Empirical Essays on Employment, Financial Development and Stability

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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 warrant that this authorization does not, to the best of my belief, infringe the rights of any third party.

Abstract

This thesis is a collection of essays on the important problems in developing countries and aims to contribute to the empirical literature on the i) financial services sector expansion and its implications on formal employment, i) impact of early retirement incentives on labour force participation rates and finally on the iii) effectiveness of stabilization funds on reducing the boom and bust cycles in light of fluctuating international commodity prices.

Chapter 1 investigates the role of financial services expansion, especially the impact of increase in consumer credits on the reduction of informal employment. I argue that liberalization should naturally lead to a decline in the share of informal employment due to the fact that international firms are less likely to employ informally and consumers whose borrowing constraints are relaxed due to more credit availability are more likely to prefer goods that are paid with consumer credits. I test this hypothesis by exploiting the regional variation in Turkey. Due to the possible endogeneity problem, I employ several instruments and find positive impact of consumer services expansion on formal employment. Two unique datasets that I explore for for possible instruments are i) the religiosity and political tendencies surveys of 2011 and 2013, and ii) regional Armenian population loss data between 1914-1917 in the former Ottoman Empire that preceded the Turkish Republic. The exogenous variation that I seek to explore accordingly are; i) Islam bans all sorts of interest charges in financial transactions and therefore residents of more conservative regions are on average less likely to demand consumer credits, and ii) Armenians were the trading and artisan class of the Empire and therefore the main users of the financial instruments and when they perished.

Chapter 2 is about the impact of a Social Security System that allowed women and men to retire as early as 38 and 44 years old on labour supply decisions in Turkey. Before the pension reform of 1999, the Law 3774, dated 1992 brought incentives to those individuals who several conditions to retire at a much earlier age than the conventional 60-65 years window. Using the Statistics on Income and Living Condition (SILC) panel dataset between 2007-2010 in a Fuzzy Regression

Continuity Design, we find that these incentives let to an average decline of about 16.9 hours in weekly hours worked by men aged 44-52 and 20.6 hours decline in weekly hours worked by women who are aged between 39-49 in a bandwidth of three years around the eligible age for retirement. Moreover, we find that the entitlement for retirement after 44 years old reduced the probability of labour force participation of men by about 28% to 37% while we did not find a statistically meaningful impact on the participation decisions of women.

Chapter 3 explores whether sovereign wealth or stabilization funds created by governments in oil rich countries are effective in reducing volatility and ensuring a counter-cyclical or acyclical fiscal policy in line with the optimal fiscal policy literature or whether they are just another government account in practise. The existing literature on the effectiveness of stabilization funds suffers from endogeneity problems, namely i) the endogeneity between gdp and government expenditures and ii) the endogenity of the decision to establish stabilization funds. In this paper, I contribute to the literature by addressing both of these problems by using a series of Two Stage Least Square Estimations and find positive evidence in favour of stabilization funds in reducing volatility and pro-cyclicality of the fiscal policy in oil rich countries. The findings are relevant for the wider discussion of the procyclicality in developing countries, as one third of the countries which are documented to improve fiscal policy cyclicality seem to be the ones that are resource rich and have a stabilization fund in place.

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I am thankful to my friends with whom I shared many countless happy moments and laughter in London, especially to Mehmet Erdem Yaşar, Etkin Ozen, Hande Küçük Tuğer, Beyza Polat, Ulaş Karakoç and my cousin Ilgin Beaton. Their presence and support made life much easier and joyful even during the most stressful times.

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I am indebted to my dear family for their love, support and patience through all these years we spent apart. My father Ahmet Aşık has been my sole inspiration to do a PhD and I am immensely thankful to him to never stop believing in me and to raise me as a person always seeking for intellectual virtue. I am thankful to my mother, Semiha Aşık for her love, patience and sacrifice, to my dearest brother Candan Aşık and sister in-law Deniz Aşık for giving me more love than I

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Lastly, I dedicate this work to the most beautiful person in my life, my biggest source of joy and endless happiness, to my son Mehmet Can Altıntaş.

To my son, Can

Contents

List of Tables

List of Figures

Chapter 1

Expansion of Consumer Credits and Formal Employment: The Case of Turkey

1.1 Introduction

Informal employment is an important labour market problem in most developing countries. They have implications on limiting collection of public tax revenues and on creating a wedges in labour markets. This paper is not concerned with the underlying reasons of informality, instead questions the impact of financial services expansion on formal employment, if there is any. The claim is that along a phase of globalization and financial integration in a developing country, the increase in consumer credits, credit card services and other financial services might have positive externalities on formal employment through the electronization of payments system. It is possible to describe the impact working through three main channels. First, the new consumption environment with economies of scale brought by the expansion of domestic and international retail chains, and conglomeration of stores around shopping malls combined with more consumer credit availability might naturally necessitate the formalization of transactions and employment procedures.[1]

[1]We define formality as paid employment with registration in social security system.

Rapid urbanization, modernization of the economy and automation of the value chain benefit the sales of larger enterprises with comparative advantage disproportionately more and hence changes the mode of spending to the disadvantage of old fashion local shops or enterprises. This effect is amplified by financial liberalization and rapid banking sector growth which facilitates access to consumer credits and credit cards for more income groups in the population, and not just for the rich. Therefore, overall, not only the mode of consumption spending has changed, but also the mode of expenditure financing by the consumers have changed in many fast growing economies. Second, increasing inclusiveness of financial services as well as electronization of payments might have the implication that the workers are more likely to demand formal contracts as one usually needs proof of income for access to loans. And third, monitoring payments and expenditures through credit cards and electronic system is a more effective way of combatting with informality for the government and therefore most governments improve the regulations and infrastructure in order to spread the use of electronic payment technologies.

Penetration of financial services among the population therefore, should have positive externalities on lowering informality as it incorporates those three important modernizing trends in the economy. The hypothesis in this paper is that the decline in the informality (about 9-10 percentage points in both manufacturing and service sectors) in the last years was partly due to financial services enlargement in the Turkish economy. An important reason why I focus on the financial services and consumer credit expansion as opposed to the loans extended to firms is that in developing countries financial services sector expansion might yield more immediate benefits for consumers than it does for firms. Evidence shows that in many developing countries, the small and medium size firms (SMEs) still prefer own sources as opposed to bank credit for financing of investments and working capital. World Bank's Investment Climate Assesment (ICA) for Egypt shows that the percentage of firms which have bank loans were 11.4% in 2008 (which actually fell down from 17.4% in 2004).[2] The same survey for Turkey shows that only half of the firms surveyed had loans in 2009 whereas an average person holds more than one credit card at a time as we will explain in more detail in section 3.[3] Low

[2]http://www.aucegypt.edu/research/src/Documents/Egypt_ICA_Policy_Brief.pdf

[3]http://www.tepav.org.tr/upload/files/1253714309r3973.Turkey_Investment_Climate_Assessment_Vol_I.pdf

rates of bank borrowing by firms in some middle income countries might be due to the fact that bank financing could be more costly for SMEs or it could be due to different risk perceptions. Hence, if financial services expansion has an impact on formal employment, impact coming from consumer services might be as important as the firm credit channel.

The impact of increased consumer credit availability and financial services on formal employment is largely overlooked. A new book by Cull et al. (2013) focuses on the on empirical foundations of financial inclusion across countries. The premise of the book is built upon the study by Honohan (2008), who documents that the number of adults who do not use formal or semi-formal financial services globally is approximately 2.5 billion against the 2.2 billion users. Although the book shreds light upon various channels through which expanding the financial services might improve the lifes of billions, very little attention is paid to the changing composition of formal-informal employment in relation to banking growth. The closest study in the literature to the view of my research is by Catao, Pages and Rosales (2009) which explores the link between firm credit and formalization in Brazil. The study focuses on the firms' decision to formalize and conjectures that firms need not only to be formally registered to borrow credit but also need to comply with considerable requirements about their balance sheets, income flows, tax reliabilities. Since the strengthening of the communication and data gathering technologies allow governments to monitor more effectively and limit illegal borrowing activities, the study tests the empirical relevance of the credit channel as a driving force of formality. Using the Rajan and Zingales (1998) financial dependence methodology, Catao, Pages and Rosales (2009) test whether the economic sectors that are more dependent on domestic bank credit are the ones where formal employment expands faster as the terms of access to bank credit improve. The study finds that as the aggregate supply of formal bank credit increases, formalization rate increases faster in the sectors that are more dependent on bank credits.

A related branch of the literature that is somewhat parallel to the research question in this paper is the relationship between the trade liberalization, financial liberalization and informality. This wave of literature mostly focuses on the man-

ufacturing sector, attaching less importance on the implications for the services sector. The parallelity of this literature with my paper is based on the observation that after a period of trade liberalization, multinational firms and chains penetrate the domestic markets through foreign direct investments and they have a postive impact on the total share of formal employment in a country, both in services sector and manufacturing industry. The mechanisms and interaction between liberalization and informality in the literature is mixed though. In the model by Goldberg and Pavcnik (2003) formal employment is subject to labour market regulations and costly. Trade liberalization brings more competition, greater competition drives the demand for cheaper informal inputs therefore the relationship between informal employment and trade liberalization is unambigously positive. In their model, the degree of reallocation from the formal to informal sector depends on the degree of labour market flexibility. Aleman-Castilla (2006) finds that the least productive firms which are mostly informal will be forced to exit and the trade liberalization will reduce the informality. Fugazza and Fiess (2010) employ various macro and micro data sets and suggest that macro-founded data sets support the conventional view that trade liberalization is associated with an increase with informality while the micro-founded data set do not.

In this paper I test this hypothesis by using Turkish Labour Force Surveys between 2008-2012 and the regional macro data for Turkey. Due to the potential endogeneity problem, I use various instrumental variables for the financial services development. There are two unique datasets to construct instruments with exogenous variation. The first one is the religiousity and political survey that was conducted by Turkish Economic Policy Research Institute (TEPAV) at the end of 2011 and beginning of 2013 which have regional representation power. Turkey is a predominantly muslim country (98%) however, the degree of religousity varies accross regions. Islam bans any financial transaction that involves interest and I conjecture that in the regions where islamic conservatism is higher, the demand for consumer credits and credit cards should be on average lower. TEPAV's surveys include several questions that measure subjects' degree of religiousity and I aim to use this exogenous variation as an instrument for financial services indicators such as consumer credits per capita and expenditure per capita that is done by using using credit cards. The second unique dataset that was never used in the

literature is the loss of Ottoman Armenian population between 1914-1917 due to forced expulsion and extermination by the ruling Ottoman during World War I. The identifying assumption is that the Armenians were the main users of the financial services as they were the main trading class, and when they were deported, it was a permanent blow to the financial sector. The baseline OLS findings as well as the 2SLS estimations suggest that the financial sector expansion have an impact on formal employment.

The paper is organized as follows. Section 2 starts by motivating the case of Turkey. In section 3, I describe the data and present some descriptive statistics. I then present the empirical evidence on the impact of expansion of financial services on formal employment in sections 4 and 5. Section 6 concludes.

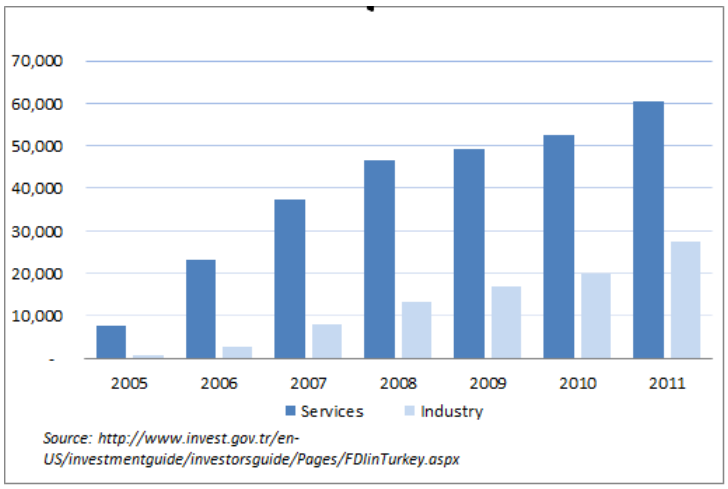
1.2 Motivation: The Case of Turkey

In this section, I present macro evidence on the expansion of financial services sector in Turkey before establishing the link between formalization of employment and expansion of financial services using micro data. Turkey is an emerging market economy which has been recording a strong growth performance in the last decade. After coming out of a catastrophic financial crisis in 2001, the country went through extensive structural reforms and tightened budgetary policies under the Stand-by Arrangement Program with the IMF. The economy grew about 43% since year 2000.[4] The growth rates in 2010 and 2011 were second highest in the world after China with 9.2% and 8.5%. The rigorous program implementation, recapitalization and banking reforms as well as the decrease in uncertainty associated with the budgetary discipline brought with it significant capital inflows and foreign direct investments, mostly in the financial intermediation and services sector. Figure 1.1 shows the cumulative FDI flows by sectors between 2005-2011. According to the statistics provided by the Investment Agency of Turkey, services sector was the biggest recipient of the FDI inflows between 2005-2011 and within the services

[4]http://www.economist.com/news/briefing/21579005-protests-against-recep-tayyip-erdogan-and-his-ham-fisted-response-have-shaken-his-rule-and

sector, financial intermediation attracted the largest share ranging from 27% to 83%. During this period, there have been several bank mergers and acquisitions as well as the penetration of international giants like HSBC and City Bank into Turkey. As for the FDI flows into industrial sector, more than half of the inflows were directed towards electricity, gas and water supply.[5]

Figure 1.1: Cumulative FDI Flows by Sectors (million US$)

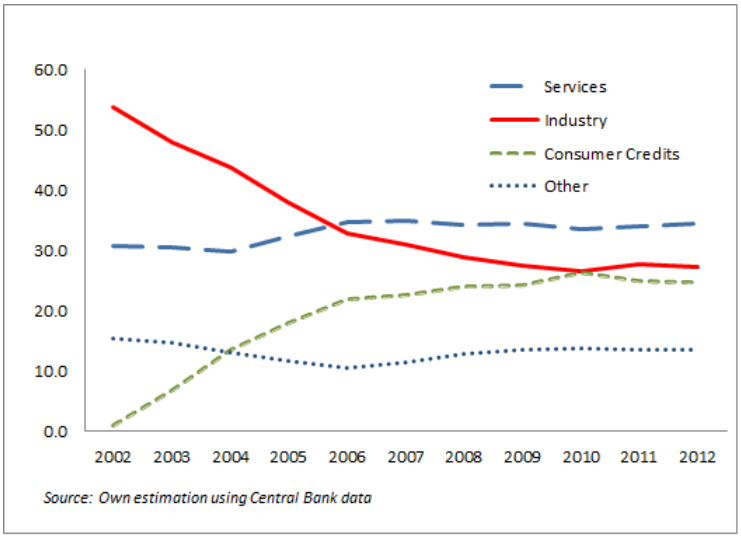


Data by Turkstat shows that the share of labour employed in the financial intermediation services was unchanged at 1.2% between 2004 and 2011, however the value added per worker (in 1998 prices) in the same sector increased by 71.3% while the industrial value added per worker actually declined. A natural outcome of the expansion of financial intermediation services has been the increase in consumer credits. Historically the biggest recipient of bank credits have been the small and medium entreprises (SME) through state controlled banks during the 1990s. As Figure 1.2 shows, the share of consumer credits in total credits went from literally zero in 2002 to around 25% as of 2012. On the other hand, the share of industrial credits which constituted 53.7% of the total credits in 2002 fell down to 27.3% in just 10 years time.

Although the share of consumer credits has been steadily increasing in the last decade, cross-country comparisons show that loans to households in Turkey is among the lowest as compared to peer countries. Figure 1.3 shows that the loans

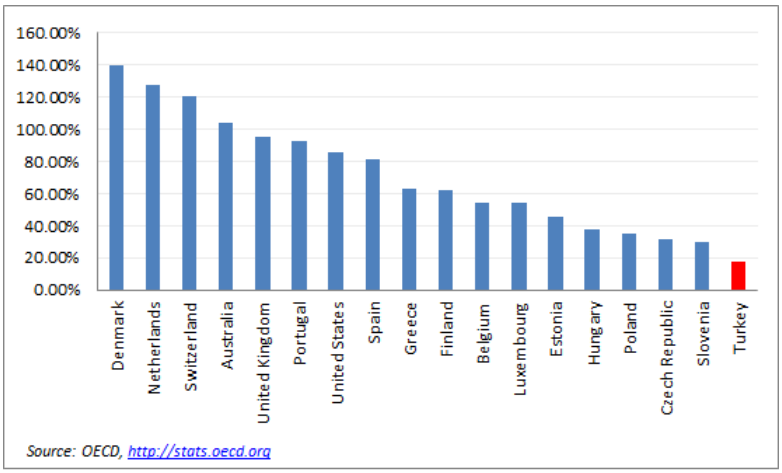
[5]http://www.invest.gov.tr/en-US/investmentguide/investorsguide/Pages/FDIinTurkey.aspx

Figure 1.2: Share of Sectoral Banking Credits



to households as a percent of GDP stood at 17.6% as of 2011 and Turkey ranked at the bottom across the OECD countries. However, it is worth noting that the loans to households were just %12 percent of GDP by the end of 2008, and in just three years time the growth of household credits surpassed the growth rate of GDP.[6]

Figure 1.3: Loans to Households (% of GDP, 2011)

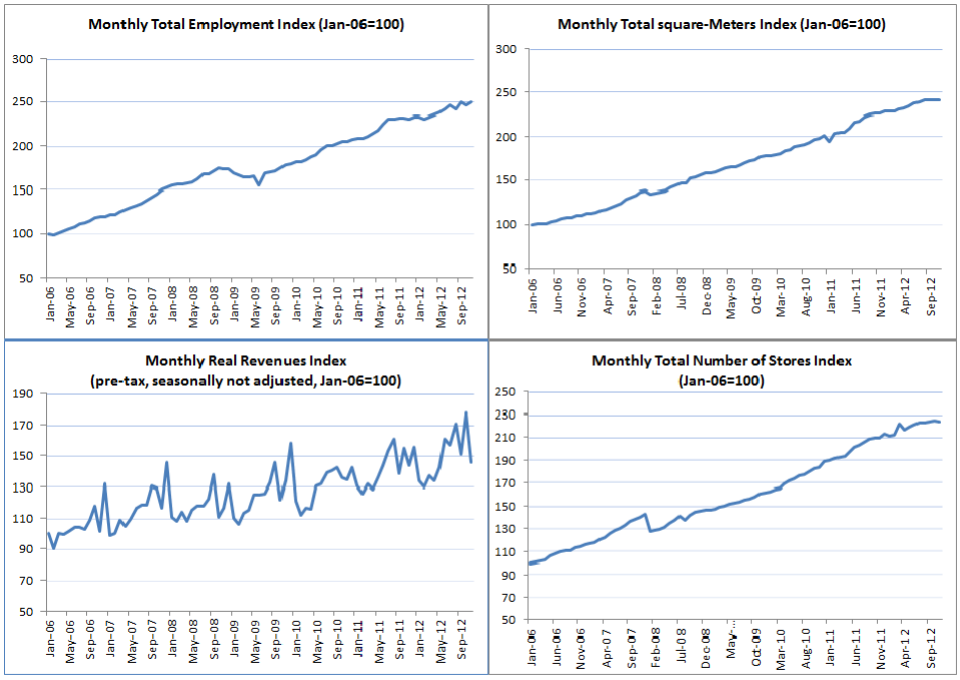


In what comes next, I present evidence on the changing modes of consumption in Turkey. While Turkey managed to attract short term and long term inflows that

[6]In the section on Data Sources and Description, we provide more detailed information on per capita credit growth and other indicators of financial services expansion between 2008-2012.

led to cheaper finance during the last decade, another phenomena taking place hand in hand with financial services sector was the increase in the number of shopping malls, supermarkets and other retail chains. There were two new processes in effect that fueled consumption; the first one is the economies of scale offered by retail chains conglomorated in shopping malls. Trade Council of Shopping Centers and Retailers of Turkey (TCSC) provides monthly aggregate data on various indicators regarding the performance of the retail sector since 2006. Figure 1.4 shows that between 2006 and 2012, i) the land used by retailers and shopping malls (measured as square meters), ii) employment and iii) number of shops have increased more that 2.5 folds. According to the data by TCSC, the total number of shopping centers in Turkey stood at 367 by the end 2013.[7]

Figure 1.4: Wholesale and Retail Sector Performance Indicators)



The second process that fueled consumption in Turkey was the increasing access to credit cards and the opportunity to pay in several installments for expenditures paid via credit cards (a very common practise offered by banks in Turkey). Ac-

[7]http://www.ampd.org/arastirmalar/default.aspx?SectionId=164 Unfortunately, the data on the number of shopping malls and the rentable area is not available on a regional basis.

cording to a survey published by the Interbank Card Center, 52% of the subjects in 2011, and 61% in 2012 suggested that their choice of a specific credit card depends on the installment opportunities.[8] The same survey shows that 39% of the subjects prefered that the installment opportunities to be offered in the consumer durables and 37% prefered them to be in technology goods. Interbank Card Center data also shows that the number of debit and credit cards increased from 64 million in 2009 to 91 million as of end 2012 (note that the population of Turkey is around 73.6 million) while the number of pos machines (which process the in-store payment by credit cards) increased from 1.4 million to 2.1 million during the same period.[9] Volume of transactions with domestic credit cards went up from 139.1 billion Turkish Liras in 2007 to 355.1 billion TL by the end of 2012. The number of transactions with domestic credit cards were recorded at 1.4 billion in 2007 and at 2.4 billion in 2012.[10]

While the modernization and changing patterns of consumption might have direct and indirect positive effects on formal employment in each sector, formalization in the wholesale and retail sectors are likely to be highest. The reasoning is as follows; i) *the impact of domestic and international retail chains:* retailers operating in domestic market specializing in many different products ranging from clothing to technology or grocessy are subject to tighter tax regulations, permissions and audits. Therefore it is only natural that jobs created in these sectors are much more likely to be formal than informal as opposed to small, family-owned traditional local stores. ii) *visibility channel:* not only the retail chains, but also many other firms, enterprises operating in service sector are likely to be exposed to positive and negative externalities in this new way of consumption. Food and catering services are such examples. Retailers as well as restaurants naturally prefer operating where masses of people visit. Increasing visibility helps revenues but at the same time limits the room for informal modes of doing business such as employing informally. iii) *the outside option channel:* competition among enterprises is likely to increase the need for professionalism and attracting employees with higher qualifications. Workers with better qualifications, on the other hand are more likely to ask for formal contracts and under more pleasant work conditions.

[8]Card Monitor: Credit Card Habit Surveys, 2012

[9]http://www.bkm.com.tr

[10]http://www.bkm.com.tr/donemsel-bilgiler.bkm

An anectodal evidence comes from an NY Times article, which suggests that in China although the wages are on average more than two times higher, Chinese graduates say no to factory shops and prefer urban positions and office jobs. A particular paragraph from the article reads:

"Mr. Wang, 25, has worked only several months at a time in low-paying jobs, once as a shopping mall guard, another time as a restaurant waiter and most recently as an office building security guard. But he will not consider applying for a full-time factory job because Mr. Wang, as a college graduate, thinks that is beneath him. Instead, he searches every day for an office job, which would initially pay as little as a third of factory wages." [11]

It is indeed possible to make a similar line of argument between the formal and informal jobs.

