was exemplified in a paper by Paul Krugman analysing differences in income elasticities and trends in real exchange rates (Krugman 1989). In the paper, Krugman states an empirical regularity, namely that the income elasticities of demand for a country's imports and exports are systematically related to the country's long-term growth rate, with fast growing economies enjoying a high income elasticity demand for their exports and a low income elasticity of demand for imports [23]. Similarly, slow growing economies face a low income elasticity for their exports but a high income elasticity for imports. The interesting

[22]The formalization of this was undertaken by Anthony Thirlwall and his various co-authors, and it is worth noting that Kaldor gave Thirlwall's resulting publications the seal of approval.

[23]Thirlwall (1991) makes the point that Krugman does appear to be re-inventing the wheel somewhat with his discovery of this empirical fact, which had already been known about for some time. Similarly, looking at the list of references in the Krugman paper suggests a limited engagement with the extant literature.

corollary of this empirical finding, is that whilst an income and price elasticity framework should give rise to substantive shifts in equilibrium real exchange rates over time, in reality the income elasticities end up being just about the right magnitudes to make this unnecessary. This is the essence of Krugman's so-called '45-degree rule'.

When seeking to account for the close association of growth rates and the favourability of income elasticities, Krguman contends that there are essentially two competing explanations. Firstly, it could be that income elasticities determine growth: those countries with unfavourable income elasticities might end up running into serious balance of payments difficulties whenever an economic expansion gathers pace. Similarly, if *real* exchange rate devaluation proves unattainable due to surging import costs and real wage resistance then the country will not be able to grow faster than the growth rate dictated by the income elasticities. The second explanation is that differential growth rates between countries affect trade flows so as to create apparent differences in income elasticities, with the implication that there is a supply-side element in the differences in demand that countries face.

Krugman pulls no punches in stating which side of the argument he comes down on, and is worth quoting directly on this point:

'It just seems fundamentally implausible that over stretches of decades balance of payments problems could be preventing long term growth, especially for relatively closed economies like the US in the 1950s and 1960s. Furthermore, we all know that differences in growth rates among countries are primarily determined in the rate of growth of total factor productivity, not differences in the rate of growth of employment; it is hard to see what channel links balance of payments [difficulties] due to unfavourable income elasticities to total factor productivity growth' (Krugman 1989, p.1037).

In support of his claims, Krugman presents a theoretical model to lay out the key interactions at play. The framework is based in no small part on some of his earlier work (Krugman 1980) consisting of a trade model based on monopolistic competition and increasing returns, where the price of goods is equalized between countries and the number of product varieties produced in a country is a function of its labour force (which acts as a measure of resource availability). Based on this, if the labour force grows at different rates across countries, the faster growing economy will be able to increase its world market share by increasing the number of goods faster than other countries, thus enabling it to export more without a reduction in relative prices and therefore resulting in a higher income elasticity of demand for its exports.

The opposite position, whereby causality runs from the income elasticities to the rate of economic growth is championed by McCombie & Thirlwall (1994): they posit that Krugman's argument is 'neoclassical' in character on account of the fact that the model he presents to formalize his intuition is predicated on the assumption of an exogenously given long-run growth rate - i.e. the growth of the labour force - and the presumption that a faster growing country will necessarily export more products independent of the characteristics of the goods it is producing. They rebuke Krugman's (admittedly offhand) dismissal of the view that countries with unfavourable income elasticities will have slow growth owing to balance of payments difficulties whenever they attempt to expand. And, they take Krugman to task on the issue of whether the income elasticities themselves are exogenous, or whether they are endogenously determined by the growth process itself. McCombie and Thirlwall suggest that in many instances the income elasticities are largely determined by natural resource endowments and the characteristics of goods produced (i.e. whether they are necessities versus luxuries), hence exports themselves are the product of history and independent of the growth of output.

This generates a rather peculiar situation, however, in which the ostensibly demand-oriented theory being championed by McCombie and Thirlwall (itself essentially a dynamized-version of Harrod's foreign trade multiplier) ends up taking on a distinctly supply-side flavour, with the income elasticity of demand for exports causing economic growth. Conversely, the ostensibly 'neoclassical' model put forward by Krugman where the elasticities themselves are endogenous to the rate of economic growth, and increasing returns sit at the heart of the international trade mechanism, will surely raise a few eyebrows. Now to be clear, it is evident that Krugman's model does contain some features consistent with neoclassical growth theory (i.e. exogeneously given labour supply growth being the determinant of economic growth), and similarly McCombie and Thirlwall's contention of weaknesses in export performance acting as a binding constraint on expansive macroeconomic policies obviously incorporates a role for demand. But there is no escaping the fact that the Harrodian-Kaldorian analysis being advanced by McCombie and Thirlwall has, at its very core, a distinctively supply-side feel to it, as evidenced in the following quote by Thirlwall:

'Structural change almost certainly requires a country to design an industrial policy embracing a national innovation system to facilitate the flow of technological knowledge across all sectors of the economy. The market mechanism itself is unlikely to bring about the required structural changes needed. I am attracted to the concepts of *growth diagnostics* and *self-discovery* [emphasis added]' (Thirlwall 2019).