Before moving on to establish the empirical link between the expansion of financial services and formal employment, I provide a snapshot of the evolution of the share of the formal and informal employment across non-agricultural sectors since 2004. Here, we exclude mining and electricity, gas production from total industrial production as the labour share in those two sub-sectors are both less than 1% in total. Table 1.1 shows the change in shares of formal employment in manufacturing and services sectors. We see that the share of formal employment has increased significantly in both sectors. However, when one considers the fact that the services sector employs around 43% of the total Turkish labour force versus 18% share of employment in industry, the difference across the two sector becomes more stark.

This section presented evidence on the aggregate trends of the financial services sector and the channels through which it might have had an impact on the Turkish formal employment. Next, I describe the datasets and provide more detailed information before moving on to establishing an empirical link between the formal employment and financial services expansion.

[11] http://www.nytimes.com/2013/01/25/business/as-graduates-rise-in-china-office-jobs-fail-to-keep-up.html?pagewanted=all&_r=0

Table 1.1: Employment Shares by Formality

	Manufact.	Manufact.	Services	Services	Wholesale	Wholesale
	2004	2012	2004	2012	2004	2012
Formal	68.7	79.3	67.8	76.2	55.6	72.1
Informal	32.3	20.7	32.2	23.8	44.4	27.9

Source: Own estimations using Household Labour Surves provided by Turkstat

1.3 Data Sources and Description

The last section presented evidence using the time series macro data. Unfortunately, the aggregate country-level time series data on consumer credits and financial sector growth is limited to present meaningful evidence. The empirical strategy in this paper relies on the regional variation across 26 regions of Turkey (at NUTS 2 level) albeit over a somewhat limited time period.

I combine three main datasets for the purpose of the study. The first dataset is the regional financial indicators series that includes variables such as total spending by credit cards, consumer credits, total employment in the financial sector, number of bank branches and cash machines. These statistics are collected and disseminated by the Banking Regulation and Supervision Agency of Turkey (BRSA) and available between 2008-2012. Unfortunately, the BRSA does not disseminate data before 2008 on the grounds that due to the centralized decision making in the banking system, banks reported most of the financial indicators (such as regional credits) as if they pertained to Istanbul region, when the real recipient of the credit actually resided elsewhere, simply because the credits were approved by the headquarters in Istanbul which is the financial capital of Turkey. Starting from 2008, reporting procedures were improved to reflect the correct regional financial indicators. Below, I list some descriptive statistics about average consumer credits, spending by credit cards and number of branches.

1.2 shows the impressive growth in real credits and expenditure by credit cards between 2008 and 2012. While the real GDP per capita grew about 9.1% from

Table 1.2: Selected Financial Services Indicators (Unweighted Average of 26 regions)

	2008	2012	Change (%)
Credit card expenditure per capita (TL)	3,337***	10,940***	227.8%
	(1028.2)	(1,031.3)	
Consumer credits per capita (TL)	929.7***	2181.4***	134.6%
	(101.8)	(196.3)	
Number of branches	350***	422***	20.6%
	(103.3)	(122.7)	
Real consumer credits per capita (TL)(1)	5.9**	10.4***	74.7%
	(637.7)	(932.4)	
Real credit card expenditure per capita (TL)	21.3***	52.5***	146%
	(6.4)	(4.9)	
Notes			
Credit card expenditure per capita ($)	2581.2	6146.5	138.1%
Consumer credits per capita ($)	719.1	1225.5	70.4%
GDP per capita (TL)(2)	13,378	18,846	40.9%
GDP per capita ($)	10,347	10,588	2.3%

(1) Standard deviations in paranthesis

(1) deflated by regional CPI (2004=100)

(2) Official figure for Turkey, not regional average as data is not available

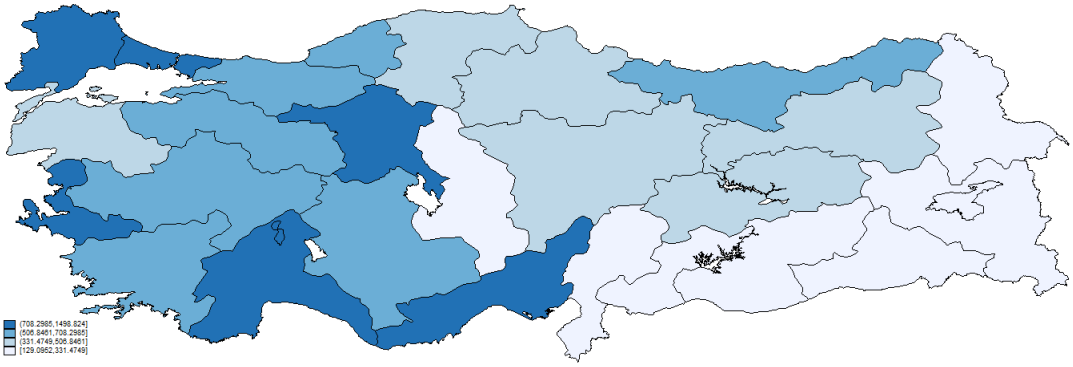
Sources: Own Estimates using BRSA-Finturk, Turkstat and Central Bank Data

2008 to 2012, real consumer credits per capita have increased by 74%.[12] Figure 1.5 displays the differences in nominal credit card expenditures per capita across 26 regions of Turkey. As the figure shows, Istanbul, Ankara and south-west coastline of Turkey fare much better, while the south-east part of Turkey is lagging significantly behind. This research tries to exploit these regional differences though the time series dimension is limited to2008-2012 period.

The second dataset is the household labour surveys conducted by Turkstat between 2008-2012. The surveys are rotating panels, with each household to be visited 4 times over 18 months period. The number of households visited per month is approximately 14,000. Unfortunately the panel dimesion of the surveys are not publicly available, therefore one has to treat each survey as a cross-section.

[12]GDP per capita growth rates are reported as nationwide (http://www.turkstat.gov.tr/VeriBilgi.do?alt_id=55), and not as regional average.

Figure 1.5: Credit Card Expenditures Accross Regions (in real terms)



The survey includes detailed information about the background of an individual, education, maritial status, labour force status, past work experience, sector, region where the individual resides, whether the individual is employed as a registered worker to the social security system or not, i.e. employed as formal or informal. Unfortunately there is no information on whether the entreprises where the individuals are employed are formaly registered in the tax system or not. Therefore, in measuring formal employment, I use the information on whether the indivual is registered to the social security system by the employer or not. Merging the annual surveys provide us with over 1 million observations (including the agriculture sector) between 2008-2012. In all the estimations, however, I exclude the agricultural sector employment since the main focus of the paper is the formalization of employment in urban areas catalyzed by the automation of transactions. More information on the household labour force surveys can be found in Data Appendix and in Table 1.7.

The last data set is the regional indicators data disseminated by Turkstat, covering 26 regions of Turkey at NUTS 2 level and providing a rich set of social, economic and infrastructure indicators during the same period. Unfortunately the data on GDP at the regional level is available only until 2008. However, the dataset includes other useful indicators that we rely on as proxy variables for regional economic activity. Those variables namely are the i) regional electricity consumption per capita ii) the area (in square meters) of the completed or partially completed office buildings and iii) completed or partially completed residential buildings (in square meters). The last two variables are worth elaborating. Construction sec-

tor in Turkey has been traditionally strong, and these variables can be considered as proxies for both the general economic activity, (partially reflecting infrastructure and housing investments) and for hinting expectations on job creation (as the offices buildings are meant to be filled with workers) at a regional basis. These statistics are reported by the regional municipalities which are the authorized bodies for construction permits. Note that these variables are reported as an annual flows, and not as stocks. Below, I display descriptive statistics on the key variables of interest. In the empirical analysis, I exploit the variation in these proxy variables as covariates along with key indicators of average education attainment, age and wage gaps between the formal and informal workers.

Table 1.3: Growth Rates of Selected Indicators (unweighted average of 26 regions)

	2008	2012	Change (%)
Formal Hours (% of total)	64.7***	71.5***	10.5%
	(2.6)	(2.1)	
Formal Employment (% of total)	65.2***	71.6***	9.8%
	(2.5)	(1.9)	
Completed Res. Buildings (million m2)	1.9***	2.9***	52.8%
	(3.7)	(0.083)	
Completed Office Buildings (million m2)	0.08***	0.14***	75%
	(0.02)	(0.008)	
Total Electricity Cons. (per cap, kw)	2.2***	2.6***	16%
	(0.2)	(0.2)	
Unemployment Rate	10.9***	8.6***	-26.7%
	(0.69)	(0.68)	

In aggregating each regional variable, individual weights provided in LFS are used.
Sources: Own Estimates using Turkstat Data

In addition to these main datasets, I rely on two additional ones when addressing the endogeneity of the consumer financial services expansion. The first one is the ethnicity, religiousity and political tendencies survey and the second one is the historical regional data on the loss of Armenian population which were the trading and the artisan class (and therefore likely to be the main users of the financial services). This second dataset will be explained in detail in a seperate section with the historical background.

Religiousity and political tendencies surveys were conducted by the Turkish Economic Policy Research Institute (Tepav) at end-2011 and early 2013 in order

to help contribute to policy discussions on critical political issues of that time such as i) public perceptions on minority rights, ii) the rights of minorities to receive state or private education in mother-language (discussed mostly for the kurdish), iii) removal of headscarf ban for public employees as well as for girls in secondary education, and iv) public perceptions about relaxation of the secular law system towards a more religious one. The 2011 survey was conducted between November 26-December 4 across the regions of Turkey and represents the voter population over 18 years old with a confidence level of 98.5%. The 2013 survey was conducted between April 6-7, 2013 and have the same regional representative power. For consistency and in order to monitor the change in perceptions over time, both surveys included identical questions.

Using the information in the survey, I use the 'religiousity' as an instrument for the financial services expansion. The survey question that remains in both surveys and that I use in measuring the degree of religiousity in this paper is the percent of population who declares themselves to be 'regulary praying five times a day'. Praying five times during the day is mandatory in Islam, however only those individuals who are usually truly pious obey the command. Islam considers that interest is not 'halal', i.e. the business transactions should be conducted free of interest.[13] Islamic banking does not allow for interest bearing savings accounts and similarly consumer credits as well as credit cards are considered to be as haram as well by conservative muslims. Therefore, I make the critical identifying assumption that in those regions where the inhabitants are on average more religious, financial services growth should be relatively limited as the demand for financial products like consumer loans or credit cards is likely to be lower. This generates an exogenous variation in financial services expansion that is not directly related to formal employment. The second critical assumption that I make in my analysis is that 2013 survey is representative of religious habits and attitutes for the year 2012 as i) the survey was conducted in early 2013 (April) and ii) religious beliefs in a society are not expected to radically change in couple of months. This assumption provides me with two cross-sections with identical questions for the years 2011 and

[13]The islamic banking replaces interest with profit and loss sharing which practically serves as interest payment through commissions, fees, penalties and profit sharing, however, the conventional definition of interest is strictly forbidden. On the other hand, Islamic banking practises in Turkey is very limited because Turkey is a secular state by constitution.

2012 which I rely on for two stage estimations in the next section.

1.4 Empirical Relationship

In order to establish the empirical link between financial services sector and formal employment, I first merge the combined household labour force surveys of 2008-2012 with the regional socio-economic indicators of Turkstat and regional financial indicators of the BRSA. This provides us with 437,773 observations each containing region level socio-economic and financial information. Using the combined dataset, I first run logistic regressions to estimate whether there is any relationship between the consumer financial services expansion and the probability of being employed formally controlling for individual characteristics as well as regional variables. The equation of interest is the following one:

$$Y_{i,j,t} = \beta_0 + \beta_1 X_{j,t} + \beta_2 Z_{i,j,t} + \beta_3 D_t + \epsilon_{i,j,t} \tag{1.1}$$

where i denotes the individual, j denotes the region and t denotes the time. $X_{j,t}$ is the vector of regional variables of interest, namely i) the consumer financial services expansion, ii) unemployment rate, iii) electricity consumption per capita, iv) average firm size (in terms of employment) v) squaremeters of completed residential buildings per capita, vi) squaremeters of completed office buildings per capita, vii) average years of schooling, viii) real earnings gap between the formal and informal workers, ix) age gap between the formal and informal workers, and x) education gap the formal and informal workers. The first six variables aim to capture the economic activity while the last four variables are aimed to capture the regional inequality differences and development gaps across regions.[14] $Z_{j,t}$ is the

[14] Average age and education themselves are slow changing variables that exhibit very little variation over the sample period, 2008-2012 within regions. Yet in less developed regions with inferior socio-economic conditions, there is a possibility that average age and education levels could differ significanty across formal and informal groups due to different fertility rates and social inquality. Therefore, these -gap measures- *(measured as the ratio of formal to informal)* are aimed to capture these fundamental differences across regions.

vector of individual characteristics such as the civil status, experience, age, sex, educational status, sector employed, size of the firm the individual is employed at, whether the individual is employed permanently or termporarily and whether the individual lives in urban areas or not.

It is worth mentioning that in year 2008, the government reduced the rates of social security contributions by employers to limit the impact of the global financial crisis. However, the change in legislation targeted female workers of all ages and male workers only between ages 18-29 and the law enforced uniform cuts of contributions across all 26 regions without favoring any particular region.[15] I acknowledge that the fact that the regional consumer credit data is available only starting from 2008 is a weakness, such that we have no data prior to 2008 to control for the full impact of the legislation change. Therefore there is a possibility that the analysis mistakenly attributes the impact of legislation change to the increase in financial services. However, there are three reasons why this might not be a severe problem. First, new social security contributions were uniform accross Turkey and the estimations include full time dummies (and in the next section where I test the relationship at the regional level, all estimations are fixed effects). Therefore, the impact of the legislation should be controlled for. Second, the legislation targeted mainly female workers. According to Turkstat, female labour force participation rate in Turkey was as low as 24% in 2008, 42% of the female employers were employed in agricultural sector, and only 28% of the informal female workers were employed outside agricultural sector. By the end of 2012, the participation rate went up to 29% while 42% was still employed in agricultural sector.[16] Therefore the impact of the legislation change is unclear at least in terms of structure of female employment. It is very likely that the slow increase in female participation and employment is due to the natural demographic trajectory with cohorts with higher schooling rates entering the labour force. And third, as for male workers, legislation change for only the 18-29 age group is somewhat limited and the analysis already controls for average age differentials between formal and informal workers.

In what follows, I measure consumer services expansion using two alternative variables, namely the real consumer credits per capita and population per bank

[15] http://www.tbmm.gov.tr/kanunlar/k5763.html
[16] http://www.tuik.gov.tr/PreTablo.do?alt_id=1007

branch (both in natural logs) where the key assumption is that the regional consumer credits per capita and population per bank branch are exogenous from the individual's point of view.[17] The results are summarized in Tables 1.8 and 1.9 and includes the pooled estimations for the combined surveys of 2008-2012 as well estimations using cross-sections of each year seperately. The pooled estimations show that a 1% increase in the real consumer credits per capita is associated with a 3.2% increase in being employed formally. Accordingly, a 1% increase in the population per bank branch (meaning more individuals have to share a bank branch) is associated with a 3.7% decline in the probability of being employed formally. The pooled data allows to control for changes in aggregate conditions in the economy over the years, however, estimations of each cross section yields similar coefficients; in the range of 2.3% to 4.8% for the real consumer credits and -2.2% to -5.7% for the population per bank branch. As expected, unemployment has a negative and statistically significant effect on the probability of being employed formally, with estimates in the range of -0.1% to -0.5% for in both specifications. Negative and significant coefficients on the age and education gaps between the formal and informal workers suggest that in those regions where the formally employed are on average older and more educated, the probability of being employed formally is lower. On the other hand, the regional variables that are used as proxy for economic activity turns out not to be statistically significant, while electricity consumption per capita has the opposite sign for both specifications in Tables 1.8 and 1.9.[18] The coefficients on all individual characteristics are as expected, being a female employee decreases the likelihood of being employed formally, whereas being married is positively associated with probability of working formally. Education dummy coefficients are positive and highly significant, while working temporarily increases the chances of being employed informally.

One of the hypothesis of this paper is that the impact on formal employment should be strongest in the wholesale and retail sector, if there is any. Therefore

[17] Although the combined sample size is large, I acknowledge that the results might be subject to omitted variables bias due to unobservable characteristics based on households, as one cannot exploit the rotating panel dimension due to the fact that unique identifiers are not provided by Turkstat. Nevertheless, I am still interested in revealing the empirical correlation based on the data available.

[18] Although the coefficients are small, the negative sign could be reflecting the informality in the densely populated industrial regions.

in order to explore the sectoral differences, I estimate the probability of formal employment for 6 sectors, namely; the i) manufacturing, ii) construction, iii) retail food and accomodation, iv) transportation and communication, v) financial services and administrative support and finally vi) social and personal services. [19] In the sectoral estimations, I use the real consumer credits per capita as the measure of financial services expansion, however, the results are completely robust to using the population per branch or real credit card expenditures.[20] In line with the priors, sectoral estimations in Table 1.10 show that the coefficient of real consumer credits is highest in the retail, food and accomodation sector, a 1% increase in real consumer credits per capita increases the probability of being employed formally about 12.1%. The association is sizeable and statistically highly significant. Taking into account the fact that services, especially the sub-sector, retail, food and accomodation employs the largest share of total employment in Turkey (on average 27.1%, followed by 25.1% in manufacturing), the results are encouraging such that there is a natural path for formalization as financial services sector develops. The relationship is also still significant, albeit weakly for other sectors as well except for the financial services sector. This is expected given the fact that banking and insurance sectors constitute the largest fraction of financial services sector where formality is very high to start with.

Although the region level variables should be fairly exogenous from the individuals' point of view, the endogenous nature of the financial services expansion is a concern in establishing a empirical relationship with formality. In what follows next, I instrument the two measures of financial services in a two stage probit estimation. The instruments that I use are; i) percent of the married population in total regional population for the pooled estimations for 2008-2012, ii) religousity as measured by the percent of regional population who regulary prays five times a day for 2011-2012. The first instrument is aimed to capture the fact that married couples are more likely receive consumer loans or do spending with credit cards, therefore the expected sign in the first stage is positive. The identifying assumption

[19]Turkstat's Household Labour Survey for 2008 reports sectors employed (Nace Rev 1) only in 1 digit under 8 broad categories under agriculture, mining, manufacturing, electricity and gas, construction' retail food and accomodation, transportation and communication. The breakdown starting from 2009 is provided in 2 digits and the conversion tables provided by the Turkstat is used to aggregate the data for consistency with the 2008 dataset.

[20]The estimations are available upon request.

is that the percent of the population that is married directly affects the demand for financial services whereas it has no direct impact on formal employment. This is admittedly a strong assumption to make as the logit estimations in Tables 1.8 and 1.9 show that being married increases the probability of being employed formally. Under the assumption that the regional percent of the married population is fairly exogenous from individual's point of view, I present the results in columns (1) and (2) of Table 1.11. On the other hand, given the questionable nature of this instrument, I use the religiosity as an alternative to the percent of married population where the estimations are presented in columns (3) and (4). Unfortunately since the measure on religiousity at the regional level is avaliable only for 2011-2012, the number of observations fall by half.

Two-stage probit estimations in Table 1.11 show that the coefficients for both the real consumer credits and population per bank branch have the expected sign and are statistically highly significant, albeit the slightly higher than the previous estimations. The estimations show that 1% increase in real consumer credits per capita increases the probability of being employed formally about 4.2% to 4.7%. Accordingly, 1% increase in population per bank branch reduces the probability of being employed formally about 4.7% to 5.6%. Table 1.11 summarizes the first stage results. In all four scpecifications, first stage coefficients of the instruments have the expected sign and they are statistically higly significant. Percent of the married population is positively correlated with real consumer credits per capita and negatively correlated with population per bank branch. Similarly, we see that in those regions where the population is more religious, real credits per capita is lower and the population per bank branch is higher. On the other hand, the Wald Test suggests that we cannot reject the null hypothesis that the correlation (rho) between the errors in the probit equation and the reduced-form equation for the endogenous regressor is zero. Both the plain logit estimations and the two-stage probit estimations confirm that financial services expansion as measured by real consumer credits per capita and population per bank branch has a statistically significant effect on the probability of being employed formally. Over all, the estimated effect is in the range of 2.2% to 4.7% for the consumer credits and -2.3% to -5.6% for population per bank branch.

Region Level Fixed Effects Estimations

After the micro estimations, I next investigate the empirical relationship at the regional macro level. In what follows, I first run fixed effect regressions of formally worked hours on the same regional variables as above.[21]. As in the case of micro data, I again use the real consumer credits per capita and population per bank branch as the measures of financial services expansion, but also include real credit card expenditures per capita as an additional measure. This measure is slightly less likely to be subject to the endogeneity problem as compared to the consumer credits due to the fact that banks in Turkey are much more lenient on providing credit cards to customers irrespective of income-age-education or formal employment statuses whereas requirements for loans are stricter. Since banks are more likely to extend credits to those who have documented incomes and job security, consumer credits are more likely to be higher in regions where formality rate is higher, which makes the endogeneity problem more severe. After running OLS with fixed effects, I run 2SLS estimations using the same instruments as before and then in the next section, I exploit an alternative instrument, namely the Armenian population loss.

The first set of OLS with fixed effects estimations at regional level are listed in Table 1.14. Neither real consumer credits per capita, nor real credit card expenditures per capita turn out to be statistically significant at the regional level, while population per bank branch is significant only at 10% significance level. This measure of consumer financial services has the expected sign, and suggests that 1% increase in population per bank branch is associated with 0.142 percentage points decline in formally worked hours. On the other hand, formality does not seem to be associated with the variables to reflect macroeconomic conditions such as the unemployment rate, electricity consumption per capita or office building construction, except for residential building construction. As expected, variables that reflect development levels such as the average years of schooling and the education gap between the formal and informal workers are statistically highly significant. Average years of schooling is the most important determinant of formality rate whilst the real wage gap between formal and informal workers is insignificant. The

[21]The results are almost identical when I use formal employment rate instead of formal hours worked

age gap variable between formal and informal workers is also significant and the sign is positive, indicating that the regions in which formal workers are relatively older, formality rate is more likely to be higher.

Next, in order to control for the potential endogeneity problem with respect to these three measures of financial services expansion, I estimate two stage least squares using the same instruments, i) proportion of the married population and ii) religiousity. As explained before, the exogeneity of the first instrument might be of concern and while the religiosity is a better instrument for that matter, the availability of this variable for only two years (and hence the sample size of just 52) is also problematic. Nevertheless, the estimation resuls and the first stage statistics are summarized in Tables 1.14 and 1.15. Results show that the coefficients of the measures of financial services are statistically significant and have the expected sign. The coefficients of the instruments also have the expected sign and are highly significant in all the cases. The percent of married population is positively correlated with both the real consumer credits and credit card expenditures per capita and negatively correlated with population per branch. Religiousity likewise, is negatively correlated with credits and credit card expenditures and positively correlated with population per bank branch. On the other hand, first stage F statistics with respect to religiousity instrument are unfortunately mostly below the rule of thumb level of 10. All the three endogenous variables pass the Wu-Hausman test of exogeneity for which the null hypothesis is that the specified endogenous regressors can actually be treated as exogenous. This suggests that the plain fixed effects Table 1.14 might be better estimates taking into also account the possibility of large biases.

Overall, the region level evidence is less conclusive as compared to the micro estimates. Although the results show that financial services expansion seems to increase the probability of being employed formally, we cannot safely conclude that at the macro level overall formality is improved. Due to the short time dimension of the panel and limited number of truly exogenous instruments available, one needs to take the estimation results with caution.

In what comes next, I explore an alternative dataset which is the Armenian regional population loss between 1914-1917. The main assumption that I build the

empirical analysis on, is that the Armenians were the main users of the financial system, since they were the trading and artisan classes as opposed to the Muslims who were allocated fertile land by the Ottoman Empire and were mostly employed in agricultural sectors. Adopting the view that the institutions are very slow to change, I instrument financial services sector development with the Armenian population loss. In the next section, I first summarize the historical events and re-run the estimations using the population loss data as an instrument.

1.5 Exploiting A Historical Data: Armenian Population Loss

The empirical relationship I try to establish in this section is based on the historical events that took place in Anatolia under the Ottoman rule in the beginning of the 20th century. During 1914-1917 nearly a million Armenian citizens living in Anatolia under the Ottoman Empire were expelled and massacred. As will be explained in more detail below, the Armenians were the artisans and the trading class and had higher schooling rates than the Muslim subjects of the Empire. Moreover, the deportation decision were not executed uniformly across the country, excluding the main cities such as Istanbul and Izmir, targeting ethnic cleansing mainly in the Eastern provinces with the pretext that the Armenians cooperated with the Russian Empire which had ambitions to expand towards Eastern Anatolia. The crucial identifying assumption in this paper is that the Armenians were among the main class that used financial instruments and when and where they were almost completely exterminated, the financial know-how was lost with a permanent effect on the financial development.

The regional data used in this paper is from Talaat Pasha's own private report on the 'Armenian Genocide'. His private report which provided a detailed breakdown of Ottoman Armenians in each province in 1914 and 1917 was published in 2008 by historian Murat Bardakci. Talaat Pasha's writings were submitted along with other documents to Bardakci by Talaat Pasha's wife, Hayriye Talat in 1983,

shorthly before her death but did not include the deportation report initially. In preparation for an essay for the 90th anniversary of the tragic events, Bardakci called the living relatives of Hayriye Talaat in 2005 to ask whether other writings were left by Talaat Pasha and only then this report which was meticulously hidden in an old luggage was uncovered.[22]

Talaat Pasha was one of the three key Ottoman officials of the time and was the Interior Minister when the laws of deportation and confiscation of the Armenian property were executed. This data is an evidence of the 'official account of deportations'. The last modern Ottoman census was carried over between 1906-1907, however population count and ethno-statistics were rigorously collected for Ottoman rulers due to the facts that i) the Empire was in military conflict in various fronts and they were needed for security and military reasons, and ii) there was a huge inlux of muslim refrugees escaping from Balkans and Caucasians and the Empire needed to secure the living conditions of the new comers. The most detailed statistical count was carried over for Armenian population due to the reasons that will be explained below. From Talaat Pasha's report, we see that there was a secret count of the Armenian population in 1915 which included recent data on births, death and migration which were added on top of the 1906-07 census and provided a calculation of the ethnic composition by 1914 (Dundar, 2008: page 143). From Talat Pasha's notes it is also understood that after executing the 'Temporary Deportation Law of Armenians' in 1915, Talaat Pasha asked for detailed progress reports from 34 provinces (23 vilayets plus mutasarrifliks, the smaller administrative units) in 24 August 1916 to see how many Armenians there were in each province, how many were 'native' and how many of them were 'outsiders'. And six months later on 11 February 1917, he sent another set of telegrams to 23 provinces asking for headcounts of native and outsider Armenians (Sarafian, 2011: pages 5-11).

The evidence in this section is based on this dataset that was made publicly available by Murat Bardakci and summarized later by another historian, Ara Sarafian in 2011. Table 1.4 shows the Armenian population in 1914 and 1917 before and after the deportation decision was executed and the figures show that

[22]Murat Bardakci, (2008) 'Talat Pasa'nin Evrak-i Metrukesi'. pages 28-29

more than a million Armenian citizens of the Ottoman Empire were missing; either deported, massacred or perished along the way.

Table 1.4: Armenian Population Loss, 1914-1917

	Native Armenians, 1917	Outside Armenians, 1917	Armenians of Province in Other Provinces 1917	Armenians in 1914	Missing Armenian Population
Ankara	12,766	410	4,513	44,661	61.31%
Nigde	193	850	555	4,939	84.86%
Izmit	3,880	142	9,464	56,115	76.22%
Kutahya	3,932	680	0	4,023	2.26%
Eskisehir	1,258	1,096	1,228	8,620	71.16%
Bolu	1,539	551	67	3,002	46.50%
Afyon	2,234	1,778	1,504	7,498	50.15%
Icel	252	116	17	350	23.14%
Balikesir	1,852	124	1,696	8,663	59.04%
Kayseri	6,650	111	6,979	47,974	71.59%
Adana	12,263	4,257	19,666	51,723	38.27%
Kahramanmaras	6,115	198	2,110	27,306	69.88%
Sivas	8,097	948	3,974	141,000	91.44%
Kastamonu	3,437	185	232	9,052	59.47%
Konya	3,730	14,210	3,642	13,078	43.63%
Aydin	11,901	5,729	122	19,710	39.00%
Bursa	2,821	178	10,251	59,038	77.86%
Sanliurfa	1,144	6,687	451	15,616	89.79%
Erzurum	0	0	3,364	125,657	97.32%
Bitlis	0	0	1,061	114,704	99.08%
Van	0	0	247	67,792	99.64%
Diyarbakr	0	0	1,849	56,166	96.71%
Trabzon	0	0	580	37,549	98.46%
Elazig	0	0	2,203	70,060	96.86%

Sources: Murat Bardakci, (2008) and Ara Sarafian (2011)

Background

Ottoman Empire was ethnically heterogeneous, consisting of multiple nationalities and faiths including Armenians, Greeks, Jewish, and all others that can be broadly categorized as Muslims. While the Empire was the most powerful state in the Mediterranean and Europe during the 16th and 17th century, it went through two interrelated processes in the 19th century: modernization but slow decline. European states surpassed the Ottoman Empire economically and politically due to innovation while western ideas of nationalism were imported to the Ottoman Empire during the same period that had an impact both within the Empire and beyond its borders (Ungor, 2011: page 25). In 1829 Greece declared independence which was followed by Serbia, Montenegro, Bosnia, Wallachia and Moldova in 1875. Ottoman Empire responded to increasing discontent and nationalism by passing several reforms ranging from agricultural, industrial, financial, architectural and land as well as political. Under the rule of Sultan Abdulhamid II, Ottoman Empire moved from an absolute monarchy into constitutional monarchy between 1876-1909. 1876 constitution introduced equal rights to the Christian minorities and caused enthusiasm also among Armenian communities. However, as suggested by Ungor (2011: page 26), although transportation, communication,

education and health care were significantly improved, the reforms did not produce long-lasting results and nationalism continued unabated. In the meanwhile a new political group named Young Turks alligning with the Committee of Union and Progress (CUP) emerged whose ideology was based on 'Muslim nationalism'.

During centuries, Armenians who were the natives of Anatolia since the ancient times found the way to protect their identities under the Ottoman rule through education and awareness, especially thanks to the efforts of the Armenian Church. As explained by Kevorkian and Paboudjian (1992: pages 77-86), Armenian communities went through a period of modernization and renaissance starting from the 17th century after the establishment of a press in Ishafan by the Armenian clerics. Printing was prohibitted under the Ottoman rule and the access to books and publications helped intellectual ideas flourish within the Armenian community. The wave continued in the 18th and 19th centuries when printing was finally allowed. Publishers based in Constantinople (Istanbul) started to grow in numbers and several liberal Armenian schools were openned. The Armenian intelligentsia became increasingly vocal about the need that the schooling rates (especially in the Eastern regions) had to be increased in order to maintain the Armenian identity. The constitution of 1863 which brought autonomy to decision making also helped increase the number of Armenian schools. This positive phase however, was interrupted as Sultan Abdulhamid turned increasingly authoritarian and the constitution was suspended. In the meanwhile, the life of Armenians in the Eastern provinces were getting tougher, on one hand facing attacks from Kurdish rebellions that were provoked intentionally by the Sultan against Armenians and on the other hand receiving arms and support from Russians who had ambitions to control the Caucasians and Anatolia. The political suppression and provocations finally led two major massacres of the Armenians, first in 1896 and then in 1909 which ended up with a death toll of hundred thousands Armenians. These events were unfortunately the preview of one of the biggest human catastrophe of the century.

As explained by Ungor (2011: pages 27-33) becoming increasingly discontent with Sultan Abdulhamid's repression regime, the Comitte of Union and Progress branched out into secret cells all over the empire, publishing articles and books to

disseminate their ideas and eventually overthrow the Sultan. CUP made alliance with other opposition groups including initially the Armenians and their efforts carried the Young Turks to power after the Constitutional Revolution of 1908, introducing an unprecedented period of freedoms, only to last until the counter-coup by Sultan's supporters in April 1909. Unfortunately over time the Young Turks turned as repressive as the Sultan himself in trying to achieve their nationalistic aspirations. As Ungor (2011) puts it, 'like many other revolutions, the Young Turk revolution betrayed its initial aspirations and Turkish nationalist hegemony led to dictatorship, war and genocide'. Over the years the political tone of the Young Turks shifted from Ottoman to Muslim and then to Turkish nationalism (Ungor, 2011: page 29). The Tsarist Russian threat which had imperial ambitions in the Eastern provinces feeded the Young Turks' paranoia about Armenian and Kurdish seperation and the lack of 'Turkishness' in the east started becoming a major concern (Ungor, 2011: pages 40-41). The first traumatic development that aggrevated the nationalist ideas was the Balkan War of 1912, which resulted in the permanent loss of the entire Balkan peninsula and the massive influx of the Muslim refugees escaping from slaughters. According to Akcam (2006), Balkan refugees as well as Circassian and Chechen refugees that escaped from Russians between 1878-1904 inevitably desired for revenge due to the massacres they suffered from and therefore played a pivotal role in the killings of the Armenians and the confiscation of their properties during the genocide in 1915.

In 1914, the Ottoman Empire entered the World World I, siding with Germany, Austria-Hungary, Bulgaria and fought against the British Empire, French Republic, Russian Empire and Italy. By December 1914, Ottoman, under the command of War Minister Enver Pasa lost the Battle of Sarikamish (North-East Anatolia) to Russia and Enver Pasa publicly blamed the Armenians for the defeat.[23] Armenians were now considered to be a major threat more than ever and the trust between the Armenian subjects that were constanty accused for treason and the Ottoman rulers irreversably shatterred. The critical landmarks for mass massacres were the deportation and exile decision that targeted major Armenian intellectuals on April 24, 1915. Today, this date is commemorated as the anniversary of Armenian

[23]Balakian (2003), The Burning Tigris: The Armenian Genocide and America's Response. New York: HarperCollins. pp. 25, 445

Genocide, although the loss of civilian Armenian population took place after the 'Temporary Law of Deportation' and 'Temporary Law of Expropriation and Confiscation' on 27 May 1915 and 13 September 1915. The first law aimed at deporting the Armenians 'that have engaged in dangerous activities, such as collaborating with the enemy, massacring the innocent people and instigating rebellions'. The law was masked as a security measure but authorized deportation, and massacre of more than a million Armenians including innocent children, women and elderly. The destination for the deported Armenians was the town of Der Zor in South-East Syria and the surrounding desert. The security and facilities during deportation were completely inadequate given the fact that Ottoman was fighting in multiple fronts during the war. As a result, hundreds of thousands perished from starvation, sickness, robbery, rape and brutal treatment along the way. According to the estimates, the number of missing Armenian population between 1914-1917 under Ottoman Empire is about 1.15 million, which roughly corresponds to 77% of 1914 population (Sarafian, 2011: page 6).

The Law of Expropriation and Confiscation aimed at determining the value of the immovables and land under the pretext of 'protecting the properties of the deported Armenians and to be returned to the owners when security was restored'. All property, including land, livestock, and homes belonging to Armenians, was to be confiscated by the authorities. However, Armenians never got back. The properties were mostly allocated to the migrants that fled from the Balkans and Caucasuses and all other properties including olive, mulberry orchards, vineyards, workshops, factories and stores were sold at auctions (Ungor and Polatel, 2011: page 44). According to Talaat Pasha's report, in 1915, 20,545 buildings, 267,536 acres of land, 76,942 acres of vineyard, 7,812 acres of gardens, 703,491 acres of olive groves, 4,573 acres of mulberry gardens, 97 acres of orange fields, 5 carts, 4,390 animals, 2,912 agricultural implements, and 524,788 planting seeds were allocated to the muslim settlers (Ungor and Polatel, 2011: page 82).[24] Although the Young Turks achieved their aspirations of Turkifying Anatolia and providing means of living to the Muslim refugees, it is not clear whether the human capital that was lost with Armenians were entirely compensated with new comers. This

[24]This was also great opportunity for windfall for many Ottoman elites and locals who sized many valuable Armenian property. Ungor and Polatel (2011) provide an account of many Ottoman governors and officials plundering Armenian property in several provinces of Anatolia.

is an important research topic that needs to be explored eventually by economists and historians, especially when we are about to enter the 100^{th} anniversary of the genocide in 2015.

As of today the human crimes against the Armenians are still not officially recognized by the Turkish Republic, and official narrative is based on 'World War I conditions and security requirements'.

Relevance for the Financial Development Gaps in Modern Turkey

As suggested at the beginning of this section, the identifying assumption that I make in the empirical analysis is that the Armenians were the trading class of the Ottoman Empire and when the population was exterminated, trade and financial system was massively hurt. Although it should be possible to document by detail the number of perished Armenians artizans and traders due to the detailed etho-statistics carried over by the Ottoman officials of the time, the access to the Ottoman Archives as well as Land Registry and Cadastre statistics are still restricted to this date. Therefore, in my analysis, I mostly rely on qualitative side evidence provided by historians.

Ungor and Polatel (2011; page 18) document that Armenians dominated commerce in the east while it was heavily Greek in the west. The authors summarizes the available commerical statistics as; 'In 1884, of the 110 merchants in the north-eastern provincial capital Trabzon, for domestic and international trade a vital port city, 40 were Armenian and 42, Pontic Greek. According to a 1913 study on Anatolia by the Armenian parliamentarian and writer Krikor Zohrab, of the 166 importers, 141 were Armenians and 13 were Turks. Of the 9,800 shopowners and craftsmen, 6,800 were Armenians and 2,550 were Turks; of the 150 exporters, 127 were Armenians and 23, Turks; of the 153 industrialists, 130 were Armenians and 20 were Turks and finally, of the 37 bankers, 32 were Armenians. In the six eastern provinces, 32 Armenian money lenders plied their trade versus only 5 Turkish ones. On the eve of the genocide, in early 1915, of the 264 Ottoman industrial establishments, only 42 belonged to Muslims, and 172 to non-Muslims. These figures, based mainly on Ottoman sources, suggest unmistakebly that the economic intelligentsia of the Ottoman Empire became more and more 'Armenianized' in

that period.'

Again, as documented by Ungor and Polatel, (2011: pages 92-95), foreign diplomats were reporting alarms on not only the human crimes but also on the likely economic disaster that expected the Empire. In june 1915, German Vice Consul Kuckhoff reported 'Through the extermination of the Armenian element, all trade and commerce in Anatolia will be destroyed and any economic development of the country will be impossible for years to come, for all merchants, industrialist and craftsmen are almost exclusively Armenians.' [25]. Joseph Pomiankowski, the Austro-Hungarian Military Atachee of the time reported that the loss of artisans, merchants, traders and farmers was a major blow to the economy.[26] As Ungor and Polatel (2011, page 94) documented, another German report from Aleppo in 1916 suggested that 'since 90% of trade in the interior is in the hands of Armenians, the result is that the country is facing ruin...With the few exceptions, the evacuated areas there will not be left a single mason, blacksmith, tailor, carpenter, potter, tentmaker, weaver, shoemaker, jeweler, pharmacist, doctor, lawyer or any other professional or trader, the country will acually be in a helpless state. [27]

Empirical Evidence

In this section, I present the findings on financial development and formalization of employment using the Armenian population loss as an instrument with the identifying assumption that Armenians were the trading class and when they were exterminated, financial knowledge was hit unevenly accross different regions of Turkey.

The previous section used data on nuts2 regional classification that divided regions into 26. The Ottoman provinces system was however based on a different classification though it broadly matched with the current classification. In my analysis, I exclude the then Ottoman provinces of Beirut, Aleppo, Der Zor, Mosul

[25]German Foreign Office Archives, R14086, Ab.22101, attachment, report by vice-consul Kuckhoff, 4 July 1915, in Ungor and Polatel (2011)

[26]Pomiankowski, Der Zusammenbruch des Ottomanischen Reiches, 1928 in Ungor and Polatel (2011)

[27]German Foreign Office Archives, R14093, Valentini to Bethmann-Hollweg, 10 September 1916, in Ungor and Polatel (2011)

and Syria as they no longer belong to the Turkish Republic. The remaining Ottoman provinces are easily mapped with Turkey's current provinces and reduced to 18 in my analysis to ensure consistency. Whenever an Ottoman region is included as a bigger region under current Turkish regional classification, I use the weighted average for the Armenian population loss, using the 1914 and 1917 data on population. Additionally, I take the yearly averages of remaining data for 2008-2012 and make it a cross-section since the population loss instrument is an exogenous historical cross-section.

Table 1.5 below summarizes the findings and Table 1.6 summarizes the first stage results. The result using the Armenian population loss also confirm the earlier findings that the consumer financial services sector development is associated with higher fraction of formal employment. The signs are highly statistically significant, suggesting that as the real consumer credits and real expenditures via credit cards per capita increases by 1%, share of formal employment goes up about 0.046 to 0.059 percentage points while a 1% in the population per bank branch reduces the share of formal employment by 0.055 percentage points. These coefficients are about the same size as the coefficients that were estimated using the married population ratio and the religiousity measure.

Table 1.5: Two Stage Least Squares Estimations Using Armenian Population Loss as Instrument

Instrumented:

1) Real Credit Per Capita

2) Real Credit Card Expenditures Per Capita

3) Population Per Branch

	2SLS	2SLS	2SLS
Real Credits (per capita, in logs)	5.912***		
	(1.825)		
Real Credit Card Expenditures (per capita, in logs)		4.601***	
		(1.752)	
Population Per Bank Branch (per capita, in logs)			-5.496***
			(1.845)
Unemployment (%)	-1.315***	-1.279***	-1.136***
	(0.313)	(0.356)	(0.292)
Electricity consumption (kw, per cap.)	-0.667	-0.211	-0.388
	(0.789)	(0.767)	(0.728)
Average Number of Employees at Work	11.402***	10.352***	11.725***
	(2.746)	(2.831)	(2.973)
Compl. Res. Buildings (m2, per cap.)	-5.674**	-4.919*	-5.566**
	(2.414)	(2.566)	(2.299)
Real Wage Gap	-0.016	-0.295	-0.234
	(1.202)	(1.220)	(1.166)
Average Schooling	9.701*	14.569***	12.433**
	(5.611)	(5.047)	(5.199)
Education Gap	-38.725***	-31.327***	-40.718***
	(9.502)	(10.101)	(9.698)
Age Gap	7.372	0.282	8.008
	(19.516)	(21.821)	(18.548)
Constant	109.902***	76.596***	121.066***
	(33.710)	(29.089)	(35.930)
Observations	18	18	18
R-squared	0.962	0.956	0.961

Robust and clustered (at region level) errors in paranthesis

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

On the other hand, the first stage results are not as strong as the earlier two stage least square estimations where religiosity and ratio of the married population were used as instruments. In all the three cases, the F statistics are lower than the rule of thumb level of 10. The coefficients of the Armenian population loss instrument are statistically significant at 5% and 10% levels. However, first stage results suggest that the bias might be high as the F statistic is way below

the Stock-Yogo Critical Values for 10% IV relative bias. While the question of exogeneity for empirical purposes is much less of a concern for this instrument, one cannot reject the null hypothesis that specified endogenous regressors can be treated as exogenous using the Wu-Hausman Test of Endogenous Regressors. The main drawbacks of using the Armenian population loss, however, is that since the instrument does not vary over time, the dataset is reduced to a cross-section of 2008-2012 averages with small number of observations. Therefore the instrument acts more or less like region dummies.

Table 1.6: First Stage Statistics: 2SLS Estimations Using Armenian Population Loss as Instrument

Instrumented:
1) Real Credit Per Capita
2) Real Credit Card Expenditures Per Capita
3) Population Per Branch

	(1)	(2)	(3)
Coefficients of the Instrument			
Armenian Population Loss	0.623***	0.801**	-0.670**
	(0.204)	(0.342)	(0.245)
First Stage Statistics			
F test of Excluded Instruments	9.27	5.47	7.42
Wu-Hausman Test of Endogeneity[(1)]	2.272	2.291	2.062
	pval (0.132)	pval (0.130)	pval (0.151)
Kleibergen-Paap Wald rk / Cragg-Donald Wald F Stat.	9.27	5.47	7.42
(Stock-Yogo Crit. Val. for 10% IV Rel. Bias)	16.38	16.38	16.38

(1) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Overall, however, despite the drawbacks the estimation results confirm the earlier findings that consumer services sector development is associated with a reduction in informal employment share.

1.6 Conclusion

Informal employment is an important labour market problem in most developing countries. It has implications on both limiting collection of public tax revenues and on creating a wedge in labour markets. This paper is not concerned with the reasons of informality but with the natural reduction of the share of informality in a small open economy which goes through a fast phase of globalization and financial integration. Integration has the benefits of i) increasing the supply of credits in the domestic economy and ii)creating economies of scale with more productive firms dominating sales. More specifically, liberalization and integration draws in both international firms for domestic production as well as cheaper credits that are passed on the consumers which previously face borrowing constraints. As a result of this phase, modes of consumption and payments are typically modernized and old consumption habits die in developing countries. This paper argues that this process should naturally lead to a decline in the share of informality due to the fact that i) international or bigger firms which have competition advantages are less likely to employ informally, and ii) consumers whose borrowing constraints are now relaxed are more likely to become users of new financial products such as credit cards and consumer credits which were unavailable under autarky. More specifically, we argue that the second channel, i.e. the consumer credit channel amplifies the reduction in informal employment.

This paper argues that consumer credit channel helped reduce the informality in Turkey over the last years. During the last decade, Turkey attracted significant foreign direct investment inflows, especially into services sectors. Share of consumer credits went literally from less than 1% to 25% between 2002-2012. Moreover, real credits per capita increased by 75% between 2008-2012. In this paper, I test these hypotheses using the household labour surveys merged with regional indicators and financial databases. I measure consumer financial services growth by three different variables, namely i) real credits per capita, ii) real expenditures via credit cards per capita, and iii) population per bank branch.

Starting with logit estimations, I find that one percent increase in the real

credits is statistically significantly associated with about 3-5% percent increase in the probability of being employed formally. A percent increase in regional population per bank branch is statistically significantly associated with about 3-5% decrease in the probability of being employed formally. Looking at employment probabilities in selected sectors, I find that the relationship between the financial services expansion (as measured by the real credits per capita) and the formal employment probability is strongest in the retail, food and accomodation sector, confirming the hypothesis of the paper.

Taking into account the potential endogeneity of the financial services expansion, I rely on two stage least squares estimations to establish the empirical link between formality and financial services enlargement. The two alternative instruments used in the paper are i) the percent of the married population and ii) religiosity as measured by the proportion of the population who prays five times a day. The identifying assumptions accordingly are as follows; i) married couples are more likely to be the beneficiaries of consumer credits as well as users of credit cards, ii) Islam bans any transaction involving interest, therefore the real devoted muslims are less likely to borrow consumer credits, or use credit cards for that matter. Using these instruments, I confirm the earlier results for employment probability. As for the regional estimations of the share of formal employment, using the same instruments in two stage least squares estimations show a positive and statistically significant relationship between consumer financial services expansion and formal employment albeit with somewhat weaker first stage statistics.