Growth diagnostics essentially comprises locating the binding constraints on economic performance and focussing efforts upon them directly, rather than a 'spray gun' approach to economic policy-making that lacks specificity. Self-discovery meanwhile, entails seeking out new areas of comparative advantage and then nurturing them with the most suitable policies (Ibid). If the objectives stated here seem suspiciously like a reheated version of old industrial policy nostrums, then the instruments through which to achieve them certainly exude a nos-

talgic feel: government expenditure on R&D to enhance export quality, public sector credit and guarantees, targeting exports with growth potential and identifying imports where there is import substitution potential.

The policy implications arising from this debate seem to reaffirm the supply-side core of this supposedly demand-oriented approach. When highlighting what went wrong with British economic performance, viewed through a sympathetically Harrodian-Kaldorian lens, McCombie and Thirlwall (1994) successfully round-up the usual pack of supply-side culprits: poor industrial relations leading to weaker uptake of new technologies; deficiencies in training and skills from workers right up to senior management; insufficient R&D and innovative activity; deep-seated institutional factors inhibiting responsiveness to shifting market conditions. Similarly, the suggested route towards better policies and a brighter future basically seems to center on the use of industrial policy to improve the non-price competitiveness of tradeable goods, but arguably fails to do justice to the historic difficulties Britain has had with regard to enacting successful industrial policies, as well as the inherent obstacles to devising appropriate policies for an advanced economy that is reasonably close to the technological frontier (as opposed to a low income country looking to develop say basic heavy industry). None of this necessarily undermines the contention that weakness in the tradeable sector can (or did) lead to a serious constraint on economic growth, but it does serve to highlight the fact that the attendant policy implications of the demand-oriented Harrod-Kaldor hypothesis seem to lead to a leftist version of supply-side economics.

4.7 Concluding Remarks

The Harrod-Kaldor hypothesis stoked a peculiar debate in both the history of UK economic policy as well as within Keynesian economics. The very essence of the hypothesis was the product of separate work undertaken by Harrod and Kaldor, and was originally intended to

characterize open-economy macroeconomic dynamics under the classical gold standard, prior to the emergence of government as a serious force within the economy and before the era in which consumption-led growth was the norm. The backlash from Orthodox Keynesians came when the Cambridge Economic Policy Group embraced the foreign trade multiplier and sidelined autonomous shifts in investment as the key source of autonomous demand in the UK economy, along with their seemingly overt endorsement for import controls as a legitimate instrument of macroeconomic policy.

This study, harnessing a range of techniques from the frequency domain analysis literature, found that the Harrod-Kaldor hypothesis has much to commend in terms of its congruence with the UK economy over the periods 1831-1939 and 1956-2019 respectively. As-per Kaldor's insistance, it appears that in the earlier period causation flowed from exports to investment, which is consistent with the logic of the Harrod foreign trade multiplier. In the latter period, the analysis becomes more nuanced: contrary to Kaldor's claims, there is still evidence that exports Granger-cause investment, however, investment is also found to be Granger-causing exports at certain frequency scales, thus representing a case of bilateral causation.

Our discussion of the competing theoretical frameworks at play helps provide economic ballast to the empirical findings. Indeed, Kaldor was an avid proponent of so-called 'circular and cumulative causation' growth models in the spirit of Gunnar Myrdal and others, which provide a cogent insight into the expansive dynamics linking exports as the ultimate source of autonomous demand to rising tradeable output; improvements in price and non-price competitiveness, and further growth in market share. Through this theoretical lens, success breeds further success whilst failure inculcates subsequent decline. By contrast, the finding that investment Granger-caused exports in the post-war sample fits the theoretical predictions and stylized-facts of the 'heterogeneous firms in international trade' literature. This

extensive body of publications, which represents the latest generation of international trade theory, posits that only the most productive firms within an economy are capable of undertaking the sunk investments necessary to enter into the competitive domain of exporting. In essence, these firms already larger, more productive and amongst the most successful businesses in the home market before exporting even begins, hence the direction of causality flows from investment to exports. Economics is seldom black or white, however, and the finding of bilateral causation between exports and investment in the latter period speaks to set of mechanisms at work which are convivial to both theoretical paradigms.