And finally, I employ a unique and completely exogenous dataset, which is the regional Armenian population loss data between 1914-1917 under the hypothesis that i) Armenian population loss was a blow to financial sector development as they were the main users of financial instruments, ii) institutions are very slow to change and the population loss had permanent effects. Using the population loss as an instrument for financial development, I find similar results, however due to the time-invariant nature of the instrument as well as the limited number of observations, this instrument performs relatively poorly.

The results are encouraging, such that from a policy making perspective, countries should probably encourage financial deepening, electronization of payments

systems and use of financial products for payments in combatting with informality rather than other policy tools such as subsidies or investing a lot of resources on auditing and inspection.

1.7 References

[1] Agenor, Pierre-Richard, and Otaviano Canuto. 2012. Middle-income growth traps. *World Bank Policy Research Working Papers* No: 6210. September

[2] Aleman-Castilla, Benjamin. 2006. The effect of trade liberalization on informality and wages: evidence from Mexico. *Center for Economic Performance Discussion Papers* No: 763. December

[3] Alisveris Merkezleri ve Perakendeciler Dernegi Istatistikleri, [Online] Avaliable:
http://www.ampd.org/arastirmalar/default.aspx?SectionId=164

[4] Akam, Taner. 2006. A Shameful Act: The Armenian Genocide and the Question of Turkish Responsibility. New York: Metropolitan Books.
ISBN 0-8050-7932-7.

[5] Balakian, Peter. 2003. The Burning Tigris: The Armenian Genocide and America's Response. New York: HarperCollins.
ISBN 0-06-019840-0

[6] Bardakci, Murat. 2008. Talat Pasa'nin Evrak- i Metrukesi. Istanbul: Everest Yayinlari. ISBN : 978-9752-8956-07

[7] Bradsher, Keith. 2013. The education revolution: Chinese graduates say no thanks to factory jobs. New York Times, 24 January. [Online] Avaliable:
http://www.nytimes.com/2013/01/25/business/as-graduates-rise-in-china-office-jobs-fail-to-keep-up.html?pagewanted=all&_r=0

[8] Catao, Luis A.V., Carmen Pages, and Maria F. Rosales. 2009. Financial dependence, formal credits and informal jobs: new evidence from Brazilian household data. *Inter-American Development Bank Working Paper Series* No. IDB-WP-118. November

[9] Card-Monitor: Credit Card Habit Surveys. 2012. [Online] Avaliable:
http://www.bkm.com.tr/yayinlar.aspx

[10] Chaia, Alberto, Aparna Dalal, Tony Goland, Maria, J. Gonzalez, Jonathan Morduch and Robert Schiff. 2013. Half of the world is unbanked. In *Banking the world, empirical foundations of financial inclusion* ed. Cull Robert, Asl Demirguc-Kunt and Jonathan Morduch. MIT Press. Cambridge

[11] Dundar, Fuat. 2008. Modern Turkiye'nin Sifresi: Ittihat ve Terakki'nin Etnisite Muhendisligi (1913-1918) Istanbul: Iletisim Yayinlari. ISBN 13:978-975-05-0601-7

[12] Fugazza, Marco and Norbert Fiess. 2010. Trade liberalization and informality: new stylized facts. *UNCTAD Policy Issues in International Trade and Commodities Study Series* No.43, United Nations New York and Geneva.

[13] Goldberg, Pinelopi K., and Nina Pavcnik. 2003. The response of the informal sector to trade liberalization. *Journal of Development Economics.* Vol. 72, Issue 2. December. pp. 463-496

[14] Honohan, Patrick. 2008. Cross country variation in household access to financial services. *Journal of Banking and Finance*, Vol. 32. Issue 11. May pp. 2493-2500.

[15] Interbank Card Center Periodic Reports (2013) [Online] Avaliable: http://www.bkm.com.tr/bkm-en/periodic-data.aspx

[16] Ismihan, Mustafa and Kivilcim Metin-Ozcan. (2009) Productivity and growth in an unstable emerging market economy: the case of Turkey, 1960-2004. *Emerging Markets Finance and Trade*, M.E. Sharpe, Inc., vol. 45(5), pages 4-18, September.

[17] Kevorkian, Raymond H. and Paul B. Paboudjian. 2012. 1915 Oncesinde Osmanl Imparatorlugu'nda Ermeniler. Istanbul: Aras Yayincilik. ISBN 978-605-5753-32-0.

[18] Ngai, Rachel and Christopher Pissarides. 2008. Trends in hours and economic growth. *Review of Economic Dynamics*, Vol. 11. Issue 2. April. pp. 239-256

[19] Raghuram G. Rajan and Luigi Zingales. 1998. Financial dependence and growth. *American Economic Review* Vol. 88. Issue 3. June. pp. 559-586

[20] Saygili, Seref, Cengiz Cihan and Hasan Yurtoglu. 2005. Turkiye ekonomisinde sermaye birikimi, verimlilik ve buyume: 1972-2003. DPT Yayinlari No: 2686

[21] Sarafian, Ara. 2011. Talaat Pasha's Report On the Armenian Genocide. Gomidas Institute Studies Series. [Online] Avaliable:
www.gomidas.org/uploads/Talaat%20Pashas%20Report%20on%20the%20Armenian%20Genocide.pdf

[22] The Economist. 2013. The New Young Turks. June 8. [Online] Avaliable:
http://www.economist.com/news/briefing/21579005-protests-against-recep-tayyip-erdogan-and-his-ham-fisted-response-have-shaken-his-rule-and

[23] Ungor, Ugur Umit. 2011. The Making of Modern Turkey: Nation and State in Eastern Anatolia, 1913-1950. Oxford University Press
ISBN 978-0-19-960360-2

[24] Ungor, Ugur Umit and Mehmet Polatel. 2011. Confiscation and Destruction: The Young Turk Seizure of Armenian Propertry. Bloomsbury Publishing Group
ISBN 978-1-4411-3578-0

[25] World Bank. 2007. Turkey investment climate assessment, volume I: overview of findings and recommendations. [Online] Avaliable:
www.tepav.org.tr/upload/files/1253714309r3973.Turkey_Investment_Climate_Assessment_Vol_I.pdf
November

[26] World Bank Policy Briefs. 2009. World Bank Egypt investment climate assessment, 2009: accelerating private enterprise-led growth policy brief. [Online] Avaliable:
http://www.aucegypt.edu/research/src/Documents/Egypt_ICA_Policy_Brief.pdf

Data Appendix:

- *Consumer Credits*: provided quarterly by the Banking Regulation and Supervision Agency (BRSA) at province level. Annual figures are then aggregated at the Nuts2 level for 26 regions. Real consumer credits per capita are consumer credits deflated by regional CPI indices and divided by the regional population. Regional CPI indices are provided by the Turkish Central Bank and population figures by the Turkish Statistical Agency (Turkstat).

- *Credit Card Expenditures*: provided quarterly by the BRSA at province level. Annual figures are then aggregated at the Nuts2 level for 26 regions. Real credit card expenditures per capita are estimated as the expenditure figures deflated by regional CPI indices and divided by the regional population.

- *Number of Bank Branches*: provided quarterly by the BRSA at province level. Annual figures are then aggregated at the Nuts2 level for 26 regions. Population per bank branch equals to regional population divided by the number of branches.

- *Age*: provided as eleven age categories in 5-year intervals. Source: household labour surveys.

- *Civil Status*: takes on the value 1 if the individual is married and the couple lives together, and 0 otherwise. Source: household labour surveys.

- *Employment Location*: takes on the value 1 if the individual lives in urban areas, and 0 otherwise. Source: household labour surveys.

- *Education*: years of completed education, provided under 6 categories, namely; i) no degree, ii) primary school, iii) secondary school, iv) high school, v) vocational school and vi) higher education. Source: household labour surveys.

- *Social Security Registration*: takes on the value 1 if the individual is registered in the social security administration and 0 otherwise. Source: household labour surveys.

- *Experience*: difference between the survey year and the year individual started working. Source: household labour surveys. Industry classification: categorized under NACE Rev.1 classification for the survey year 2008 and Nace Rev.2 for 2009, 2010, 2011 and 2012. Industries include: agriculture, mining, manufacturing,

electricity, construction, transportation, trade and finance, and community, social and personal services. Source: household labour surveys.

- *Duration of the Job*: takes on the value 1 if the work is permanent and 0 otherwise. Source: household labour surveys. Firm size: measured by the number of people employed in the firm and classified under 6 categories: i) less than 10 employees, ii) 10-24, iii) 25-49, iv) 50-249, v) 250-499, and vi) 500 and more. Source: household labour surveys.

- *Age Gap*: regional average of the age of formal workers divided by the average age of informal workers. Source: household labour surveys.

- *Education Gap*: regional average of the education of formal workers divided by the average education of informal workers. Source: household labour surveys.

- *Wage Gap*: regional average of the real labour income of formal workers divided by the average labour income of informal workers. Labour incomes in the surveys are reported net of taxes. Real labour income for formal and informal workers is the nominal income deflated by regional CPI index. Source for labour income is household labour surveys and regional CPI indices are provided by the Turkish Central Bank.

- *Unemployment Rate*: provided monthly and annually by Turkstat at the regional and national level.

- *Total Electricity Consumption Per Capita*: electricity consumption per kilowatt hours is provided by the Turkstat at the regional level and includes household consumption, industrial consumption, commercial consumption, consumption for agriculture and street lights. Total electricity consumption per capita equals regional electricity consumption divided by the regional population.

- *Completed or Partially Completed Residential Buildings and Office Buildings (in square meters)*: reported to Turkstat by regional municipalities which are the responsible bodies to authorize construction permits in Turkey. Turkstat then disseminates the data at the regional level and annually.

Table 1.7: Fraction of Workers by Types in Household Surveys, 2008-2012

	Formal	Informal
Gender		
Male	80.7%	69.7%
Female	19.2%	30.3%
Marital Status		
Single	21.2%	48.9%
Married	78.8%	51.2%
Age		
15-19	2.0%	29.6%
20-24	11.6%	14.3%
25-29	18.7%	6.5%
30-34	22.6%	6.2%
35-39	17.8%	7.5%
40-44	11.9%	20.0%
45-49	7.4%	6.3%
50-54	3.6%	2.7%
55-59	3.9%	5.0%
60-65	0.5%	1.9%
Location		
Rural	17.0%	18.2%
Urban	82.9%	81.9%
Duration		
Permanent	96.3%	72.5%
Temporary	3.7%	27.5%
Firm Size		
Less than 10	43.8%	91.1%
10 to 24	9.1%	4.7%
25 to 49	17.2%	2.4%
50 to 249	18.4%	1.4%
250-449	4.7%	0.2%
500+	6.7%	0.1%
Years of Experience	7.40	5.30

Table 1.8: Logit Estimates of Formal Employment Probability-I (Marginal Effects), 2008-2012

(Conditional on being Employed)

VARIABLES	Pooled	2008	2009	2010	2011	2012
Real Consumer Credits (per capita)	0.03157***	0.02293**	0.02383**	0.03482***	0.04826***	0.02836***
	(0.00614)	(0.01093)	(0.01162)	(0.00854)	(0.00922)	(0.00853)
Unemployment Rate (%)	-0.00334***	-0.00528***	-0.00188*	-0.00259*	-0.00738***	-0.00470***
	(0.00050)	(0.00167)	(0.00102)	(0.00135)	(0.00102)	(0.00099)
Real Wage Gap	0.00326	0.00752	0.00953	-0.00557	-0.00320	0.00428
	(0.00381)	(0.00940)	(0.00629)	(0.00541)	(0.01046)	(0.01074)
Age Gap	-0.33139***	-0.29991*	-0.42573***	-0.66281***	-0.28797***	-0.17240*
	(0.07117)	(0.15860)	(0.09575)	(0.17633)	(0.10396)	(0.09799)
Education Gap	-0.10955***	-0.13468***	-0.11822***	-0.04533	-0.19182**	-0.09525**
	(0.03369)	(0.03222)	(0.04515)	(0.05849)	(0.08014)	(0.04657)
Average Years of Schooling	-0.00092	-0.00202	-0.00889	-0.00989	-0.00583	0.02663*
	(0.00991)	(0.02157)	(0.01816)	(0.01838)	(0.01994)	(0.01537)
Electricity consumption (kw, per capita)	-0.00893**	-0.00368	-0.01295**	-0.01594*	-0.01113***	-0.00513
	(0.00381)	(0.00670)	(0.00506)	(0.00842)	(0.00354)	(0.00381)
Average Number of Employees at Work	0.00458	0.01058	0.01170	-0.00129	0.04054**	0.02393
	(0.00966)	(0.01695)	(0.01482)	(0.01220)	(0.01789)	(0.02028)
Compl.Residential Buildings (m2, per cap)	-0.00528	-0.00051	0.00343	-0.01056	-0.03214***	-0.02941
	(0.00411)	(0.00639)	(0.00592)	(0.00843)	(0.01115)	(0.01858)
Compl.Office Buildings (m2, per cap)	-0.08608	-0.19259	-0.06240	-0.10616	-0.50608***	-0.08599*
	(0.05536)	(0.15374)	(0.11387)	(0.11370)	(0.14241)	(0.04606)
Experience	0.01641***	0.01794***	0.02039***	0.01824***	0.01612***	0.01186***
	(0.00149)	(0.00189)	(0.00143)	(0.00177)	(0.00182)	(0.00125)
Experience Squared	-0.00039***	-0.00042***	-0.00049***	-0.00044***	-0.00037***	-0.00027***
	(0.00005)	(0.00008)	(0.00005)	(0.00006)	(0.00007)	(0.00004)
Sex Dummy (female=1)	-0.03765***	-0.03953***	-0.04000***	-0.03530***	-0.03837***	-0.03371***
	(0.00404)	(0.00468)	(0.00569)	(0.00489)	(0.00602)	(0.00371)
Civil Status Dummy (married=1)	0.02726***	0.02847***	0.02500***	0.02544***	0.03367***	0.02491***
	(0.00322)	(0.00411)	(0.00403)	(0.00616)	(0.00433)	(0.00346)
Permanent (permanent=1)	0.10912***	0.20782***	0.12466***	0.09759***	0.09528***	0.06500***
	(0.00658)	(0.01584)	(0.00945)	(0.00609)	(0.00581)	(0.00704)
Urban Dummy (urban=1)	-0.00301	-0.00982*	0.00171	0.00409	-0.00196	-0.00500
	(0.00480)	(0.00575)	(0.00624)	(0.00736)	(0.00574)	(0.00522)
Primary School	0.06630***	0.06952***	0.09006***	0.07039***	0.07456***	0.04309***
	(0.00465)	(0.00878)	(0.01026)	(0.00457)	(0.00649)	(0.00601)
Secondary School (8 years)	0.09199***	0.09646***	0.12000***	0.09203***	0.10383***	0.06423***
	(0.00550)	(0.00853)	(0.01258)	(0.00601)	(0.00787)	(0.00620)
High School	0.14497***	0.15883***	0.17230***	0.15398***	0.15584***	0.10418***
	(0.00802)	(0.01540)	(0.01359)	(0.00928)	(0.00853)	(0.00782)
Vocational School	0.15437***	0.16897***	0.19033***	0.15307***	0.16237***	0.11543***
	(0.00959)	(0.01454)	(0.01951)	(0.00779)	(0.00967)	(0.01025)
Higher Education	0.23230***	0.24175***	0.27566***	0.24038***	0.25016***	0.17846***
	(0.01119)	(0.01605)	(0.01870)	(0.01083)	(0.01397)	(0.01324)
Age Group Dummies	YES	YES	YES	YES	YES	YES
Firm Size Dummies	YES	YES	YES	YES	YES	YES
Sectoral Dummies	YES	YES	YES	YES	YES	YES
Year Dummies	YES					
Observations	437,246	78,020	79,318	88,190	94,606	97,112

Robust and clustered (at region level) standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 1.9: Logit Estimates of Formal Employment Probability-II (Marginal Effects), 2008-2012

(Conditional on being Employed)

VARIABLES	Pooled	2008	2009	2010	2011	2012
Population Per Bank Branch	-0.03716***	-0.03478***	-0.02234*	-0.02875***	-0.05733***	-0.03450***
	(0.00664)	(0.01341)	(0.01220)	(0.00953)	(0.00712)	(0.00694)
Unemployment Rate (%)	-0.00340***	-0.00505***	-0.00149	-0.00205*	-0.00821***	-0.00478***
	(0.00049)	(0.00158)	(0.00093)	(0.00120)	(0.00092)	(0.00085)
Real Wage Gap	0.00332	0.01019	0.00986	-0.00465	-0.00257	0.00283
	(0.00390)	(0.00895)	(0.00635)	(0.00568)	(0.00847)	(0.00937)
Age Gap	-0.31618***	-0.25987*	-0.44833***	-0.68910***	-0.21964***	-0.16482**
	(0.07170)	(0.13979)	(0.09614)	(0.17998)	(0.08167)	(0.06912)
Education Gap	-0.09339***	-0.12857***	-0.12199**	-0.05102	-0.16110**	-0.06549
	(0.03323)	(0.03030)	(0.04887)	(0.06000)	(0.06736)	(0.04794)
Average Years of Schooling	0.00087	-0.00311	-0.00261	0.00088	0.00122	0.02178
	(0.00957)	(0.01915)	(0.01721)	(0.02068)	(0.01554)	(0.01471)
Electricity consumption (kw, per capita)	-0.00656*	-0.00227	-0.01315**	-0.01663**	-0.00458	-0.00188
	(0.00395)	(0.00607)	(0.00517)	(0.00845)	(0.00310)	(0.00335)
Average Number of Employees at Work	0.00376	0.01091	0.01297	0.00448	0.04238***	0.01741
	(0.00814)	(0.01524)	(0.01381)	(0.01002)	(0.01513)	(0.01591)
Compl.Residential Buildings (m2, per cap)	-0.00384	0.00148	0.00269	-0.01347	-0.03194***	-0.02136
	(0.00398)	(0.00580)	(0.00581)	(0.00871)	(0.00899)	(0.01583)
Compl.Office Buildings (m2, per cap)	-0.09106*	-0.23588	-0.04939	-0.02905	-0.57773***	-0.08437*
	(0.04802)	(0.14885)	(0.10565)	(0.12271)	(0.13959)	(0.04704)
Experience	0.01640***	0.01796***	0.02038***	0.01825***	0.01609***	0.01187***
	(0.00152)	(0.00190)	(0.00143)	(0.00176)	(0.00185)	(0.00126)
Experience Squared	-0.00039***	-0.00042***	-0.00049***	-0.00044***	-0.00037***	-0.00027***
	(0.00005)	(0.00008)	(0.00005)	(0.00006)	(0.00007)	(0.00004)
Sex Dummy (female=1)	-0.03765***	-0.03957***	-0.03996***	-0.03525***	-0.03840***	-0.03371***
	(0.00396)	(0.00470)	(0.00569)	(0.00490)	(0.00595)	(0.00361)
Civil Status Dummy (married=1)	0.02723***	0.02846***	0.02495***	0.02535***	0.03355***	0.02488***
	(0.00315)	(0.00412)	(0.00403)	(0.00616)	(0.00426)	(0.00336)
Permanent (permanent=1)	0.10916***	0.20815***	0.12484***	0.09779***	0.09502***	0.06491***
	(0.00658)	(0.01580)	(0.00939)	(0.00611)	(0.00582)	(0.00701)
Urban Dummy (urban=1)	-0.00339	-0.01037*	0.00202	0.00437	-0.00231	-0.00545
	(0.00491)	(0.00568)	(0.00638)	(0.00750)	(0.00573)	(0.00508)
Primary School	0.06619***	0.06952***	0.09022***	0.07052***	0.07416***	0.04278***
	(0.00468)	(0.00872)	(0.01028)	(0.00465)	(0.00633)	(0.00607)
Secondary School (8 years)	0.09196***	0.09658***	0.12014***	0.09210***	0.10359***	0.06400***
	(0.00553)	(0.00849)	(0.01256)	(0.00601)	(0.00770)	(0.00623)
High School	0.14495***	0.15900***	0.17235***	0.15404***	0.15556***	0.10406***
	(0.00814)	(0.01534)	(0.01357)	(0.00925)	(0.00855)	(0.00782)
Vocational School	0.15438***	0.16916***	0.19047***	0.15315***	0.16212***	0.11521***
	(0.00970)	(0.01443)	(0.01945)	(0.00784)	(0.00955)	(0.01043)
Higher Education	0.23217***	0.24181***	0.27582***	0.24049***	0.24960***	0.17812***
	(0.01120)	(0.01595)	(0.01866)	(0.01098)	(0.01382)	(0.01328)
Age Group Dummies	YES	YES	YES	YES	YES	YES
Firm Size Dummies	YES	YES	YES	YES	YES	YES
Sectoral Dummies	YES	YES	YES	YES	YES	YES
Year Dummies	YES					
Observations	437,246	78,020	79,318	88,190	94,606	97,112

Robust and clustered (at region level) standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 1.10: Logit Estimates of Formal Employment Probability by Selected Sectors (Marginal Effects), 2008-2012

(Conditional on being Employed)

VARIABLES	Manufacturing	Construction	Retail, Food & Accomodation	Transportation & Communication	Finan. Services & Admin. Support	Social Services
Real Credits (per cap., in logs)	0.01705*	0.05030*	0.12104***	0.08186***	0.01470	0.01245***
	(0.00934)	(0.03026)	(0.01612)	(0.02019)	(0.01012)	(0.00315)
Unemployment Rate (%)	-0.00347***	-0.00477*	-0.00581***	-0.00565***	-0.00195***	-0.00110***
	(0.00078)	(0.00258)	(0.00163)	(0.00164)	(0.00061)	(0.00028)
Real Wage Gap	0.00034	0.01127	0.01576*	-0.00182	-0.00096	0.00281
	(0.00563)	(0.01837)	(0.00818)	(0.01280)	(0.00371)	(0.00299)
Age Gap	-0.45481***	-1.19606***	-0.58999***	-0.26578	-0.27545***	-0.00211
	(0.09518)	(0.36289)	(0.19372)	(0.23973)	(0.07148)	(0.03132)
Education Gap	-0.12666**	-0.33816**	-0.30867***	-0.10446	0.02957	-0.04615*
	(0.04929)	(0.14786)	(0.06487)	(0.09933)	(0.02668)	(0.02570)
Average Years of Schooling	0.02184	0.09282	-0.05110**	-0.05837*	-0.00911	-0.00308
	(0.01484)	(0.06147)	(0.02213)	(0.03504)	(0.01010)	(0.00687)
Electricity consumption (kw, per capita)	-0.00394	-0.03986**	-0.02535**	0.00106	-0.01003***	-0.00241*
	(0.00509)	(0.01559)	(0.00994)	(0.01250)	(0.00385)	(0.00125)
Average Number of Employees at Work	-0.01575	-0.04684	0.04838*	-0.04374	0.01838	0.00440
	(0.01523)	(0.04032)	(0.02839)	(0.02692)	(0.01234)	(0.00450)
Compl. Residential Buildings (m2, per cap)	0.01207	-0.01253	-0.03431***	0.01723	-0.01199**	-0.00594**
	(0.00803)	(0.02820)	(0.01184)	(0.01808)	(0.00596)	(0.00286)
Compl. Office Buildings (m2, per cap)	-0.09658	-0.08599	0.04882	-0.15626	-0.03617	-0.03149
	(0.06494)	(0.30130)	(0.18473)	(0.17461)	(0.08012)	(0.03855)
Experience	0.02399***	0.03321***	0.04045***	0.01089***	0.00891***	0.00301***
	(0.00178)	(0.00306)	(0.00122)	(0.00139)	(0.00064)	(0.00061)
Experience Squared	-0.00075***	-0.00110***	-0.00123***	-0.00009	-0.00020***	-0.00005***
	(0.00006)	(0.00013)	(0.00005)	(0.00006)	(0.00003)	(0.00001)
Sex Dummy (female=1)	-0.06148***	0.10196***	0.00143	0.04649***	-0.02235***	-0.01317***
	(0.00924)	(0.02664)	(0.00862)	(0.01268)	(0.00277)	(0.00161)
Civil Status Dummy (married=1)	0.02447***	0.05908***	0.05886***	0.02237	0.01643***	0.00762***
	(0.00440)	(0.01574)	(0.00689)	(0.01731)	(0.00321)	(0.00126)
Permanent (permanent=1)	-0.11139***	-0.32997***	-0.20036***	-0.25135***	-0.05381***	-0.00924***
	(0.01060)	(0.02590)	(0.03011)	(0.01745)	(0.00758)	(0.00261)
Urban Dummy (urban=1)	-0.00516	-0.00489	0.01149*	0.00207	-0.01059***	-0.00088
	(0.00604)	(0.01606)	(0.00691)	(0.01061)	(0.00360)	(0.00405)
Education Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Age Group Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Firm Size Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes
Observations						
Observations	109,922	39,139	87,229	25,969	38,639	128,689