Whilst we actively referred to a Harrod-Kaldor hypothesis on account of the substantive contributions of both men, this does not do justice to the significant differences in economic worldview between the two, nor to the divergent policy implications each drew from their research endeavours. Harrod was an ardent free-trade man with a longstanding record of opposing measures that might be regarded as protectionist; Kaldor meanwhile came to actively espouse the use of import controls as a logical corollary of the Harrod foreign trade multiplier, and implored British policy makers to place them at the center of their economic strategy. Further still, Kaldor advocated for extensive use of industrial policy to improve the non-price attributes of British exports, thus raising buyers' willingness to pay in the world markets, and liberating the country from the binding straitjacket of the balance of payments constraint on growth. This was not a view shared by Harrod, however, and a crucial difference between the two men is the way in which Kaldor refined Harrod's foreign trade multiplier into a determinant of the economy's long-term growth rate, when it seems that Harrod himself merely envisaged the theoretical device as an explanation of how changes in income (rather than price level adjustment) would restore macroeconomic equilibrium under the gold standard following a transitory disturbance.

Ultimately the Harrod-Kaldor hypothesis and the associated controversy represents a unique

debate in macroeconomics, not least because of its largely British-centric focus - both in terms of the protagonists involved and its application to economic policy. Exports and investment tend to be the most volatile components of aggregate demand, and both Harrod and Kaldor posed an important intellectual challenge to the mainstream body of Keynesian thought with the invention and subsequent application of the foreign trade multiplier. Whilst this study by design has focussed on the macroeconomic nature of the debate, an interesting area for future investigation might undertake a more disaggregated analysis at the sector or even industry level, in particular to try and shed further light on the specifics of the causal mechanisms at play between investment and exports, and how these may have evolved over the two distinct periods under study.

Appendix

4.A Breakdown of data and sources

- The data used in the paper was sourced from the Bank of England's *A Millennium of Macroeconomic Data* dataset. https://www.bankofengland.co.uk/statistics/research-datasets

- The annual data used for the 1831-1939 sub-period was transformed into log-difference form. For the latter sub-period, 1956-2019, the data was transformed into log form and expressed as q-on-q4 growth rates.

4.A.1 Specification Details

1. The multiresolution analysis and variance decompositions were conducted using a Daubechies wavelet of length 4; and resolved to 4 or 6 scales for the earlier and latter periods respectively.

2. Variable co-movement: this analysis was conducted in Matlab, and used a Daubechies filter of length 3, resolved to 4 or 6 scales for the earlier and latter periods respectively.

3. The VARs underlying the spectral Granger causality tests had their lag length determined with reference to statistical information criterion: the sample 1831-1939 was estimated with

$p(3)$ lags on annual data, and the 1956-2019 sample $p(9)$ lags on quarterly data.

4.B Additional Empirical Outputs

Here we produce those outputs that were referenced but not displayed in the main body of the paper (for reasons of space).

Figure 4.B.1: Frequency Scale Variance Decomposition of RGDP, 1831-1939 and 1956-2019

1956 – 2019

Scale	Variance	Rel. Proport.	Cum. Proport.
W1	0.337857	0.0657	0.0657
W2	0.560706	0.1091	0.1748
W3	1.486845	0.2893	0.4641
W4	1.661836	0.3234	0.7875
W5	0.868391	0.1690	0.9565
W6	0.223732	0.0435	1.0000

1831 – 1939

Scale	Variance	Rel. Proport.	Cum. Proport.
W1	3.507629	0.4163	0.4163
W2	2.605193	0.3092	0.7255
W3	1.987107	0.2358	0.9613
W4	0.326215	0.0387	1.0000

Figure 4.B.2: Frequency Scale Variance Decomposition of Investment, 1831-1939 and 1956-2019

1956-2019

Scale		Variance	Rel. Proport.	Cum. Proport.
0.5 - 1	W1	3.469876	0.0924	0.0924
1 - 2	W2	4.213039	0.1122	0.2046
2 - 4	W3	9.721250	0.2588	0.4634
4 - 8	W4	12.08719	0.3218	0.7852
8 - 16	W5	4.912021	0.1308	0.9160
16 - 32	W6	3.155734	0.0840	1.0000

1831-1939

Scale		Variance	Rel. Proport.	Cum. Proport.
2-4	W1	32.27426	0.2756	0.2756
4 - 8	W2	42.45559	0.3625	0.6381
8 - 16	W3	34.05215	0.2908	0.9288
16 - 32	W4	8.334713	0.0712	1.0000

Figure 4.B.3: Frequency Scale Variance Decomposition of Exports, 1831-1939 and 1956-2019

1956 – 2019

Scale	Variance	Rel. Proport.	Cum. Proport.
W1	4.745130	0.1815	0.1815
W2	5.300224	0.2027	0.3842
W3	8.446763	0.3230	0.7072
W4	4.320194	0.1652	0.8724
W5	2.054562	0.0786	0.9510
W6	1.280838	0.0490	1.0000

1831 – 1939

Scale	Variance	Rel. Proport.	Cum. Proport.
W1	47.53684	0.5660	0.5660
W2	23.77647	0.2831	0.8491
W3	9.024917	0.1075	0.9566
W4	3.646098	0.0434	1.0000

Figure 4.B.4: Frequency Scale Variance Decomposition of Government Consumption, 1831-1939 and 1956-2019

1956 – 2019

Scale	Variance	Rel. Proport.	Cum. Proport.
W1	0.605397	0.1950	0.1950
W2	0.415769	0.1339	0.3290
W3	0.601969	0.1939	0.5229
W4	0.684741	0.2206	0.7435
W5	0.556983	0.1794	0.9229
W6	0.239245	0.0771	1.0000

1831 – 1939

Scale	Variance	Rel. Proport.	Cum. Proport.
W1	65.81604	0.2539	0.2539
W2	80.09917	0.3090	0.5628
W3	95.57934	0.3687	0.9315
W4	17.76480	0.0685	1.0000

Chapter 5

Concluding Remarks

Engaging in the study and research of economic history is seldom an easy path to navigate, nor to pull off with a complete sense of satisfaction: the aspirant economic historian is forced to tread a fine line between pursuing research topics that are authentic and intimately related to the conundrums, debates, and challenges of the period under study, and yet remain sufficiently in touch with the main thrust of contemporary economic theory and the ever-evolving repertoire of econometric techniques. Thus, achieving a seamless balance between history and economics which meets the satisfaction of all of the people, all of the time, is a difficult trick to pull off! Nonetheless, just as an economy might tend towards some competitive general equilibrium position, constantly seeking and adjusting (but not necessarily ever achieving completely), the task of the economic historian is one of constant refinement in terms of data, method, analysis, and historical interpretation. The resulting output, it is hoped, draws on the best of both economics and history, and yet the resulting output is something distinctive, unique, and belongs exclusively to neither camp.

5.1 "Twin Deficits" Under Bretton Woods, or a Case of Mistaken Identity?

Examining the UK's trials and tribulations under the Bretton Woods system produced some striking findings about the nature of the external adjustment mechanism. Contrary to established opinion, which has long focussed on the ostensibly pernicious effects of fiscal policy in driving current account imbalances (the "twin deficits"), the investigation revealed that the fiscal balance was at best a peripheral force in accounting for variation in the current account, which seemed pale in comparison to the role played by other key macroeconomic variables – such as credit shocks, IS shocks, and the real exchange rate. Furthermore, we also found that shocks from the current account exhibited a much greater impact on the fiscal balance than the reverse, which suggests that the traditional account of the twin deficits (with causation flowing from the fiscal balance to the current account) ought to be turned on its head in the case of the United Kingdom during the Bretton Woods era.

The empirical analysis turned up yet more striking findings: utilising tax shocks identified via the narrative approach, we obtained the heretical result that a contractionary (expansionary) tax shock actually caused a decrease (increase) in the fiscal balance. Needless to say this finding would have been utterly inimical to both academic economists and policy makers of that era, as it ran wholly contrary to the predictions emanating from the income-expenditure type models of the day. But drawing on more recent theoretical frameworks within international macroeconomics, we find that our striking result actually fits perfectly with the causal relationships predicted by the newer, inter-temporal theories of current account balance determination. In this class of model, the current account acts as a conduit for inter-temporal savings and investment decisions and severs the simplistic link between current income and current expenditure. We highlight the conceptual shortcomings associated with the previous vintage of theoretical models and make the case that in order to reconcile

data and theory it is necessary to move beyond the static, non-optimizing Mundell-Fleming type constructs in this particular instance.

On the topic of the infamous devaluation of 1967, much conjecture has abounded as to the cause of the currency crisis, as well as the drivers of recovery in the current account balance in the months and years thereafter. We suggest that contrary to the usual allegations of fiscal laxity in the build up to the crisis, the true culprit was actually the current account's own idiosyncratic shocks – having controlled for the impact of other key domestic economic variables. We substantiate this finding with reference to the forensic account of a senior UK Treasury official, who documented the litany of unforeseen shocks that served to undermine both UK exports, as well as increasing the country's import bill, most of which were essentially random in character. The current account's marked reversal in the months thereafter was driven in no small part by the effects of the devaluation itself; a reversal of the previously adverse and improbable factors blighting imports and exports respectively, and a modest role for fiscal policy that was felt only after a significant time lag (c.1969/1970).