Robust standard errors in paranthesis

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 1.11: Two Stage Probit Estimates of Formal Employment Probability, (Marginal Effects)

Instrumented: i) Real Consumer Credits Per Capita, Columns (1) and (3)
ii) Population Per Branch, Columns (2) and (4)
Instruments: i) Percent of Married Pop. for pooled 2008-2012, Columns (1) and (2)
ii) Religiosity for 2011-2012, Columns (3) and (4)

VARIABLES	2008-2012	2008-2012	2011-2012	2011-2012
Real Consumer Credits (log, per capita)	0.04668***		0.04197**	
	(0.01142)		(0.01668)	
Population Per Branch (log)		-0.04730***		-0.05556***
		(0.01057)		(0.01784)
Unemployment Rate (%)	-0.00430***	-0.00423***	-0.00646***	-0.00705***
	(0.00064)	(0.00060)	(0.00098)	(0.00105)
Real Wage Gap	0.00577	0.00539	0.00391	0.00523
	(0.00438)	(0.00444)	(0.00942)	(0.00884)
Age Gap	-0.35177***	-0.36319***	-0.28570***	-0.24288***
	(0.09336)	(0.08884)	(0.09901)	(0.09350)
Education Gap	-0.12127***	-0.10966***	-0.16722**	-0.11149
	(0.04089)	(0.03945)	(0.07552)	(0.07612)
Average Years of Schooling	-0.00694	-0.00175	0.01475	0.01209
	(0.01268)	(0.01172)	(0.01438)	(0.01525)
Electricity consumption (kw, per capita)	-0.00832*	-0.00675	-0.00946*	-0.00300
	(0.00460)	(0.00473)	(0.00487)	(0.00601)
Average Number of Employees at Work	0.00008	0.00327	0.02908*	0.02241
	(0.01316)	(0.01066)	(0.01578)	(0.01590)
Compl. Residential Buildings (m2, per cap)	-0.00375	-0.00401	-0.03560***	-0.02887***
	(0.00670)	(0.00582)	(0.00943)	(0.01096)
Compl. Office Buildings (m2, per cap)	-0.13070*	-0.11620*	-0.14650	-0.17485*
	(0.06701)	(0.06127)	(0.09031)	(0.09636)
Experience	0.01900***	0.01899***	0.01612***	0.01613***
	(0.00164)	(0.00164)	(0.00163)	(0.00168)
Experience Squared	-0.00045***	-0.00045***	-0.00037***	-0.00037***
	(0.00006)	(0.00006)	(0.00005)	(0.00006)
Sex Dummy (female=1)	-0.04656***	-0.04644***	-0.04545***	-0.04561***
	(0.00535)	(0.00529)	(0.00565)	(0.00561)
Civil Status Dummy (couple=1)	0.03301***	0.03281***	0.03613***	0.03614***
	(0.00401)	(0.00396)	(0.00449)	(0.00436)
Permanent (permanent=1)	0.18072***	0.18107***	0.12737***	0.12699***
	(0.01351)	(0.01350)	(0.01261)	(0.01256)
Urban Dummy (urban=1)	-0.00442	-0.00420	-0.00404	-0.00511
	(0.00613)	(0.00605)	(0.00656)	(0.00626)
Education Dummies	YES	YES	YES	YES
Age Group Dummies	YES	YES	YES	YES
Firm Size Dummies	YES	YES	YES	YES
Sectoral Dummies	YES	YES	YES	YES
Year Dummies	YES	YES	YES	YES
Observations	437,246	437,246	191,718	191,718

Robust and clustered (at region level) standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 1.12: First Stage Estimations

Instrumented: i) Real Consumer Credits Per Capita Cards, Columns (1) and (3)
ii) Population Per Branch, Columns (2) and (4)
Instruments: i) Percent of Married Population for pooled 2008-2012, Columns (1) and (2)
ii) Religiosity for 2011-2012, Columns (3) and (4)

Coefficients	(1)	(2)	(3)	(4)
Percent of the married population	0.134***	-0.133***		
	(0.013)	(0.009)		
Religiousity			-1.522***	1.171***
			(0.317)	(0.397)
Wald test of exogeneity (athrho = 0)[(1)]	1.72	0.25	0.00	0.16
	(Prob>chi2 = 0.19)	(Prob>chi2 = 0.62)	(Prob>chi2 = 0.97)	(Prob>chi2 = 0.67)

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively
(1) Null hypothesis: the correlation between the errors in the probit equation and the reduced-form equation for the endogenous regressor is zero

Table 1.13: Regional Share of Hours Worked Formaly

VARIABLES	(1) Fixed Effects	(2) Fixed Effects	(3) Fixed Effects
Real Credit Card Exp. (per cap., in logs)	0.223		
	(0.960)		
Real Credits (per cap., in logs)		1.975	
		(4.515)	
Pop. Per Bank Branch (per cap, in logs)			-14.186*
			(7.635)
Unemployment (%)	-0.157	-0.154	-0.146
	(0.108)	(0.107)	(0.104)
Electricity consumption (kw, per cap.)	0.022	0.045	0.378
	(1.413)	(1.393)	(1.262)
Average Number of Employees at Work	5.083	4.906	4.155
	(2.987)	(2.902)	(3.037)
Compl. Office Buildings (m2, per cap.)	-4.129	-3.928	3.398
	(8.047)	(7.210)	(6.477)
Compl. Res. Buildings (m2, per cap.)	1.500*	1.507*	1.550**
	(0.769)	(0.739)	(0.739)
Real Wage Gap	-0.404	-0.390	-0.388
	(0.496)	(0.477)	(0.530)
Average Years of Schooling	16.167***	16.280***	16.563***
	(2.585)	(2.457)	(2.640)
Education Gap	-12.331**	-12.620**	-13.038**
	(5.392)	(5.413)	(5.187)
Age Gap	26.816*	26.640*	25.584**
	(14.240)	(14.219)	(12.285)
2009 Dummy	-3.307**	-2.394	-1.229
	(1.256)	(2.757)	(1.589)
2010 Dummy	-3.468***	-2.575	-1.882
	(1.089)	(2.495)	(1.466)
2011 Dummy	-2.818***	-2.397	-1.720
	(0.989)	(1.586)	(1.231)
2012 Dummy	-3.019***	-2.947***	-2.450***
	(0.521)	(0.564)	(0.569)
Constant	-3.841	5.115	125.547*
	(20.439)	(29.443)	(71.203)
Observations	130	130	130
R-squared	0.796	0.797	0.807
Number of clusters	26	26	26

Robust and clustered (at region level) standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 1.14: Two Stage Least Squares Estimation of Regional Formal Employment

Instrumented: i) Real Credit Card Expenditures Per Capita, Columns (1) and (4)
ii) Real Credits Per Capita, Columns (2) and (5)
iii) Population Per Branch, Columns (3) and (6)
Instruments: i) Percent of Married Population, Columns (1)-(6)
ii) Percent of Married Population and Religiosity, Columns (4)-(6)

VARIABLES	2SLS	2SLS	2SLS	2SLS	2SLS	2SLS
Real Credit Card Expenditures (per capita, in logs)	4.617**			5.727*		
	(1.992)			(3.402)		
Real Credits (per capita, in logs)		5.546**			5.875*	
		(2.199)			(3.382)	
Population Per Bank Branch (per capita, in logs)			-6.011**			-8.384**
			(2.524)			(4.255)
Unemployment (%)	-0.642***	-0.634***	-0.619***	-0.922***	-0.910***	-0.997***
	(0.189)	(0.166)	(0.172)	(0.287)	(0.249)	(0.246)
Electricity consumption (kw, per cap.)	0.044	-0.319	0.093	0.227	-0.201	0.528
	(0.925)	(0.722)	(0.896)	(1.194)	(0.993)	(1.214)
Average Number of Employees at Work	3.715	4.939**	4.933*	4.036	5.718*	5.499*
	(3.047)	(2.389)	(2.538)	(4.293)	(3.187)	(3.221)
Compl. Office Buildings (m2, per cap.)	-3.709	-6.456	-5.796	-8.931	-10.650	-13.150
	(14.787)	(13.326)	(14.096)	(14.710)	(12.909)	(15.501)
Compl. Res. Buildings (m2, per cap.)	-0.956	-1.427	-1.273	-0.892	-1.942	-1.754
	(1.530)	(1.402)	(1.487)	(2.556)	(2.220)	(2.503)
Real Wage Gap	-0.273	-0.327	-0.380	-2.070	-1.012	-1.136
	(0.706)	(0.572)	(0.630)	(1.376)	(1.324)	(1.255)
Average Years of Schooling	17.421***	14.481***	15.080***	14.764***	13.065***	12.408***
	(3.350)	(2.903)	(3.036)	(4.225)	(3.931)	(3.968)
Education Gap	-26.243***	-30.283***	-29.581***	-31.385**	-40.226***	-34.625***
	(6.339)	(4.588)	(4.498)	(15.074)	(8.849)	(10.030)
Age Gap	-19.042	-15.131	-12.967	-10.221	-1.655	5.163
	(18.617)	(17.237)	(19.709)	(21.800)	(22.306)	(23.950)
2009 Dummy	2.427	-0.628	-2.731**			
	(2.905)	(1.693)	(1.175)			
2010 Dummy	1.149	1.146	-0.835			
	(1.723)	(1.705)	(1.408)			
2011 Dummy	0.124	-0.575	-1.423			
	(1.237)	(1.102)	(1.057)			
2012 Dummy	-1.161***	-1.898***	-1.958***	-1.232	-2.154***	-2.170***
	(0.400)	(0.426)	(0.458)	(0.806)	(0.568)	(0.578)
Constant	79.425**	103.127***	125.233***	97.118***	114.036***	149.700***
	(31.505)	(26.042)	(27.437)	(34.762)	(30.533)	(35.295)
Observations	130	130	130	52	52	52
Number of clusters	26	26	26	26	26	26

Robust and clustered (at region level) standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 1.15: First Stage Statistics

	(1) Real Credit Card Exp. Per Cap.	(2) Real Credits Per Cap.	(3) Population Per Bank Branch	(4) Real Credit Card Exp. Per Cap.	(5) Real Credits Per Cap.	(6) Population Per Bank Branch
Coefficients						
Percent of the married population	0.1323***	0.1109***	-0.1023***			
	(0.0402)	(0.0237)	(0.0203)			
Religiousity				-1.1287**	-1.1004***	0.771*
				(0.5088)	(0.3508)	(0.3890)
First Stage Statistics						
F test of Excluded Instruments	10.96	21.78	25.30	5.08	9.84	3.93
Hansen J Statistic (1)	0.00	0.00	0.0			
Wu-Hausman Test of Endogeneity(1)	1.934	0.00	0.061	1.315	0.020	0.37
	pval (0.1643)	pval (0.98)	pval (0.80)	pval (0.25)	pval (0.88)	pval (0.54)
Kleibergen-Paap Wald rk/C.-D. Wald F.(2)	10.96	21.78	25.30	5.08	9.84	3.93
(Stock-Yogo Crit. Val. for 10% IV Rel.Bias)	16.38	16.38	16.38	16.38	16.38	16.38

(1) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous.
(2) Under i.i.d. errors, Cragg-Donald F stat. is reported for Stock-Yogo Weak Instruments Test whereas Kleibergen-Paap statistic are reported under clustering and robust errors.

Chapter 2

The Effect of Early Retirement Incentives on Labour Supply: Evidence from Turkey[1]

2.1 Introduction

This paper investigates whether the early retirement incentives and benefits extended to men and women during 1990s had any impact on the labour supply decisions of the individuals. The populist measures taken in 1992 by the government of the time allowed individuals to be entitled for early retirement based on four criteria; i) the year to start work, iii) number of years worked, iii) minimum age depending on the year to start work and iv) number of days for premium contributions. This retirement scheme allowed women to retire as early as when 38 years old and men to retire when 44 years old. As the social security deficits started mounting, the government undertook a pension reform in 1999 which again increased the retirement age to 58 for women and 60 for men. The 1999 reform, however did not change the entitlement and earned rights of the individuals who started their work life before 1999, and only affected those who first register to the social security system as an employee after the enforcement date of the new Law. Therefore the majority of the current working population were entitled for

[1]An earlier version this chapter was a joint work with Idil Bilgiç Alparslan in which my contribution was 70% of the total work. This version however is carried out completely by myself alone and does not include any parts that Ms. Alparslan had previously contributed.

early retirement over the years and in our sample between 2007-2010. When faced with early retirement incentives, individuals have the options of i) not to retire and not to change their labour supply behaviours, ii) to retire and receive benefit income but still supply their labour, and iii) to retire and withdrawl into inactivity. In this paper we explore how this incentive scheme affected the participation and hours supplied decisions of the men and women in Turkey whose earned pension rights were unaffected by the 1999 Pension Reform.

In testing the impact of the scheme, we use the Turkish Statistics on Income and Living Conditions (SILC) data which is European Union's survey to measure the income, poverty, social exclusion and living conditions across member countries. SILC is being conducted with similar sampling and methodology across the member countries. Turkey's statistical agency Turkstat started to conduct the SILC survey in 2006 in line with statistical harmonization procedures required for the EU candidate countries. We use the 2007-2010 panel for Turkey. SILC dataset for Turkey includes rich information on the social transfers that the individuals and households receive. The reported individual benefits in the survey consist of unemployment benefits, pension benefits, widow and orphanage benefits, old age and disability benefits, scholarships and educational benefits. The requirement for the benefits to be recorded in the survey is that they need to be received regularly and from an official institution or foundation. Transfers between households are not counted in the social benefits received under individual or household income. Turkstat reports two different total 'income' definitions for households, namely; i) total disposable household income, and ii) total disposable household income excluding all social benefits received, in addition to reporting each benefit item seperately. As will be described in detail in the coming sections, the SILC data includes information on the amount of pension benefits and pension bonuses for the individuals who are retired.

Our main line of theoretical argument is standard and straightforward. Benefits serve as non-wage income in an intertemporal optimization model where labour-leisure choice is endogenous. When workers are out of the labour force, they enjoy leisure, which they lose when they participate in the labour market. In a model with endogenous value of leisure, the leisure from inactivity depends on the parameters of their utility function and it will be an increasing function of the wealth that the individual owns. The lump sum pension bonuses contribute to the wealth of the individual and non-wage pension income has negative effect on intensive and extensive margin of the labour supplied. A key aspect for identification in our empirical analysis is that the formal retirement

(and receiving benefits and bonuses) neither inhibits individuals from participating in the labour market, nor puts a legal limit on the hours that can be worked by individuals. We are hence able to investigate the causal effect of retirement incentives on the intensive and extensive margins of labour supply.

The literature on social benefits mostly focus on the pensions and social security reforms. As most early retirement schemes around the world are introduced for men and women not before ages 60-65, the literature is rich in investigating the impact on older individuals' labour supply decisions. In that respect, Turkey stands alone in introducing retirement incentives for much younger generations earlier than 60-65 years old.

Imrohoroglu and Kitao (2010) build a model to simulate a social security reform that brings a cut of 50% in retirement benefits along with same percentage of cut in the social security payroll taxes. Their model shows that due to increased savings with life cycle and precautionary motives, capital stock increases by 10% along with an increase in the aggregate labour supply by 3%, biggest effect coming from extensive margin. Moreover, their simulations show that participation rates of workers between the ages 60 and 69 increases from 50% to 62%.

Gruber and Wise (2004) associate the decline in labour force participation rates of males in United States, United Kingdom, Belgium, Canada, Denmark, France, Germany, Italy, Netherlands, Spain, Sweden, and Japan with the social security incentive systems. They investigate the social security programs and labor market institutions in 12 countries and find that a reform that delays benefit eligibility by three years would likely reduce the proportion of men 56 to 65 out of the labor force between 23 and 36 percent. Aguila (2012) explores the role of retirement incentives in the Mexican social security system on the retirement behavior of men ages between 50 and 69 and finds that lower income employees have more incentive to opt for early retirement whereas the higher income individuals prefer to delay retirement up to the normal retirement age of 65.

A study by Brinch (2001) looks at the early retirement program that was introduced in Norway in 1998 for the 62-66 years old. Using a multinominal logit model, eligibility for 62 years old males is estimated to increase the outflow rate from employment to inactivity by 10 percentage points, and for 62 years old females by 4 percentage points. For 63 years old, the effect is similarly estimated at about 6 percentages points for males and 2.5 percentage points for females. The study then assesses the impact of abolishing the early retirement program and finds that the labour force participation among older

men (55-67) may increase to 83 percent from 72 percent by 2005.

A recent NBER paper by Dave et al (2013) explores the impact of the expansion in the Medicaid eligibility criteria for pregnant women in late 10980 and early 1990s on the labour supply in US. More specifically, the study investigates whether the expanded Medicaid eligibility is associated with movement from employed with private insurance to employed with public insurance and from not employed with private insurance to not employed with public insurance for pregnant women whose marginal utility of leisure could increase after birth resulting in *crowding out*. Dave et al. (2013) find that expansion of the eligibility was negatively associated with labour force participation and that the 20 percentage point increase in Medicaid eligibility during the sample period was associated with a 6% to 7% decrease in the probability that a woman who gave birth last year was employed. In addition, the study also finds that the 20 percentage point increase in the Medicaid eligibility reduced weekly hours worked by 10.2% to 10.5%, whereas wages were 52.5% reduced owing to the 20 percentage points increase in eligibility.

In identifying the impact of early retirement schemes, we use a regression discontinuity (RD) model where we look at the pool of individuals who satisfy the conditions outlined in the pension law except maybe for the age criteria. We create an age margin variable which measures the number of years the individual is away from the cut-off age within certain bandwidths.[2] This gives us a sample of individuals some of whom satisfied the age criterion and some did not, but this design ensures that we have a treatment and control group which consist of individuals who are randomized on age conditioning on satisfying all else criteria. However in our case, satisfying the age criteria and hence entitlement for retirement do not automatically enforce retirement and compliance is less than perfect as some individuals choose to retire while some do not after finally meeting the age criteria. This calls for a Fuzzy RD where the entitlement for retirement (which is randomized on age) is used as an instrument for actual retirement. We find that the retirement incentives lead to an average decline of about 16.9 hours in weekly hours worked by men aged 44-52 and 20.6 hours decline in weekly hours worked by women who are aged between 39-49 in a bandwidth of three years around the eligible age for

[2]As will be explained more in detail, the cut-off age is different for several cohorts depending on the year to start work. For those whose retirement conditions are subject to the pension law before the 1999 reform, the earliest age is 38 for women who started working before 1981 and it is 44 for men who started working before 1979. Cut off age goes up to 56 for those women who started working between 1998 and 1999 and to 58 for men who started the work life in the same years.

retirement. The impact is 18.6 hours decline for men and 29 hours decline for women in the bandwidth of five years around the age cut-off. Again using the the entitlement for retirement as an instrument for actual retirement, we estimate that the probability of participation in the labour force declines by about 37% for men whereas the impact is insignificant for women.

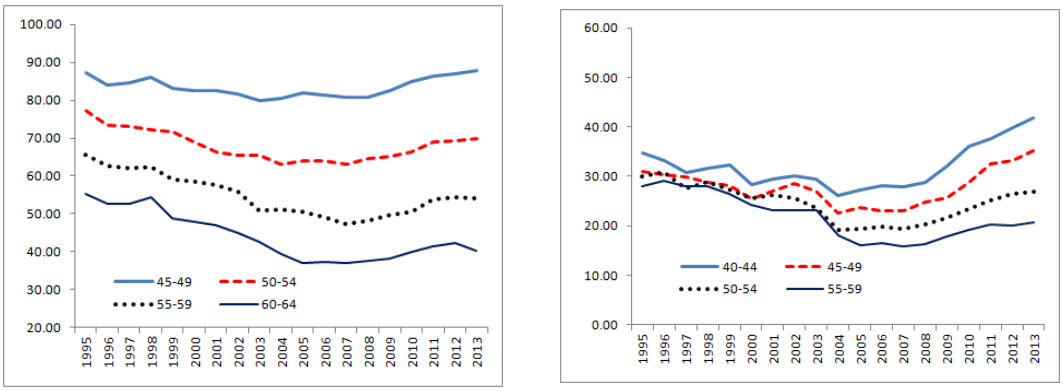
The paper is organized as follows: In Section 2, we explain the outlook of labor markets in Turkey and explain the pension system in Turkey. Section 3 gives a description of the data, explains the Fuzzy RD design and present our estimations. Final section concludes.

2.2 Background on Turkish Labour Markets and Pension Benefits in Turkey

Turkish labour force in Turkey can be characterized by two sentences; low overall participation rates and low skills. The overall participation rate between ages 15-64 was 52.4% in 2000, declined to 49.8% in 2006 and increased to 54% by the end of 2012 while the OECD average was 70.9% and EU-21 average was 72.5% by the end of 2012.[3] Gender breakdown of OECD statistics shows that female participation rate in Turkey was as low as 23.6% in 2006 and 28.7% in 2012 while for men participation rate was 66.8% in 2006 and 69.2% in 2012. Figure 2.1 shows the labour force participation of men and women between 1995 and 2013 by age cohorts. Figure clearly shows that the participation fell significantly for men and women who are between 50-64 until the mid-2000s reflecting probably the impact of early retirement incentives brought in 1992. The fall is even shaper for men between 55-65 and for women between 50-60.

In addition to the low participation problem, Turkish labour force is also highly low skilled. Education profiles of the male and female labour force are described in Table 2.1 and Table 2.2. The statistics show that about 77.3% of women and 66.9% of men in Turkey have less than 8 years of schooling. The share of women with higher educational degree in Turkey is only 8.6% while the share with university or above degree is 12.6% for men. Figures show that participation rates increase with education for both men and women, for instance the rate is 70.9% for females and 85.3% for men with higher

[3]OECD Statistics



(a) Men (b) Women

Figure 2.1: Labour Force Participation Over Time

education, while the rate is 18.6% for women and 49.3% for men with only primary school education.