How did the empirical analysis inform our discussion of the overarching policy issues of the day? Firstly, we challenged the pessimism of the famous 'Meade's Dilemma', in which the distinguished economist James Meade regarded the collapse of sterling's parity as an inevitability, which would occur due to a lack of feasible policy instruments for correcting internal and external imbalances following an exogenous disturbance. In the face of either rigid or highly sticky wages and prices, Meade argued that devaluation would end up as the only route back towards attaining current account balance without suffering intolerable unemployment and economic contraction. By contrast, our modelling suggests that tax policy constituted an instrument which could be focussed on regulating internal balance, without causing the deleterious effects on the current account that Meade and his contemporaries assumed. Whether this meant that devaluation should have been avoided, however, is a

different question. It might well have proved on balance that earlier devaluation could have resulted in less hardship down the line, but nonetheless our results challenge the notion that a collapse of sterling's parity was a foregone conclusion.

The roles of monetary policy and the real exchange rate are illuminated within the toolkit of macroeconomic policy instruments, and arguably deserve greater attention and relative importance than they have hitherto been afforded. Our findings refute the chorus of exchange rate pessimists who envisaged no beneficial effects from devaluation, and who lacked any faith in relative price adjustments (as mediated by the exchange rate) as a path towards sustained improvement in the current account balance. To be clear, however, whilst our findings suggest that exchange rate adjustment could prove to be a weapon in the macroeconomic arsenal, it is unlikely that the exchange rate alone was capable of liberating the UK from the straitjacket of the external constraint in the absence of serious and meaningful supply-side reform. And as for monetary policy, our results have a distinctive "Radcliffian "edge to them insofar as the real interest rate does not seem a particularly noteworthy policy instrument, whilst credit is found to be a substantive and meaningful driver of current account fluctuations. On the whole, our findings suggest a greater role for monetary shocks than fiscal shocks in causing fluctuations in the current account balance.

All-in-all it appears that traditional accounts of the UK during the Bretton Woods era afford excessive emphasis to fiscal policy as a driver of external imbalances, whilst neglecting the feedback of the current account to the fiscal balance. Such accounts also tend to downplay the efficacy of exchange rate adjustment and the importance of monetary policy when analysing the chronic current account difficulties. In this spirit, we suggest that a case of mistaken identity has occurred: rather than being twin-deficits the fiscal balance and current account balance are in fact distant relatives. A valuable avenue for future research would probe deeper into the nature of the monetary transmission mechanism to the external balance –

particularly in relation to the myriad of policy instruments that comprised the variegated credit policy during this period.

5.2 North Sea Oil - A Sea of Lost Opportunity?

The transition from a fixed exchange rate under Bretton Woods to a floating regime in the early 1970s did not grant policy makers the reprieve they had been hoping for, and even the ostensible gift of North Sea oil soon became a hotly contested issue in the evolving battleground of UK macroeconomic policy. Our investigation sought to probe the allegations of Dutch Disease; in particular the impact of oil on the UK's real exchange rate, and the consequences of becoming a significant net exporter of oil for the non-commodity tradeable sector – namely manufacturing.

Identifying oil shocks using two leading approaches from the literature delivers a clear verdict that oil was indeed a key driver of fluctuations in the UK's real exchange rate (outperforming a variety of other macroeconomic variables in this regard) and providing a degree of vindication to those voices warning that real shocks would come to exert a substantive impact on the competitiveness of the UK's tradeable sector. Furthermore, we pitted oil shocks and monetary shocks in a horse race to address the contentious issue of whether real versus nominal disturbances were the primary driver of real exchange rate fluctuations, with the results providing a decisive result in favour of the former. It is noted, however, that this could also reflect inter-alia improvements in the communication and practise of monetary policy over the period examined, in contrast to the inherently unpredictable and volatile behaviour of the global oil market.

In addition to the so-called 'spending effect' channel of Dutch Disease, we also shed light on the 'resource movement effect', which pertains to shifts of productive inputs out of the

traditional (non-commodity) export sector into the production of domestic goods for consumption. Indeed, our analysis finds that oil-induced increases in the terms of trade elicits a marked and persistent decrease in net exports of manufactures, thus echoing the warnings sounded by voices arguing that North Sea oil would set in motion an adverse process of structural transformation in the economy, that would result in bloated consumption at the expense of non-commodity exports.

Having empirically established the presence of effects consistent with the Dutch Disease hypothesis, the study turns to questions of political economy and financial policy surrounding North Sea oil. We highlight how the apparently simple question of "how were the oil revenues spent" is actually surprisingly difficult to answer since the revenues were never ringfenced. Indeed, trying to pin-down the precise policy measures that the windfall was used to finance is no easy task, which has left the historical record open to two very disparate interpretations – one built on renewal and success and the other on decline and failure. Proponents of the former view emphasize the positive role played by the windfall in facilitating tax cuts that helped rejuvenate the incentives to work and produce in the UK economy. Meanwhile its detractors argue that the oil revenues were squandered amidst a parlous increase in the equilibrium rate of unemployment, with no discernible effects or legacy to speak of, other than to fund the dole payments of the millions of newly unemployed.

If the effects of Dutch Disease were so pernicious, why was a more vigorous policy response not forthcoming? We advance a multifaceted explanation as to why more concerted action against Dutch Disease was not forthcoming; analysing deep ideational shifts in the economic policy landscape that ultimately conspired to make action against Dutch Disease something of a losing proposition. The demotion of the exchange rate from its traditional role in helping to obtain both external and internal balance, instead becoming an intermediate policy indicator in the doctrine of inflation control as the pinnacle of economic policy, meant

that arguments citing oil as a driver of overvaluation and declining competitiveness failed to win through. Similarly, the balance of payments was cast into relative obsolescence compared to its heyday under Bretton Woods, which meant that burgeoning current account deficits and a precipitous decline in net exports of manufactures no longer held the same sway they once did. And finally, the concept of sector-specific policies ran afoul of a much more market-driven orthodoxy, with the manufacturing sector in particular being regarded by some as a lost cause that was synonymous with industrial unrest, whilst others banked their hopes in the more avant-garde financial and business services sector as the new engine of growth in the economy. In this vein, the notion that substantive sums of public money would be siphoned off to manufacturing in order to offset the impact of the far from universally accepted Dutch Disease, was a forlorn prospect that haemorrhaged support within the citadels of policy making.

In recognizing the historically contingent nature of the way in which the windfall was managed, we elaborate the possible counterfactuals by examining what plausible alternatives were touted regarding how best to harness the 'manna from heaven'. To this extent, two largely forgotten and unstudied proposals belonging to James Meade and Nicholas Kaldor respectively, are dusted down and analysed as possible alternate policy responses. Meade favoured the establishment of a sovereign wealth fund, whilst Kaldor pushed for an urgent restorative industrial policy. Drawing on the latest insights from the resource economics literature on the optimal fiscal management of commodity windfalls, we sketch out the relative costs and benefits of each approach. Whilst it is clear that both would go a considerable way in helping to offset some of the negative effects of Dutch Disease, formulating a meaningful assessment of which route to go down would have involved significant conjecture on the part of policy makers regarding the extent and likely costs arising from scarring (i.e. hysteresis) effects. We then advance an intermediate proposal that combines elements of both Meade and Kaldor's plans, and with reference to some simulations capturing the performance of a

hypothetical UK sovereign wealth fund, a policy is proposed that combines upfront support for manufacturing with longer term saving and net foreign asset accumulation.

In a proximate sense our study finds support for some of the core facets of the Dutch Disease hypothesis, namely in relation to its impact on the exchange rate and the non-commodity tradeable sector. When locating our findings within the broader literature on de-industrialization, however, the study does not suggest that the decline of UK manufacturing was oil-induced, but rather it was oil-aggravated; this is an important distinction. Indeed, a number of powerful structural forces were at play that drove the relative decline of the manufacturing sector in the economy, many of which had been eroding the sector's competitiveness vis-à-vis other economies long before North Sea oil came on the scene. In spite of this, oil contributed to the hard-landing experienced by British manufacturing during the 1980s in particular, and its subsequently underwhelming performance during the 1990s and 2000s was not a foregone conclusion, but could have instead been bolstered by better management of the windfall revenues. The fact that this did not occur lends credence to moniker of fool's gold, rather than black gold.

5.3 A Keynesian Controversy Over Business Cycle Dynamics - Heresy or Ecumenism?

The tomes of Keynesian economics have long emphasized changes in autonomous investment, themselves the product of entrepreneurs' "animal spirits", as the ultimate driver of cyclical dynamics in a capitalist economy. However, another demand-oriented explanation was advanced that actually presaged Keynes' General Theory by nearly three years - this was Roy Harrod's theory of the foreign trade multiplier, which posited exports (rather than investment) as the ultimate source of autonomous demand in the economy. This maverick theory was firmly pushed to the side following the publication of Keynes magnum opus, but

nonetheless subsequent developments in the following decades, such as John Hicks's 'super-multiplier', helped provide theoretical ballast to the idea that exports represented the key source of autonomous demand to which all other components of demand were endogenous.

In his role as arguably the most avid proponent of an export-oriented macroeconomic policy, Nicholas Kaldor revived the theory of the foreign trade multiplier and sought to marry it to the extensive body of theoretical work on so-called 'cumulative causation growth models' in the spirit of Gunnar Myrdal, Allyn Young, Petrus Verdoorn and others. In his analysis of the relative underperformance of the UK economy over the post-war decades, Kaldor lamented the emergence of a highly consumption-led growth model, which was buttressed by an interventionist and fine-tuning macroeconomic policy, which led to a severing of the causal link flowing from exports to investment that had existed in the pre-WWII British economy.