Table 2.1: Education Profile of Female Labour Force

Female	Not Participating	Participating	Total
No degree	22.2%	5.1%	27.3%
Primary school (5 years)	24.9%	9.4%	34.3%
Secondary school (8 years)	12.2%	3.5%	15.7%
High school	6.1%	2.7%	8.8%
Vocational school	3.3%	2.1%	5.4%
Higher education	2.5%	6.1%	8.6%
Total	71.2%	28.8%	100.0%

Source: Own estimations using Turkish household labour survey, 2011

The benefit system in Turkey has traditionally been complicated and there are different rules for different transfers, though, major steps to centralize and simplify the benefit schemes are being taken by the Turkish government in the recent years. The main responsible government body for social transfers is the General Directorate of Social Benefits under the Ministry of Family and Social Policies in Turkey. A fund, named Social Solidarity and Aid under this directorate was established in 1986 in order to raise revenues for redistributive social transfers. Its main mandate is declared by Law 3294 as helping the disadvantaged citizens and taking measures to improve social justice, cohesion and income equality. Its revenues are raised from several taxes such as income and corporate taxes, traffic fines and are transferred to several social aid foundations to be redistributed to the citizens. According to the 2012 Annual Statistical Report of

Table 2.2: Education Profile of Male Labour Force

Male	Not Participating	Participating	Total
No degree	4.5%	4.4%	8.9%
Primary school (5 years)	8.9%	27.0%	35.8%
Secondary school (8 years)	7.9%	14.2%	22.1%
High school	3.4%	7.8%	11.2%
Vocational school	1.8%	7.6%	9.4%
Higher education	1.8%	10.7%	12.6%
Total	28.3%	71.7%	100.0%

Source: Own estimations using household labour survey, 2011

the Ministry, the share of social spending in total GDP was about 1.43%. According to the same report, 2.1 million households and 6.4 million individuals received social benefits while 70% of the beneficiaries were women and the number of individuals that were means-tested was 14.5 million. Table 2.3 shows the share of recipients of different social transfers and the share of transfers as a percent of individual income. As the table shows the recipient population for pension benefits constitute the highest proportion in the population and range between on average 77.9-79.9% of the total income of individuals.

Table 2.3: Social Transfers to Individuals between 15-65 (as a % of individual income)

Benefit Type	2007	2008	2009	2010
Unemployment Benefits	16.7	28.6	31.6	43.8
Recipients as % of population	0.7	0.7	0.5	1.1
Pension Income	79.9	78.9	77.9	78.4
Recipients as % of population	9.5	9.8	10.3	10.9
Widow and Orphan Benefits	88.4	88.0	86.9	86.7
Recipients as % of population	2.1	2.2	2.4	2.6
Disability and Old Age Benefits	47.3	48.9	50.2	58.1
Recipients as % of population	0.3	0.24	0.31	3.7
Education Benefits and Scholarships	95.6	90.5	82.4	89.4
Recipients as % of population	0.33	0.034	0.42	0.45

Source: Own estimations using SILC panel surveys 2007-2010, provided by Turkstat

Turkish pension system which operates on a pay-as-you-go (PAYG) basis went through several amendments since 1950s. The retirement age, which was 60 for both men and

women in the 1950s, was eliminated by the end of 1969 and later increased to 55 for women and 60 for men in 1985 by the Turgut Ozal government. In election campaigns of 1991, Suleyman Demirel used the pension benefit reform as a populistic promise in 1991 with the pretext that early retirement incentives would help reduce the youth unemployment problem. Once he formed a coalition government, one of the first policy measures he undertook was the amendment in retirement system. In 1992, the Law numbered 3774 was passed by the parliament and the minimum age for retirement entitlement was reduced to 38 for women and 44 for men.[4]. But as workers took advantage of the earlier retirement eligibility, the ratio of active workers to retirees began decreasing and the deficits start soaring, the government had to undertake a pension reform in 1999 which once again increased the minimum age for retirement.

For those individuals who started working before 1999; there are four requirements for male and female workers to satisfy the eligibility criteria for retirement: age criterion, contribution criterion, year to start work criterion and the minimum number of years of work criteron. Minimum years of work for male workers is 25 years and 20 years for female workers whose contributions are paid by either themselves or employers. Age criterion is minimum 44 years old for those males who are first registered in the social security system as an employee is between 1976-1979, and goes up to 60 for those males who are first registered after 1999. Minimum number of days to complete the contribution payment varies between 5000-7000 days. The minimum age of retirement is 38 for those women who are first registered in the social security system as an employee before 1981 and minimum age goes up to 58 for those who are registered in the social security system after year 1999.[5] Minimum number of days to complete the contribution payment varies between 5000-7000 days. The conditions for retirement by age are listed in Table 2.5.

According to our estimations (using population weights) the age distribution of pensioners is as follows: 2.6% are below 45 years old, 48.9% are between 45 and 55 years old and 48.3% are between 55 and 65 years old. If we look at the age distribution by gender, we see that about 9% of the female pensioners are below 45, 50% of female pensioners are between 45-55 and 41% are between 55- 65 years old. As for the males, less than 1% are below 45 years old, 49% are between 45-55 years old and 50% are between 55-65

[4]Turkish Industry and Business Association Report on Retirement Reforms in Turkey http://www.tusiad.org.tr/¨rsc/shared/file/emek.pdf and Today's Zaman Column http://www.todayszaman.com/business˙how-did-the-turkish-social-security-system-end-up-in-a-bottleneck˙139072.html

[5]http://www.sgk.gen.tr/ssk/sgk-emeklilik-sartlari.html

years old.[6]

2.3 Data and Estimation

The data used in this paper is taken from the Statistics on Income and Living Conditions (SILC) collected annually by the National Statistical Institute of Turkey. Since 2006, Survey on Income and Living Conditions is being used to determine the income distribution among households and individuals, evaluate the living conditions of people, measure the social exclusion and poverty from an income perspective and profile households. These surveys are conducted every year, providing cross-sectional and panel datasets. The panel technique used in the collection of data enables us to track individuals and households for multiple periods. 42.77% of the whole sample is followed for 4 years (between 2007 and 2010), 34.59% is followed for 3 years (between 2008 and 2010) and the remaining of the individuals are surveyed only for the last two years (2009 and 2010). In total, there are 62,619 observations in our dataset, covering the period between 2007 and 2010.

The sample is stratified and clustered where final sampling unit is household and the results are representative for Turkey. The questionnaire includes questions related to both households and individuals. Questions for the household are related to the qualities of the dwelling, environment, level of debt of the household, payments including rent, expenditure related to the dwelling, economic conditions and self-sufficiency level of the household and income at household level. Questions asked at individual level investigate the education levels, health issues, employment status, work history and income of the individuals of the household.

The reasons why we use the SILC dataset rather than the regular household labour force micro surveys which are available for more number of years are several. First, the labour force surveys are rotating panels over 18 months, however the Turkish Statistical Institute does not provide the unique identifier for the individuals and therefore we cannot utilize the panel dimension of the surveys. Second, the labour force surveys do not include information on how many years the individuals regularly and actively worked for a living. There is information on past employment history, but only for the

[6]Our sample includes individuals aged between 15-65.

one previous work experience of the individuals. Third, the surveys do not include any information on the type of benefits the individuals receive, be it pension benefits or any other type. And finally, the age variable is categorially provided in five year intervals in labour force surveys which makes it not suitable for RD design.[7]

In this section, we first investigate the impact of early retirement incentives on the intensive margin, i.e. the hours supplied by the recipients. As the standard theory shows when the benefits are not conditioned on the labour market status, hours supplied are negatively related to the benefits to wage income ratio.

Before we proceed, we acknowledge a caveat. The time span we have available for our dataset is four years and both the changes in participation rates and the change in the benefits could be driven by the specific business cycle during 2006-2010 rather than an underlying relationship between the two. There is a large literature on the cyclical properties of participation and hours worked. Empirical studies on business cycle facts show that employment in hours worked and participation rates are pro-cyclical whereas unemployment is counter-cyclical. Search and matching models show that participation rates should be indeed procyclical due to the fact that expected payoffs from participation increase as the market returns increase. On the other hand the nonhuman wealth A which increases the value of leisure does not immediately increase (Pissarides, 2000: p.174).[8] In real business cycle models with intertemporal elasticity of substitution greater than one, substitution effect outweighs the income effect after a temporary productivity shock and the agents increase the hours worked in order to take advantage of higher productivity.

In Table 2.4, we display the participation rates, average hours worked per week, unemployment rates and the real GDP growth. Years 2006, 2007 and 2010 are the years of high growth whereas 2008 and 2009 are the years of global financial crises. Table 2.3 on social benefits shows that both the average amount of benefits as a ratio of individual and household income and the percentage of recipient population have been mildly increasing or remaining constant for most benefit types during 2007-2010. We see that male participation rates show very little variability whereas female participation rates were on the rise after 2008. Although we do not have enough long term data, not to mention the lack of quarterly data to detrend and check the cross correlations

[7] Only the more recent surveys starting from 2011 provide the exact age of the survey participants.

[8] Eventually nonhuman wealth also increases by higher savings and participation rate returns to its original level

with GDP, the overall movements of participation rates does seem to show very little variation. Hours worked per week have been mildly falling but there does not seem to be significant co-movement with GDP growth. Although we acknowledge that monthly quarterly fluctuations might be damped when annualized in the survey data, over all there seems to be little change, especially with respect to labour market indicators for males except for the unemployment rate. Therefore we base our empirical analysis of the relationship between hours worked and the benefits on the assumption that neither benefits nor hours worked are driven by GDP movements.

Table 2.4: Descriptive Statistics on Hours Worked and Participation

Participation Rates	2006	2007	2008	2009	2010
Overall	46.3	46.2	46.9	47.9	48.8
Male	69.9	69.8	70.1	70.5	70.8
Female	23.6	23.6	24.5	26.0	27.6
Actual Hours Worked Per Week*					
Overall	51.3	49.2	49.7	48.4	47.3
Male	54.1	52.0	52.5	51.6	50.4
Female	43.2	41.4	41.9	40.2	39.7
Unemployment Rate	10.2	10.3	11.0	14.0	11.9
Real GDP Growth	6.9	4.7	0.7	-4.8	9.2

*Mean estimated using household labour surveys

In what follows, we start our analysis on the impact of retirement schemes. As explained in the previous sections, individuals, should their work life start before 1999, are entitled for early retirement based on four criteria; i) age, ii) the year to start work, iii) number of years worked and iv) number of days for premium contributions. This retirement scheme allowed women to retire as early as when 38 years old and men to retire when 44 years old. In SILC data, we can identify the individuals i) who have worked actively for at least the number of years stated in the retirement law, ii) who started working in the years outlined in the retirement law, and iii) whether the individuals are employed formally (if not yet retired). Using these information, we estimate the impact of early retirement on the hours worked using a regression discontinuity (RD) design based on age.

The reason why we focus only on those who are formally employed is because while we cannot identify whether the individuals completely satisfy the social security contribution criterion, the formal workers are more likely to have satisfied the condition than those

who are currently employed informally. One caveat is that in our 'eligible sample' there might be individuals who might have moved between informal and formal employment during their career path and hence might not qualify for retirement even if they satisfy all other conditions. This might lead to a bias in our estimations where the hours worked would have fallen by less due to misidentification for early retirement eligibility of some. We think, however, that this is not a systematic problem due to the facts that i) while informally employed, individuals are still allowed to pay premium contributions themselves, and ii) average years of schooling which is highly correlated with formal employment probability is significantly higher in our eligible subset as compared to Turkey population average.

Among those individuals who pass the three eligibility criteria, that is satisfying the 'year to start work' and 'minimum number of years worked' condition, and formal employment status (if not retired), we exploit the differences in hours worked between those who also satisfy the age condition and those who do not. To this aim, we generate a margin variable around the cut-off age when the individual becomes entitled for retirement. The margin variable is estimated as the difference between the age outlined in the law and the age of the individual in the given survey year, and thus the cut-off level after which the individual is entitled for pension benefits is zero. The treatment variable, which is the retirement takes on the value 1 if the individual is retired and receives pension benefits. Hence, the specification is such that the margin is negative and the retirement dummy is equal to zero before the cut-off and is positive with retirement dummy equal to 1 after the cut-off point if the individual is retired. Our aim is to look into the subset of eligible individuals around the age margin and estimate the impact of early retirement scheme on average weekly hours worked.

RD design exploits a discontinuity in the treatment to identify a causal effect where the treatment assignment, w_i is determined on the basis of a cut-off score, c, on an observed forcing variable, x_i. In our case, the forcing variable is years to retirement (measured by the difference between the current age and the age required by law) given the condition that the individual qualifies in terms of year to start work and mnimum number of years worked. The cut-off is hence, c=0 when the individual reaches the age to be qualified for retirement and pension benefits. The individuals whose age falls below the cut-off within a bandwidth are the control group ($w_i = 0$) and those whose ages are above and retired are the treatment group ($w_i = 1$). Consider the following specification:

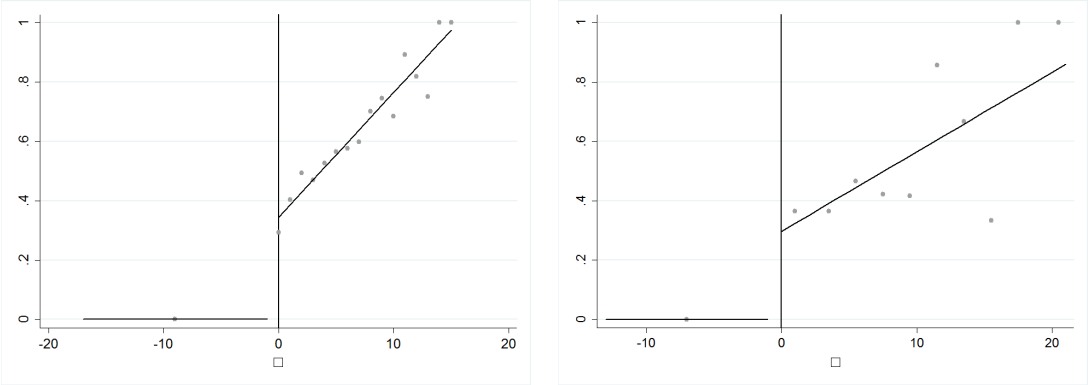
$$y_i = \beta w_i + f(x_i) + +\epsilon_i$$
$$\forall x_i \in (c-h, c+h) \tag{2.1}$$

where in our case y_i is hours worked, x_i is the forcing variable which is the age margin for retirement, w_i is the indicator function of individual i being retired at time t, and h is a neighbourhood around the cut-off c, hereby referred as the bandwidth. The control function f(x_i) is a p^{th} order polynomial of the age margin interacted with w_i on each side of c.

The problem with this specificaton, however, is that the probability of treatment after the cut-off age is not equal to one due to one-sided noncompliance. In other words, there are individuals who are assigned to receive the treatment, i.e. retirement in our case, but do not comply with their assignment. On the other hand, those who are assigned to the control group, i.e. those with negative age margins are not able to circumvent and receive the treatment. When the compliance is imperfect, the causal inference issues are analogous to the so-called *Intention-to-Treat* analysis and answers questions about the effect of assignment to treatment, rather than the receipt of treatment itself. The problem which usually arises under imperfect compliance is that if the receipt of the treatment, w_i is not unconfounded, ignoring noncompliance will lead to biased estimates of the average treatment effects (Imbens and Rubin (2009)). Less than perfect compliance calls for the 'Fuzzy RD' design where the jump in the outcome is divided by the jump in the probability of treatment at the cutoff as opposed to the sharp FD where the all the subjects assigned to the treatment group are treated. The Fuzzy RD is numerically equivalent to the IV design where the discontinuity in the probability of treatment conditional on a covariate becomes an instrument for the treatment status and the result is the so-called LATE-local average treatment effect (Angrist and Pischke, 2009: pages 250-267). Formally, the estimand is;

$$\beta_{FRD} = \frac{lim_{x\downarrow c}E[y_i|x_i = x] - lim_{x\uparrow c}E[y_i|x_i = x]}{lim_{x\downarrow c}E[w_i|x_i = x] - lim_{x\uparrow c}E[w_i|x_i = x]} \tag{2.2}$$

In the case of early retirement scheme in Turkey, we rely on Fuzzy RD design due to the fact that the compliance is less than perfect. Conditioning on having worked the minimum number of years, year to start the worklife outlined in the law and fullfiling the



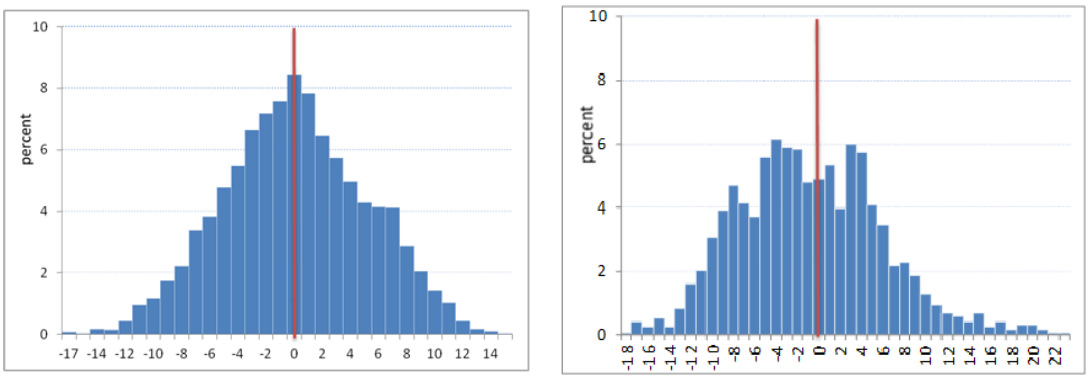
(a) Men (b) Women

Figure 2.2: Probability of Retirement

age criterion, the individuals have three options, i) do not retire, ii) retire and leave the workforce and iii) retire but still participate in the workforce. We are interested in the causal impact of retiring and receiving social security benefits on the hours worked for those individuals who chose options (ii) and (iii). Those individuals however, are very likely to be different than the ones who do not retire. Therefore the assumption of the unconfoundedness of the receipt of treatment assumption is also likely to be violated in our case. Indeed Figure 2.2 shows that at the cut-off point, the probability of retirement and receipt of social security benefits exhibit a discontinuous increase for both men and women, but the probability does not go from zero to one at the cut-off for neither men, nor women. The figures suggest that the Sharp RD design is not appropriate for estimating the treatment effect of the social security benefits.

On the other hand, assignment to treatment is random in our case because it is conditioned on the age cut-off for the individuals satisfying all else. Our case also satisfies the exclusion restriction for non-compliers which is critical for instrumental analysis. For non-compliers the effect of being entitled for retirement and social security benefits has no causal effect on hours worked. Changing the assignment for retirement has no causal impact on hours worked when the level of primary treatment w_i does not change. Fuzzy RD design using the assignment to treatment as an instrument becomes;

$$\begin{aligned} w_i &= \alpha_0 + \gamma_0 Z_i + f_1(x_i) + \epsilon_i \\ y_i &= \alpha_1 + \beta_{FRD} w_i + f_2(x_i) + \mu_i \end{aligned} \tag{2.3}$$



(a) Men (b) Women

Figure 2.3: Density of the Age Margin Around the Threshold

where w_i is the receipt of the treatment and equal to 1 if the age of the individual is greater or equal to the cut-off and the individual retired. Z_i is the assignment and equal to 1 if the age of the individual is greater or equal to the cut-off (i.e. the individual qualifies for retirement). y_i denotes the weekly hours worked. Function f1(x_i) is p$^{\text{th}}$ order polynomial of the age margin and their interactions with Z_i. Function f2(x_i) is p$^{\text{th}}$ order polynomial of the age margin and their interactions with w_i.[9]

Before estimating equation 2.3, we start with basic RD diagnostics. We first examine whether the density of the forcing variable, the age margin is continous at the discountinuity. Figure 2.3 shows the histogram of the age margin for men and women and none of them reveal any signs of manipulation around the cut-off point.[10] One of the recommended tests in every analysis involving RD is the McCrary Density Test. McCrary (2007) shows that this test is an extension of the local linear density estimator which proceeds in two steps. In the first step, one obtains a finely-gridded histogram. In the second step, one smooths the histogram using local linear regression, separately on either side of the cut off. Due to the discrete nature of the age margin data, however, we do not implement this test as local linear regressions might not perform well with discrete data.

[9] Although our dataset is a panel, Lee and Lemieux (2009; pages 61-62) suggest that including fixed effects is unnecessary for identification in RD models unlike in the more traditional settings in which the time invariant error component is correlated with the observed covariates. Authors suggest that the source of identification is a comparison between those just below and above the cut off and can be carried out with a single cross-section and imposing a specific dynamic structure introduces more restrictions without any gain in identification.

[10] Note that due to the low female participation in Turkey, the number of observations for eligible women are a quarter of that of men and the density exhibits a noiser distribution.

Next, we perform another standard check and inspect the control variables at the discontinuity that later will be included in the regressions. The covariates which are aimed to capture the socio-economic characteristics of the individuals are; i) difficulty of subsistence: a measure of whether the individuals strive to make end meets in a scale between 1-6, 1 standing for *very difficult* and 6 standing for *very easy*, ii) accomodation ownership: scaled as 1=own dwelling, 2=rented, 3=public housing and 4=other free housing, iii) civil status: shows whether the individuals are married (0=married, 1=single), iv) dependent children: a dummy variable denoting whether the individuals have at least one dependent child in the household, v) educational attainment covariates, and vi) income group dummies. Tables 2.6 and 2.7 provide summary statistics on the outcome variables and covariates for groups below and above the cut-off age.

Figures 2.4 and 2.5 represent the local averages of the covariates plotted against the age margin with regression lines fitted using 4^{th} degree polynomials.[11] In Figures 2.4 and 2.5, we do not observe any significant jumps at the treshold. The share of university graduates seems to be significantly higher at the positive side of the age margin. This could be due to the fact that it is less likely for the university graduates to satisfy the minimum years of work criterion and at the same time be relatively young to fulfill the age criteria, as they happen to start the worklife at an older age than high school graduates due to longer education. As for individuals with lower educational degrees on the other hand, they are more likely to fulfill the minimum number of years worked as they start working earlier in life, but precisely due to this reason, they might be less likely to fulfill the age criterion in comparative terms. And hence the uneven clustering of university graduates to the right of the treshold.

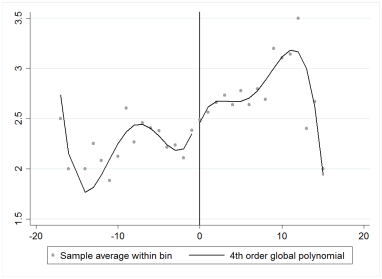
Covariate data for women, on the other hand show a noiser pattern especially for educational attainment variables. Entitlement for retirement is not linked to education, however, as in the case of men, women with university degrees might be more likely to satisfy both the age and minimum number of years worked condition, especially taking into account the fact that women who participate in the workforce are more likely to be university graduates. Moreover, women with tertiary degrees are more likely to have taken shorter maternity leaves and spells and therefore might be more likely to be over-represented on the right of the treshold.[12]. In addition to the noisy pattern in educational

[11]Number of observations fall down on both far ends of the cut-off, therefore local averages exhibit a noisy pattern at the tails.

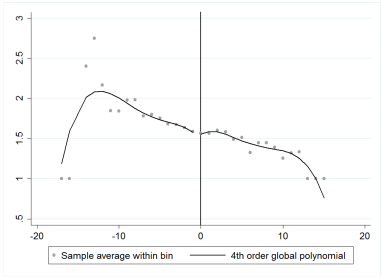
[12]Laws regulating maternity leave were changed only recently in 2013 and the leave duration was increased from 16 weeks to just 18 weeks

attainment variables, there seems to be a slight discontinuity for dependent children. Although it is another subject for research, women who would like to have another child might be more likely to retire early as compared to the women completed their fertility window. This, however would confirm the earlier concern that the unconfoundedness assumption with respect to treatment might be violated. This provides another reason to rely on Fuzzy RD/IV design for the case of early retirement.

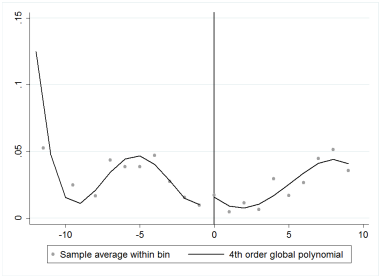
Before we move to present the results of the Fuzzy RD/2SLS estimations, we show a graphical illustration of the relationship between the social security benefits and hours worked in Figure 2.6. For both men and women, we plot the local averages of the weekly hours worked against the age margin under two alternative fitted regression lines. In all four panels, we see a decrease in the hours worked for both men and women to the right of the cut-off, however, the initial discontinuous jump does not indicate a dramatic behavioural change. The graphical evidence provides further support for the Fuzzy RD design where the receipt of the treatment is treated as endogenous and needs to be instrumented.



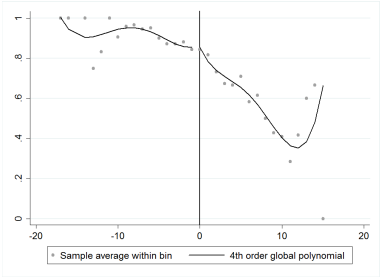
(a) Difficulty of Subsistence



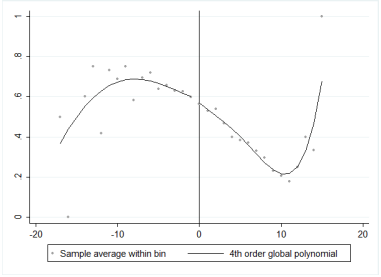
(b) Accomodation Type



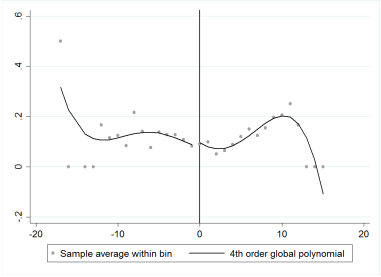
(c) Civil Status



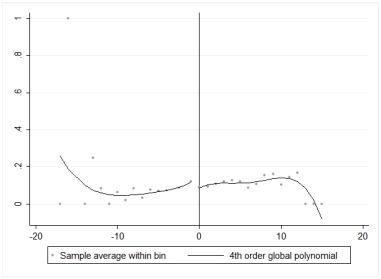
(d) Having Dependent Children



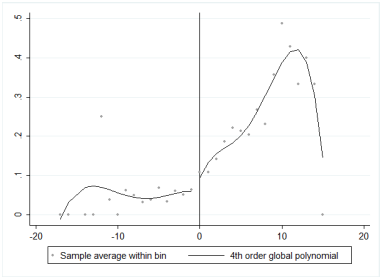
(e) Primary School Graduates



(f) Secondary School Graduates



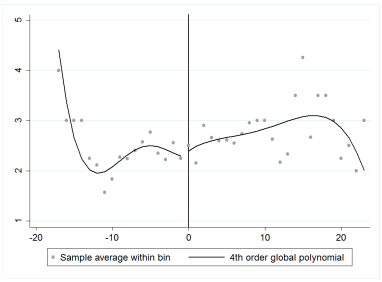
(g) High School Graduates



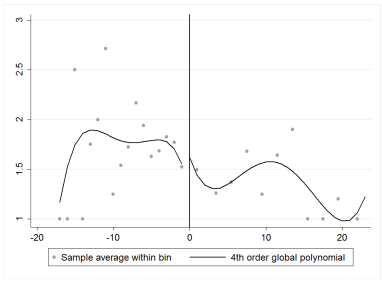
(h) University Graduates

Figure 2.4: Covariate Checks for Men Around Age Margin

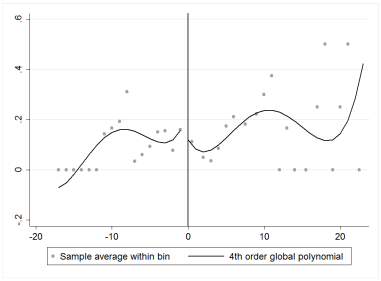
Note: The panels refer to the sample means of following covariates on each side of the treshold: i) Difficulty of subsistence is a measure of whether the individuals strive to make end meets in a scale between 1-6, 1 standing for *very difficult* and 6 standing for *very easy*, ii) Accomodation ownership is a measure of whether the individuals own the dwelling. It's scaled as 1=own dwelling, 2=rented, 3=public housing and 4=other free housing. iii) Civil status shows whether the individuals are married (0=married, 1=single). iv) Dependent children is a dummy variable denoting whether the individuals have at least one dependent child in the household, v) the rest are educational attainment covariates.



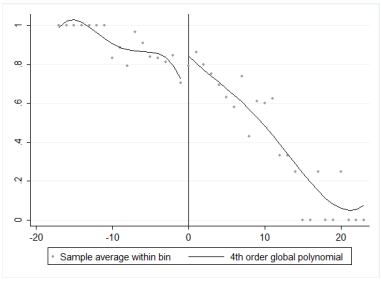
(a) Difficulty of Subsistence



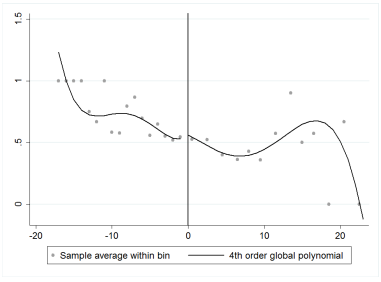
(b) Accomodation Type



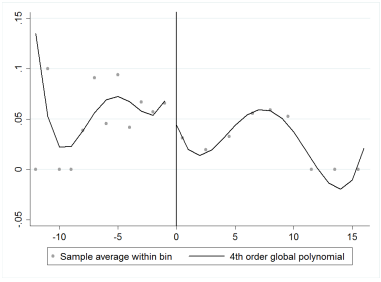
(c) Civil Status



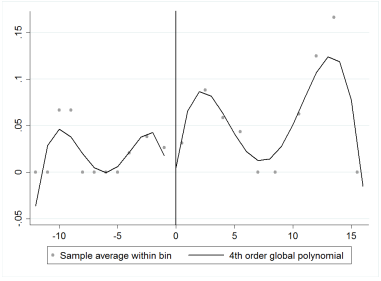
(d) Having Dependent Children



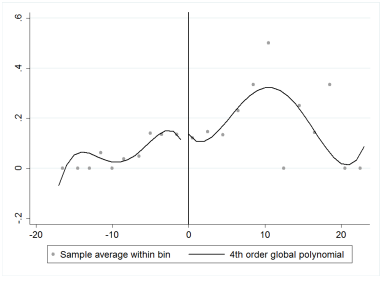
(e) Primary School Graduates



(f) Secondary School Graduates



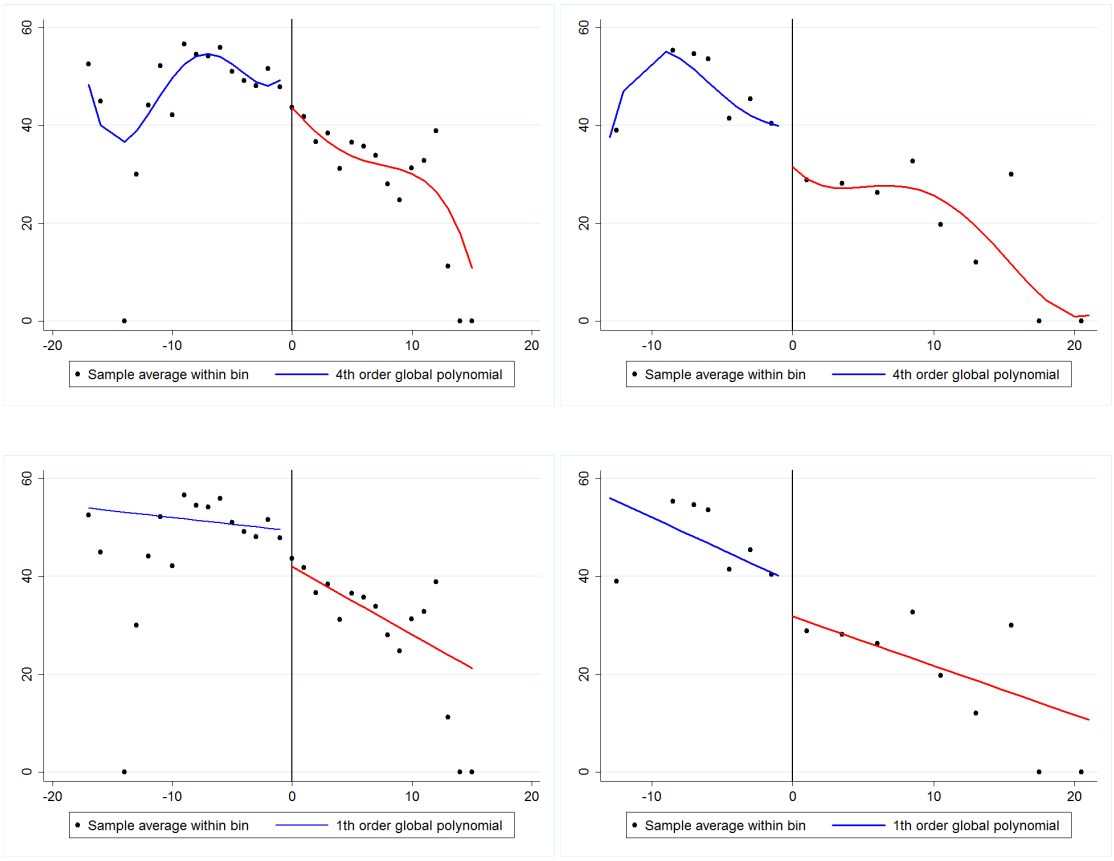
(g) High School Graduates



(h) University Graduates

Figure 2.5: Covariate Checks for Women Around Age Margin

Note: The panels refer to the sample means of following covariates on each side of the treshold: i) Difficulty of subsistence is a measure of whether the individuals strive to make end meets in a scale between 1-6, 1 standing for *very difficult* and 6 standing for *very easy*, ii) Accomodation ownership is a measure of whether the individuals own the dwelling. It's scaled as 1=own dwelling, 2=rented, 3=public housing and 4=other free housing. iii) Civil status shows whether the individuals are married (0=married, 1=single). iv) Dependent children is a dummy variable denoting whether the individuals have at least one dependent child in the household, v) the rest are educational attainment covariates.



(a) Men (b) Women

Figure 2.6: Average Weekly Hours Worked Around Age Margin

Note: The graphs show evenly-spaced binned sample means for the weekly hours worked on each side of the threshold. The solid lines represent the predicted values based on a fourth order (in the top panel) and first order polynomial (bottom panel).

Lee and Card (2008) show that when the forcing variable has discrete support (as in our case), the conditions for non-parametric or semi-parametric methods are not satisfied and the treatment effect is not non-parametrically identified. They suggest that parametric specifications with clustering on the forcing variable will yield consistent estimates of the treatment. In our regressions below, we follow the recommendation of both Lee and Card (2008) and cluster on the the age margin. Gelman and Imbens (2014) suggest that high-order polynomial regressions have poor properties and argue that they should not be used in regression discontinuity designs due to the facts that i) results are

sensitive to the order of the polynomial, ii) there are no good proven method for choosing the order of the polynomial, iii) inference based on higher order polynomials are often poor, and iv) high-order polynomial regressions often lead to confidence intervals that fail to include zero with probability substantially higher than the nominal Type 1 error rate. Gelman and Imbens (2014) hence recommend using estimators based on local linear or quadratic polynomials or other smooth functions. We follow the advise by Gelman and Imbens (2014) and use linear and qudratic polynomials.[13]

Imbens and Kalyanaraman (2009) propose an algorithm to find an optimal bandwidth, as there is a trade off between bias and efficiency, i.e., setting a high h could result in high bias whereas low h might lead to noisy estimates.[14] In our case however, the data is discrete and bins are not continuous. Angrist and Pischke (2009) recommend restricting the sample to points near the discontinuity and then get rid of most or all the polynomial controls in parametric 2SLS set ups.[15]. We therefore estimate equation 2.1 under alternative bandwidths of ± 10, ± 5 and ± 3.

The results are presented in Tables 2.8 and 2.9. Using the entire sample of eligible individuals, we find that the impact of early retirement entitlement is 22 decline hours for men and 17 hours for women. Specification with quadratic polynomial reduces the hours almost by half, but at the same time reduces R^2 by almost a quarter for men. As for women, the hours work declines by 13, which is close to the linear specification but insignificant. However, the R^2 is negative, a sign of very poor fit. When we restrict the sample around the bandwidth of ± 10 local average treatment effect of retirement is estimated as 18.9 hours decline for men and 19.1 hours decline for women. As in the case of full sample, quadratic specification reduces the decline in hours worked to 12.6 from 18.3 for men but increases it to 31.8 hours from 19.1 for women. Restricting the sample further around the bandwidths of ± 5 and ± 3 yields very similar estimations of the effect at 17-18 hours for men. For women, on the other impact differs significantly depending on the bandwidth chosen. Local average treatment effect on hours worked is estimated as a decline of 29 hours for sub-sample in bandwidth ± 5 and 20.6 hours

[13] In all our regressions the Akaike Information Criterion favors linear specification over quadratic, cubic and quartic polynomials.

[14] One recommended way in the literature to deal with bias is to add more polynomial and interaction terms than needed and explore how the RD estimates are robust to the inclusion of higher order polynomials (Lee and Lemieux, 2009; page 39).

[15] Angrist and Pischke (2009; page 263) suggest that 2SLS estimates in discontinuity samples with few controls will be broadly consistent with the more precise estimates constructed using the larger sample.

decline for bandwidth ±3, therefore the results are less conclusive.

What do these figures mean economically? We make a very simple back-of-the-envelope estimation. Turkstat provides annual total hours worked in the economy while the Social Security Institution (SSI) provides the number of pensioners by years and by age.[16] Within 3 year age margin bandwidth, our sub-sample includes men aged between 36-57 and women of ages between 36-55 while the local average treatment effect is estimated as 16.9 and 20.6 hours decline in weekly hours worked. Taking into consideration the fact that minimum retirement age for men is 44 and for women 38, and hence looking at the number of male retirees aged between 44-57 and 38-55 for women, we estimate the loss in total hours worked for those sub-groups. Our simple and static calculation shows that the loss in annual total hours worked was 2.1% in 2007, 1.9% in 2008, 1.8% in 2009 and 1.3% in 2010. If we expand the bandwidth of age margin to 10 years and use the estimations of 18.9 and 19.1 hours decline for men and women, the static total loss in annual hours is 3.1% for 2007, 2.7% for 2008, 2.7% for 2009, and 2.1% for 2010.[17]

Early Retirement Eligibility and Labour Force Participation

In the previous section, we looked at the decline in the hours supplied by the labour force who were within the window of eligibility for retirement between 2007-2010. The analysis above did not rule out the fact that individuals can still supply their labour while being a retiree and receiving pension benefits. In this sub-section, we investigate how the eligibility and actual retirement affects participation decision in the labour force and how the likelyhood of participation changes when individuals retire at an age much earlier than 65. As in the previous section, we focus only on the same individuals who meet the criteria for retirement because our purpose is not to explore the determinants of overall participation but the change in the participation behaviour due to retirement eligibility. As before we have a sub-sample of individuals all of whom fulfill the minimum number of years worked and started working within the years outlined in the law. Again as before, some of the individuals fulfill the minimum age condition and some do not and this provides us with a sample of individuals randomized on age.

We first run OLS with fixed effects utilizing the panel dimension of our data set

[16] Our estimation of the number of retirees using the population weights are consistent with SSI figures.

[17] Since this estimation does not take into account any dynamic trajectories in hours worked and since it excludes the population aged between 57-65 for men and 55-65 for women, it represents a lower bound for the loss in total hours.

to establish the relationship between the retirement and participation decisions. Our dependent variable is a dummy variable that takes on the value one if the individual who participates in the labour force and zero if the individual is inactive. We run three different specifications; in the first one we use the entitlement dummy (i.e. if the individual satisfies the age criterion in addition to the others), in the second one we use retirement dummy, and in the third specification we use shares of pension benefits and pension bonuses in total income as independent variables. The reasoning for the first specification is that in a way we would like to test whether entitlement has indeed no direct impact on participation decision other than its impact through retirement. In all specifications, we use the same control variables as before.

The estimations are summarized in Table 2.10. As expected, in the first set of specifications for men and women, once conditioned on age margin entitlement has no direct impact on the labour force participation decision. The coefficients for both men and women are insignificant albeit with the correct sign. In columns (3) and (4) we investigate the impact of actual retirement on participation decisions for men and women. Our estimations show that the probability of participation falls by 28.6% on average for men who retire at an earlier age than 65. On the other hand, the impact is insignificant for women alhough it has the expected sign. And in the last specification, instead of using the retirement dummy as the explanatory variable, we use the shares of pension benefits in total income of the individual and the share of pension bonuses to explore how much the probability of participation changes when pension-related benefits increase as a share. We find that for men, a percentage point increase in the benefit to total income reduces the participation by 0.4% while a percentage point increase in share of bonuses reduce the participation by 0.5%. The figures mean that a 10%point increases in both types of benefits would reduce the probability of participaton about 9% on average all together. However, as in the earlier specification, the coefficients of pension benefits are insignificant for women.

The estimations show significant reduction in the probability of employment for men however the results would be biased if the decision to retire are correlated with the error term. Indeed, there could be reasons not captured by the data why some individuals chose to retire at a productive age and why some others do not. So as in the previous section, we use the entitlement as an instrument for the decision to retire and estimate the impact on labour force participation by two stage least squares.

Table 2.11 summarizes the results of two stage least squares estimations for men

and women. We instrument the retirement dummy with entitlement dummy and the interaction of the age margin with retirement is instrumented with the interaction of age margin with entitlement. In the first stage of estimations for men both F statistics are higher than the rule of thumb 10 and the coefficients of the instruments are highly significantly with expected signs. Using the entitlement dummy as an instrument for retirement, we find that retirement reduces the probability of labour force participation as much as 37.8% for men, which is not a negligible decline. Moreover, once the individual retires, the probability of participation further falls by about 2.6% each year as the individual ages. On the other hand, as in the case of OLS, the estimations for women are insignificant and the first stage statistics are quite weak both in terms of the F statistics and instrument coefficient significance. The inconclusive results for women could be due to the fact that the participation of women is already very low and therefore looking at a small subset of women who meets the retirement criteria results in noisy estimates. Moreover, cultural perception diversity for women's role in economic life across diffent parts of Turkey and the fertility decisions of women might be complicating participation decisions, which we might not be able to capture although we use several controls and fixed effects in our analysis. In Turkey, labour force participation of women is high only among university graduates and those women are more likely to be over represented in our sample of women who meet retirement criteria.[18] The university graduates on the other hand might have more ambitious career plans reflecting different work-leisure preferences and therefore might not be tempted for inactivity due to early retirement incentives.

2.4 Conclusion

In this study, we investigate the impact of an early retirement law that was passed in 1992 on the labour supply decisons of the individuals in Turkey. The early retirement scheme brought incentives to retire as early as at 38 years old for women and 44 years old for men when the individual satisfies the minimum years of work, the year to start work and premium contribution conditions. The Retirement Law was reformed in 1999 and minimum age was increased again but the reform did not affect those individuals who started working before 1999. In order to estimate the impact of the early retirement incentives, we use the Statistics on Income and Living Conditions (SILC) panel data

[18]Indeed the share of university graduates is about 50% in our sample.

between 2007-2010 which includes rich information on the labour force history of the individuals as well as on different income sources such as social benefits and pension related income.

In establishing the causal impact, we use a Regression Discontinuity design in which among the individuals who pass the three eligibility criteria, that is satisfying the 'year to start work' and 'minimum number of years worked' condition, and formal employment status (if not retired), we exploit the differences in hours worked between those who also satisfy the age condition and are retired with those who do not meet the age condition. Our aim is to look into the subset of eligible individuals divided into control and treatment groups around the age margin and estimate the impact of early retirement scheme on average weekly hours worked. However, once the individual passes cut-off age, he/she might not opt for retirement and hence the compliance is imperfect in our case in contrast to the Sharp RD design. Imperfect compliance calls for the Fuzzy RD in which eligibility for retirement (which is randomized on age) is used as an instrument for actual retirement.

We find that the local average treatment effect of the early retirement scheme is about 16.9 hours decline in the weekly hours worked by men aged 44-52 and 20.6 hours decline in weekly hours worked by women who are aged between 39-49 in a bandwidth of three years around the cut-off age for retirement. Moreover, we find that the entitlement for retirement after 44 years old reduced the probability of labour force participation of men by about 28% to 37% in the course of 2007-2010 while we did not find a statistically meaningful impact on the participation decisions of women. Our findings in this paper are consistent with other findings in the literature such as Gruber and Wise (2004) and Aguila (2012) where early retirement incentives are shown to significantly distort the labour supply decisions on individuals.

2.5 References

[1] E. Aguila. 2012. Male Labor Force Participation and Social Security in Mexico. *Rand Working Papers*, (910)

[2] J. D. Angrist and J.-S. Pischke. 2009. *Mostly Harmless Econometrics*. Princeton University Press.

[3] Y. S. Baskaya and T. Hulagu. Informal-Formal Worker Wage Gap in Turkey: Evidence From a Semi-Parametric Approach. 2011. *Central Bank of the Republic of Turkey Working Paper*, (11/15).

[4] N. Bowers, A. Sonnet, and L. Bardone. 1999. Giving Young People a Good Start: The Experience of OECD Countries. Technical report, OECD.

[5] C. Brinch. Labour Supply Effects of An Early Retirement Programme. 2001. *CESifo Working Paper*, (463).

[6] M. Caliendo and S. Kopeinig. 2005. Some Practical Guidance for the Implementation of Propensity Score Matching. *IZA Discussion Paper Series*, (1588).

[7] F. Canova. Detrending and Business Cycle Facts. 1998. *Journal of Monetary Economics*, 41:476-512.

[8] S. Chatterjee and S. J. Turnovsky. 2013. Foreign Aid and Economic Growth: The Role of Flexible Labor Supply. *NBER Working Paper*, (19161).

[9] D. M. Dave, S. L. Decker, R. Kaestner, and K. I. Simon. 2013. The Effect of Medicaid Expansions in the Late 1980s and Early 1990s on the Labor Supply of Pregnant Women. *NBER Working Paper*, (19161).

[10] E. Fabrizi, M. R. Ferrante, and S. Pacei. 2013. A Micro-Econometric Analysis of the Anti- Poverty Effect of Social Cash Transfers in Italy. *Review of Income and Wealth*, (12048).

[11] H. S. Farber and R. G. Valletta. 2013. Do Extended Unemployment Benefits Lengthen Un employment Spells? Evidence from Recent Cycles in the U.S. Labor

Market. *Federal Reserve Bank of San Francisco Working Paper Series*, (09).

[12] A. Gelman and G. Imbens. 2014. Why Higher-Order Polynomials Should Not Be Used In Regression Discontinuity Designs. *NBER Working Paper*, (20405).

[13] J. Gruber and D. A. Wise. 2004. Social Security Programs and Retirement Around the World: Micro-Estimation. *NBER Working Paper*, (9407).

[14] G. D. Hansen. 1993. The Cyclical and Secular Behaviour of the Labour Input: Comparing Efficiency Units and Hours Worked. *Journal of Applied Econometrics*, 8:780.