Harnessing the empirical insights of frequency domain analysis, our study explored the macroeconomic relationships inherent in the Harrod-Kaldor hypothesis concerning the role of exports as the autonomous source of demand, and in particular whether there had been any change in the nature of those relationships post-1945. The study decomposed the key macroeconomic aggregates into their constituent fluctuations across different frequency scales, and assessed whether the pattern of co-movement evolved in line with the explanation advanced by Kaldor. Crucially, we conducted spectral-Granger causality tests to identify whether investment or exports had causal precedence in the UK economy across the two sub-periods. It turned out that Harrod and Kaldor were correct regarding the primacy of exports for the 1831-1939 period, since we found evidence that exports Granger-caused investment, but found none to support causation from investment to exports. Similarly, Granger-causation from exports to investment was also found for the 1956-2019 period - contrary to Kaldor's pessimistic assertions. Most interestingly, however, was the evidence of Granger causation

from investment to exports in the latter period, a view more consistent with Orthodox Keynesian theorizing on the importance of autonomous investments and animal spirits.

How theoretically plausible were the results from the frequency domain analysis? The notion that investments hold causal precedence over exports actually turns out to be highly congruous with the latest generation of international trade theory (and empirics) - known as 'heterogeneous firms in international trade'. This extensive body of scholarship emphasizes the uniqueness of exporting firms; their relatively strong position on the continuum of domestic producers, and the necessity of undertaking sunk investments in order to enter (and remain) in the business of exporting. The associated body of empirical evidence contends that exporting firms have already amassed a significant productivity advantage prior to exporting, and on this basis a Darwinian process of survival of the fittest characterizes both the decision to enter into exporting, as well as the ability to survive the competitive pressures it entails. This stands in contrast to the 'circular and cumulative causation' growth models espoused by Kaldor in support of the export-led approach: indeed, these models emphasized the self-reinforcing nature of competitiveness, which relied on external demand to achieve the increasing returns effects necessary to confer advantages in both price and non-price competitiveness, which would then feed through into an expansion of market share, and thus a virtuous cycle led by exports. This clearly differs from the investment-led approach, which suggests that the competitive advantage is obtained prior to exporting and a necessary precursor to bearing the sunk costs associated with moving into the international market.

In considering the policy implications of these competing theoretical paradigms, the analysis actually highlights something of a paradox: the Harrod-Kaldor hypothesis markets itself as a demand-oriented theory in the Keynesian tradition, however, at its core the associated policy implications seem to center almost exclusively on supply-side policies designed to improve product-level competitiveness and international consumers' willingness-to-pay for tradeable

sector output. Furthermore, we delve deeper into the views of Harrod and Kaldor respectively to show that, despite both being influential in emphasizing the relevance of exports as a source of autonomous demand, there was a gulf between them on key issues in economic policy. Harrod was a lifelong free-trader who espoused the virtues of the Ricardian model in successive editions of his acclaimed textbook *International Economics*, whilst Kaldor made it something of his mission to demolish the maxims of free-trade, which he found to be theoretically and empirically untenable to the extreme. Unsurprisingly, these divergent opinions markedly impacted the attitude of each man towards instruments such as import controls - with Kaldor actually invoking Harrod's foreign trade multiplier in support of them, something that would have been an anathema to the then-deceased Harrod.

Perhaps most strikingly of all, it becomes clear that Kaldor began to equate the foreign trade multiplier as the long-term limit at which an economy could grow, and ipso-facto the determinant of the equilibrium growth path. By contrast, Harrod envisaged it as an explanation of fluctuations but not necessarily for growth in the long-term. This difference in emphasis underscores the fact that despite sharing a common analytical core emphasizing the autonomous nature of export demand, Harrod and Kaldor envisaged very different ends for their shared research interest, hence any talk of a 'Harrod-Kaldor hypothesis' must necessarily be tempered by such an understanding. All-in-all, the Harrod-Kaldor hypothesis, which was taken up by the ill-fated Cambridge Economic Policy Group (CEPG) in the mid-1970s and early 1980s, failed to capture the hearts and minds of British the policy-making establishment, whilst the ensuing backlash from the Keynesian mainstream (on account of CEPG's sidelining of autonomous investment and animal spirits) consigned the export-oriented Keynesian approach to seeming oblivion. It nonetheless represented an interesting and fruitful departure from the mainstay of post-war Keynesianism, and based on the findings from the empirical analysis undertaken in this study, the Harrod-Kaldor hypothesis was not without its merits as it sought to bring the central Keynesian insight of shifts in autonomous demand

into the open-economy setting.

5.4 Revisiting the Ghosts of Economics Past (and Concluding Reflections)

Something of an ancillary goal that emerged as the thesis progressed was, over the course of exploring the main research questions, to shine a light on some of the distinguished 20th century economists, who for various reasons have found their contemporary appeal diminished and arguably somewhat overlooked. Indeed, the current thesis has engaged substantively with the varied and sometimes profound contributions of James Meade, Nicholas Kaldor, Wynne Godley, and Roy Harrod, the reasons for which are twofold. First, the economists in question have each made salient intellectual contributions to the economics discipline, and in light of their high academic standing during the decades under study, they were lively protagonists in many of the key academic debates of their times. And second, they were all highly influential and prominent policy makers: Meade, Kaldor and Godley for the Labour Party, and Harrod for the Conservatives . This meant that their academic endeavours helped to inform their policy decisions, but equally their trials and tribulations on the front line of macroeconomic policy meant that their academic interests were often guided and informed by the economic issues they helped the politicians to grapple with.

There are certain elements of the research agendas pursued by the above economists that have undoubtedly persisted into modern times: James Meade's earlier work on international capital movements; Wynne Godley on the importance of stock-flow adjustment and proper accounting in macro models; Nicholas Kaldor on the stylized facts of economic growth and the implications of economic maturity, and Roy Harrod on growth dynamics and associated stability issues. But some of their academic output has, rightly or wrongly, fallen prey to the passage of time and arguably deserves greater attention in light of contemporary economic

problems. These indicatively include Kaldor on the uniqueness of the manufacturing sector as an engine of productivity growth in the economy; James Meade on the question of achieving simultaneous internal and external balance, and Roy Harrod on the importance of real open-economy shocks and their propagation [1]. Although these thinkers were not the primary subject matter of the thesis per-se, their academic works and policy recommendations have – for good or ill- left an indelible mark on the face of the post-war British economy, and a future research agenda exploring their contributions more deeply will surely prove to be a fruitful endeavour [2].

On the specific matter of the Kaldor and Meade plans for North Sea oil, there are grounds for arguing that the plans can in fact speak to some much broader and deeper issues than the particulars of the oil windfall. Indeed, despite both being creatures of the left politically, Kaldor and Meade in fact hailed from two very distinct traditions within the Keynesian broad tent: Kaldor being the quintessential 'Cambridge Keynesian' (also known as Post-Keynesians), whilst Meade fell within the more orthodox variety of post-war Keynesianism (referred to as 'Neo-Keynesians'). The vehement disagreement between the two camps erupted into flames during the now infamous 'Cambridge capital theory controversies' of the late 1950s/early 1960s, in which leading Keynesians from the University of Cambridge and the Massachusetts Institute of Technology (MIT) engaged in what has come to be widely regarded as an esoteric, abstract, and highly theoretical indulgence that has produced little enduring influence on the mainstay of the economics discipline.

The beauty of the Kaldor and Meade plans is that they offer a window into how the deeper

[1] One could also mention here - in a provocative spirit of discussion- Wynne Godley's advocacy of import controls as a legitimate instrument of macroeconomic policy, an area which he regretted not being able to move the dial on more following his time in the policy world. See Shipman (2019, Ch.9) for an excellent discussion of this facet of Godley's views on macroeconomics.

[2] In the spirit of following one's own advice, the current author will spend the 2023/24 academic year as a Visiting Research Fellow in the Economics Department at Duke University, focusing his next research endeavour on the highly fruitful latter phase of James Meade's career: namely the reforming theoretical and policy agenda he sought to carve out in response to the apparent failure of the orthodox Keynesian model.

theoretical differences between the Post-Keynesians and Neo-Keynesians manifested themselves in more practical issues of economic policy. They speak to a range of differences including, but not restricted to: the relationship between wages and the level of employment; the relative emphasis afforded to consumption versus production, and the degree to which the structural characteristics of the economy (between particular sectors, for instance) constitute a cause for concern with regard to long-term economic performance. It is also possible to glean an insight into the worldview of each man, their wider understanding of the evolution of a capitalist economy through time, and their conception of the appropriate role of the state in the political economy of market-based society [3].

Reflecting on the overall findings of the thesis as a whole, a particularly pointed criticism emerges regarding policy makers' understanding (and sometimes attitudes) towards the external balance aspect of macroeconomic equilibrium. Throughout the decades, the collective understanding of forces affecting the current account, exchange rate, and the external drivers of fluctuations in output, has appeared vague and confused - at times even apathetic. In a similar vein, the external balance of the economy was all too often perceived as a binding constraint on economic growth, which needed to be navigated or surmounted, rather than as an impetus for higher output, induced-innovation, and and an engine of long-term prosperity. A key charge here would surely pertain to short-termism: whether it was the reluctance to devalue sooner during the Bretton Woods era and the proclivity to stumble (all too predictably) in sequence from one crisis to another, through to the largesse and devil-may-care approach to the North Sea oil. The UK's historical record herein suggests a lacklustre combination of an absence of forward-thinking in policy discourse, and a deficit of will when it came to provisioning for the future, instead waiting until events forced a haphazard and disorderly shift of gear in policy.

[3]Work is underway to this end by the current author, seeking to demonstrate the value of the Kaldor and Meade plans in the spirit of what has been described herein.

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