[15] G. Imbens and K. Kalyanaraman. 2009. Optimal Bandwidth Chioce for the Regression Discontinuity Estimator. *NBER Working Paper*, (14726).

[16] G. Imbens and D. Rubin. Causal 2009. Inference in Statistics and the Social Sciences. Manuscript.

[17] S. Imrohoroglu and S. Kitao. 2010. Social Security, Benefit Claiming, and Labor Force Participation: A Quantitative General Equilibrium Approach. *Federal Reserve Bank of New York Staff Reports*, (436).

[18] S. Imrohoroglu and S. Kitao. 2012. Social Security Reforms: Benefit Claiming, Labor Force Participation, and Long-Run Sustainability. *American Economic Journal: Macroeconomics*, 4(3):96-127.

[19] D. S. Lee and D. Card. 2008. Regression Discontinuity Inference with Specification Error. *Journal of Econometrics*, 142:655-674.

[20] D. S. Lee and T. Lemieux. 2009. Regression Discontinuity Design in Economics. *NBER Working Paper*, (14723).

[21] D. S. Lee and T. Lemieux. 2012. Regression Discontinuity Design in Economics. *Review of Economic Studies*, 79:933-959.

[22] J. McCrary. 2007. Manipulation of the Running Variable in the Regression Discontinuity Design: A Density Test. *NBER Technical Working Paper*, (334).

[23] C. A. Pissarides. 1976. Job Search and Participation. *Economica*, 43:333-349.

[24] C. A. Pissarides. 2000. *Equilibrium Unemployment Theory.* The MIT Press.

[25] P. R. Rosenbaum and D. B. Rubin. 1983. The Central Role of Propensity Score in Observa tional Studies for Causal Effects. *Biometrika*, 70:41-55.

[26] P. R. Rosenbaum and D. B. Rubin. 1984. Reducing Bias in Observational Studies Using Subclassification on the Propensity Score. *Journal of American Statistical Association*, 79:516-524.

Table 2.5: Criteria for Entitlement for Retirement

Men			Women		
Minimum Number of Years Worked	Minimum Age	Registry Year in Social Security System	Minimum Number of Years Worked	Minimum Age	Registry Year in Social Security System
25	44	1976-1979	20	38	-1981
25	45	1979-1980	20	40	1981-1984
25	46	1980-1982	20	41	1984-1985
25	47	1982-1983	20	42	1985-1986
25	48	1983-1985	20	43	1986-1987
25	49	1985-1986	20	44	1987-1988
25	50	1986-1988	20	45	1988-1989
25	51	1988-1989	20	46	1989-1990
25	52	1989-1991	20	47	1990-1991
25	53	1991-1992	20	48	1991-1992
25	54	1992-1994	20	49	1992-1993
25	55	1994-1995	20	50	1993-1994
25	56	1995-1997	20	51	1994-1995
25	57	1997-1998	20	52	1995-1996
25	58	1998-1999	20	53	1996-1997
.	.	.	20	54	1997-1998
.	.	.	20	55	1998-1999

Source: Social Security Institution. http://www.sgk.gen.tr/ssk/sgk-emeklilik-sartlari.html

Table 2.6: Summary Statistics-I

	Men			Women		
	Below Cut-off Mean (S.D.) (1)	Above Cut-off Mean (S.D.) (2)	Difference Mean (S.D.) (1)-(2)	Below Cut-off Mean (S.D.) (1)	Above Cut-off Mean (S.D.) (1)	Difference Mean (S.D.) (1)-(2)
Main outcome variables						
Weekly hours worked	50.5	36.4	14.1***	43.8	26.5	17.3***
	(0.76)	(0.77)	(1.13)	(1.44)	(1.69)	(2.5)
Labour force participation	1	0.84	0.24***	1	0.68	0.32***
	(0)	(0.01)	(0.02)	(0)	(0.36)	(0.05)
Covariates						
Difficulty of subsistence	2.5	2.8	-0.3***	2.7	3.1	-0.4**
	(0.04)	(0.04)	(1.05)	(0.13)	(0.10)	(0.16)
Share with dependent children	0.89	0.66	0.23***	0.75	0.58	0.17***
	(0.01)	(0.01)	(0.02)	(0.04)	(0.04)	(0.06)
Share who are single	0.02	0.02	0.01	0.02	0.02	0.01
	(0.01)	(0.00)	(0.01)	(0.01)	(0.00)	(0.01)
Accomodation Ownership	1.73	1.48	0.25***	1.74	1.44	0.30**
	(0.04)	(0.03)	(0.04)	(0.11)	(0.07)	(0.12)
Share with primary school degree	0.57	0.38	0.19***	0.32	0.17	0.13**
	(0.02)	(0.01)	(0.02)	(0.05)	(0.03)	(0.05)
Share with secondary school degree	0.13	0.12	0.01	0.06	0.05	0.01
	(0.02)	(0.01)	(0.02)	(0.03)	(0.02)	(0.03)
Share with high school degree	0.10	0.13	-0.03**	0.11	0.15	-0.05
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.04)
Share with university degree	0.08	0.23	-0.15***	0.42	0.48	-0.06
	(0.01)	(0.01)	(0.02)	(0.05)	(0.04)	(0.06)
Observations	794	1211	2005	95	167	262

Table 2.7: Summary Statistics-II

	Men			Women		
	Below Cut-off Mean (S.D.) (1)	Above Cut-off Mean (S.D.) (2)	Difference Mean (S.D.) (1)-(2)	Below Cut-off Mean (S.D.) (1)	Above Cut-off Mean (S.D.) (1)	Difference Mean (S.D.) (1)-(2)
Income less than 10,000 TL	0.15	0.05	0.10***	0.11	0.01	0.10***
	(0.05)	(0.01)	(0.01)	(0.03)	(0.01)	(0.03)
Income: 10,000-19,999 TL	0.40	0.30	0.10***	0.18	0.16	0.02
	(0.02)	(0.01)	(0.02)	(0.04)	(0.03)	(0.03)
Income: 20,000-29,000 TL	0.26	0.27	-0.01	0.24	0.23	0.01
	(0.02)	(0.01)	(0.02)	(0.04)	(0.03)	(0.05)
Income: 30,000-39,999 TL	0.08	0.16	-0.08***	0.20	0.17	0.03
	(0.01)	(0.01)	(0.02)	(0.04)	(0.03)	(0.05)
Income: 40,000-49,000 TL	0.04	0.08	-0.04***	0.10	0.14	-0.04
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.04)
Income: 50,000-59,999 TL	0.02	0.04	-0.02**	0.04	0.12	-0.08**
	(0.01)	(0.01)	(0.01)	(0.03)	(0.03)	(0.04)
Income: 60,000-69,999 TL	0.01	0.02	-0.01	0.02	0.02	0.00
	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)	(0.02)
Income: 70,000-79,999 TL	0.00	0.01	-0.01	0.02	0.05	-0.03
	(0.00)	(0.00)	(0.00)	(0.01)	(0.03)	(0.03)
Income: 80,000-89,999 TL	0.00	0.01	-0.01**	0.01	0.01	0.00
	(0.00)	(0.00)	(0.00)	(0.01)	(0.01)	(0.01)
Income: 90,000-99,999 TL	0.00	0.01	-0.01	0.01	0.01	0.00
	(0.00)	(0.01)	(0.01)	(0.01)	(0.01)	(0.01)
Income: greater than 100,000 TL	0.01	0.01	-0.00	0.03	0.03	0.00
	(0.00)	(0.00)	(0.00)	(0.02)	(0.01)	(0.02)
Observations	794	1211	2005	95	167	262

Table 2.8: Fuzzy RD Estimates of the Impact of Entitlement for Retirement on Hours Worked, Men

	Full Sample		Discontinuity Sample			
			±10		±5	±3
	Linear	Quadratic	Linear	Quadratic	Linear	Linear
	(1)	(2)	(3)	(4)	(5)	(6)
Mean Hours	41.9	41.9	42.1	42.1	43	43.7
Pensioner	-22.599***	-13.843**	-18.906***	-13.800**	-18.557**	-16.889*
	(4.978)	(5.755)	(5.385)	(6.692)	(7.270)	(8.895)
Age Margin	-0.177	-1.473**	-0.437	-1.352	-0.407	-0.478
	(0.272)	(0.633)	(0.338)	(1.165)	(0.455)	(1.082)
Pensioner*Age Margin	-0.123	1.856	-0.193	1.343	-0.854	-0.684
	(0.347)	(1.545)	(0.330)	(2.723)	(0.886)	(1.317)
Margin^2		-0.113**		-0.094		
		(0.057)		(0.137)		
Pensioner*Age Margin^2		0.068		0.068		
		(0.087)		(0.167)		
Observations	2,005	2,005	1,931	1,931	1,372	979
R-squared	0.213	0.163	0.216	0.179	0.200	0.184

Notes:

(1) Robust and clustered standard errors as recommended by Lee and Card (2008) are in parentheses.

(2)The control variables in all columns are educational dummies, a measure of difficulty of subsistance, civil status, existence of dependent children, accomodation ownership, income group and year dummies.

(3) Akaike Information Criterion favors linear specifications over higher degree polynomials.

(4) The entire sample of men are between 34-61 years old; for bandwidth=10 the sample includes men aged between 36-57; for bandwidth=5, 40-53; and for bandwidth=3, sample includes men of age between 42-52.

Table 2.9: Fuzzy RD Estimates of the Impact of Entitlement for Retirement on Hours Worked, Women

	Full Sample		Discontinuity Sample			
			±10		±5	±3
	Linear	Quadratic	Linear	Quadratic	Linear	Linear
	(1)	(2)	(3)	(4)	(5)	(6)
Mean Hours	32.8	32.8	34.2	34.2	34.1	34.6
Pensioner	-15.991*	-13.158	-19.106***	-24.789	-29.008***	-20.635***
	(9.704)	(12.271)	(5.331)	(16.233)	(5.425)	(6.279)
Age Margin	-1.386**	-2.864***	-1.975***	-0.988	-0.723**	-2.990***
	(0.574)	(0.915)	(0.293)	(1.745)	(0.345)	(0.804)
Pensioner*Age Margin	0.574	8.293**	4.383***	1.500	0.580	8.060*
	(0.540)	(4.231)	(1.322)	(2.571)	(1.160)	(4.265)
Margin^2		-0.116*		0.124		
		(0.066)		(0.210)		
Pensioner*Age Margin^2		-0.217		-0.213		
		(0.163)		(0.628)		
Observations	262	262	242	242	182	118
R-squared	0.501	-0.264	0.219	0.581	0.597	0.426

Notes:

(1) Robust and clustered standard errors as recommended by Lee and Card (2008) are in parentheses.

(2)The control variables in all columns are educational dummies, a measure of difficulty of subsistance, civil status, existence of dependent children, accomodation ownership, income group and year dummies.

(3) Akaike Information Criterion favors linear specifications over higher degree polynomials.

(4) The entire sample of women are between 34-61 years old; for bandwidth=10 the sample includes women aged between 36-55; for bandwidth=5, 37-49; and for bandwidth=3, sample includes women of age between 39-49.

Table 2.10: Entitlement for Retirement And Labour Force Participation

	OLS Men (1)	OLS Women (2)	OLS Men (3)	OLS Women (4)	OLS Men (5)	OLS Women (6)
Age Margin	0.020	-0.003	0.001	0.008	-0.015	0.017*
	(0.018)	(0.009)	(0.016)	(0.006)	(0.011)	(0.009)
Entitlement Dummy	-0.024	-0.011				
	(0.017)	(0.015)				
Age Margin*Entitlement	-0.032***	0.021				
	(0.009)	(0.015)				
Retirement Dummy			-0.286***	-0.097		
			(0.080)	(0.070)		
Age Margin*Retirement			-0.014	0.017		
			(0.010)	(0.015)		
Share of Pension Benefits in Total Income					-0.004***	-0.001
					(0.001)	(0.001)
Share of Pension Bonus in Total Income					-0.005***	-0.001
					(0.001)	(0.001)
Individual Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year Effects	Yes	Yes	Yes	Yes	Yes	Yes
Fixed Effects	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2,005	262	2,005	262	2,005	262
R-squared	0.488	0.809	0.534	0.811	0.547	0.809

Notes:

(1) Robust and clustered standard errors are in parentheses.

(2) Individual controls in all columns are educational dummies, a measure of difficulty of subsistance, civil status, existence of dependent children, accomodation ownership, income group and sector dummies.

(3) The sample includes men and women aged between 34-61.

Table 2.11: 2SLS Estimations of Labour Force Participation

Instrumented: Retirement
Instrument: Entitlement For Retirement

	2SLS Men (1)	2SLS Women (2)
Age Margin	0.010	0.007
	(0.018)	(0.009)
Retirement Dummy	-0.378*	-0.064
	(0.197)	(0.066)
Age Margin*Retirement	-0.026*	0.040
	(0.015)	(0.027)
Individual Controls	Yes	Yes
Year Effects	Yes	Yes
Fixed Effects	Yes	Yes
Observations	2,005	262
R-squared	0.525	0.809
First Stage		
F Statistics		
Retirement Dummy	11.7	2.36
Age Margin*Retirement	93.6	9.19
Coefficients for Instrumenting the Retirement Dummy		
Entitlement Dummy	0.0711**	0.2622*
	(0.029)	(0.139)
Age Margin*Entitlement	0.0379***	0.322
	(0.008)	(0.267)
*Coefficients for Instrumenting Age Margin*Retirement*		
Entitlement Dummy	0.1286***	0.1303
	(0.045)	(0.1522)
Age Margin*Entitlement	0.6619***	0.5732***
	(0.048)	(0.143)

Notes:

(1) Robust and clustered standard errors are in parentheses.

(2) Individual controls in all columns are educational dummies, a measure of difficulty of subsistance, civil status, existence of dependent children, accomodation ownership, income group and sector dummies.

(3) The sample includes men and women aged between 34-61.

Chapter 3

Effectiveness of Stabilization Funds in Managing Volatility in Oil-Rich Countries

3.1 Introduction:

Fluctuating natural resource and commodity prices typically create boom and bust cycles in the natural resource rich economies and lead to an erratic growth performance under the absence of prudent fiscal policies. Stabilization Funds are special purpose investment funds or arrangements created by governments for macroeconomic management purposes. They hold and manage assets that are proceeds of natural resource/commodity export revenues, balance of payments surpluses, privatization or foreign currency operations. These special purpose funds include sovereign wealth funds, fiscal stabilization funds, savings funds, reserve investment corporations, development funds, and pension reserve funds without liabilities. According to the data by the Sovereign Wealth Instutite, the total asset size of the sovereign wealth funds worldwide is about USD 6,020 billion, USD 3,529 billion of which is oil and gas related.[1] The focus of this paper is to investigate the effectiveness of stabilization and savings funds that are established to accumulate oil and gas revenues to finance certain investments and expenditures or smooth the fiscal revenues in the face of highly volatile international prices. By 'effectiveness' I

[1] http://www.swfinstitute.org/fund-rankings/

mainly refer to the degree of fiscal countercyclicality or acyclicality given the objective of smoothing fiscal expenditures and revenues through creating a 'tool' for saving.

The question of whether the stabilization funds are effective is an important one because in a way, it relates to the broader discussion whether the fiscal policy in developing countries have become less procyclical. A recent study by Frankel, Vegh and Vuletin (2012) show that there is a group of countries that have graduated from fiscal procyclicality, meaning that the fiscal policy have become countercyclical. One third of the countries in the 'graduation list' however comprises countries that are resource rich and have a stabilization fund in place.[2] The study by Frankel et al (2012) argue that the main determinant whether a country graduates from procyclicality is the institutional quality. The measures of instutional quality used in the study are the International Country Risk Guide dataset, however, the study also acknowledges the potential endogeneity problem where the cyclicality of fiscal policies might affect the institutional quality. In order to address these concerns, the study instruments institutional quality measures by European settler mortality and latitude variables a la Acemoglu et al. (2001). Using aso revelant instruments for other potentially endogenous variables, the study concludes that there is a strong causal link from better institutions to less procyclical policies. As I will show below, some part of the graduation is actually due to creating a mechanism to further tie the hands of the governments in oil rich countries, even after controlling for institutional quality differences.

From a theoretical point of view, there would be no reason for any resource rich country to establish stabilization or savings funds if there were perfect insurance markets. However, the experience shows that the number of such funds started to increase dramatically especially towards the end of 1990s and most of the oil producer countries seem to have relied upon funds, rather than relying on insurance markets. Moreover, there is a vast literature showing that the external capital inflows are highly procyclical, making borrowing more difficult during times of negative shocks. Therefore during the times of high capital inflows, the business cycles are further exacerbated through expansionary fiscal policies. This phenomenon is described as 'when it rains, it pours' by Kamisnky, Reinhart and Vegh (2004). Ilzetski (2011) show that a political economy

[2]Graduated countries in the list are Algeria, Bahrain, Chile, Libya, Nigeria, Norway, Oman, Saudi Arabia, United Arab Emirates, Bolvia, Botswana, Brazil, Costa Rica, Cote d'Ivoire, El Salvador, Germany, Hong Kong, Indonesia, Malaysia, Morocco, Paraguay, Phillipines, Syrian Arab Republic, Turkey, Uganda and Zambia where the first nine have a stabilization fund in place. See Frankel et al. (2013, Fig.4)

model with resdistributive government policies and borrowing constraints can explain procyclical fiscal policies only during economic downturns, and introducing political polarization to the model significantly improves the ability to explain differences in fiscal policy accross countries.[3]

In this paper, I take an agnostic view on whether the international capital markets are imperfect as well as on why any country would pursue a procyclical fiscal policy that aggrevates the business cycles. In line with the theoretical prescriptions, I assume that the optimal fiscal policy is either countercyclical (in a Keynesian setting) or acyclical following Barro's tax smoothing result (in the Neoclassical setting).[4] I take the view that it might be due to the fact that stabilization funds provide a mechanism for self-insurance to accumulate resources and smooth expenditures, and this might be the reason why resource rich countries which are vulnerable to external conditions have started to rely on them one after another. In this paper, I ask the question whether such funds indeed help countries to achive better fiscal policy outcomes that are closer to the optimal fiscal policy framework prescribed by the theory.[5]

I use a sample of 29 oil-rich countries, namely; Algeria, Angola, Azerbaijan, Bahrain, Bolivia, Brazil, Cameroon, Chad, Republic of Congo, Ecuador, Gabon, Indonesia, Islamic Republic of Iran, Kazakhstan, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Qatar, Russian Federation, Saudi Arabia, Sudan, Trinidad and Tobago, United Arab Emirates, Venezuela, Vietnam and Yemen for the period between 1980-2012. I find that the fiscal policy is indeed highly procyclical in oil-rich countries *without* funds and they are mildly procyclical or acyclical in countries *with* stabilization or savings funds. Moreover, I find evidence that the volatility of major macro variables of interest such as the volatility of real household consumption, real government expenditures and government consumption as well as gross fixed capital investments are lower in those countries with such funds. Running seperate estimations only for countries with funds for the 1980-2012 period show that the procyclicality result becomes statistically insignificant (before and after), supporting the view that countries that establish such saving mechanisms might be more prudent to start with as opposed to countries *without funds*. If so, the results are supportive of Frankel et al (2012) who suggest that the 'graduating class' are the more

[3]For a discussion of causes of procyclical fiscal policies in developing countries, see Ilzetski (2011) and Jaimovich and Panizza (2007, p.4-6)

[4]For a short discussion, see Ilzetzki and Vegh (2008, p.4-6)

[5]By 'outcomes', I mean 'directly controllable fiscal policy realizations' such as government expenditures rather than budget balance which is not entirely controllable by the government due to revenue collection aspect. I will elaborate this point in Section 2.

prudent ones with better institutions, although I do not find a statistically significant association between fiscal performance and institutional quality in my sample of oil-rich countries.[6].

This paper is among the few to investigate whether stabilization or savings funds deliver more desirable outcomes. The existing results in the literature with respect to the experience with funds are mixed though. A case study by Fasano (2000) suggests that in some countries like Kuwait, Norway and State of Alaska, savings funds have contributed to enhancing the effectiveness of fiscal policy by making the budget expenditures less driven by revenue availability, whereas in other countries the experience has been less successful because of frequent changes to fund rules and the deviation from its intended purposes.[7] Fasano (2000) suggests that such funds have been more successful in countries with a strong commitment to fiscal discipline and sound macroeconomic management and the experience shows that funds should not be considered as a substitute for sound fiscal management. Another study by Husain, Tazhibayeva and Ter-Martirosyan (2008) suggests that the economic output in oil-exporting countries is strongly affected by oil prices and investigate whether the world oil price changes have an independent influence on economic activity or whether the channel is through the impact of procyclical fiscal policies on the economic activity.[8] Findings support the view that procyclical fiscal policies in oil exporting countries is the main mechanism by which oil price shocks are transmitted to the non-oil economy.

The study by Shabsigh and Ilahi (2007) uses a panel data set consisting of 15 oil-rich countries with and without stabilization funds for the period 1973-2003. The question they ask is whether having a stabilization fund is associated with having lower volatility in an oil-rich economy. The study finds evidence of a robust negative relationship between the existence of an oil fund and inflation, volatility of broad money, real exchange rate and prices in oil-exporting countries. Main challenges in establishing a robust empirical relation between the existence of stabilization funds and better fiscal outcomes are unobserved heterogeneity, endogeneity and the difficulty of distinguishing the impact

[6]Insignificance of the coefficients for institutional quality measures could be due to the fact that there is not much institutional quality variation across countries, with the exception of Norway

[7]The study covers the experience of Norway, Chile, Venezuela, State of Alaska, Kuwait and Oman.

[8]The study estimates impulse responses to oil shocks based on panel VARs of oil prices, fiscal stance and output. The countries analyzed include Iran, Norway, Yemen, Algeria, U.A.E. Nigeria, Saudi Arabia, Libya, Oman and Kuwait.

of the introduction of funds which overlap with the beginning of an oil-boom. The study partially addresses these challenges by using fixed effects estimator to remove the impact of time-invariant variables. The econometric specification however, cannot capture the role of time-variant factors and endogeneity of oil funds.

Ossowski, Villafuerte, Medas and Thomas (2008) also use panel data consisting of 32 oil-rich countries with and without a stabilization fund and/or a fiscal rule in place between 1992 and 2005.[9] The empirical question is whether having a stabilization fund and/or a fiscal policy rule leads to i) lower change in non-oil primary primary balance as a percent of non-oil GDP , ii) lower change in real government expenditures, iii) lower ratio of the change in expenditures to the change in oil revenues in an oil-rich country. Prefered specification is fixed effects estimator again to address the problem of time-invariant factors affecting the outcome variables. In addition, Arellano and Bond (1991) dynamic GMM estimator is introduced to address the possible endogeneity problem, i.e. a fiscal rule/fund could be introduced because of the existence of imprudent fiscal outcomes. The study controls for the institutional factors using International Country Risk Guide data on democratic accountability, bureaucratic quality, government stability and law and order. Contrary to the findings of Shabsigh and Ilahi (2007), Ossowski, Villafuerte, Medas and Thomas (2008) cannot find evidence of a positive impact on fiscal outcomes.

A survey by Devlin and Titman (2004) suggests that the extent to which savings and stabilization funds can smooth out investment and revenues depends on the random process generating the commodity/natural resource prices. When price changes are mean-reverting, the present value of the future revenues are not strongly affected by the spot prices therefore will not diminish the efficiency of funding for expenditures, whereas with a random walk process/permanent price changes, present value of future oil revenues will be large, and so will be the optimal level of investment. In that case, financial instruments rather than stabilization or savings funds will be more effective to deal with the fluctuations caused by price changes. When price changes are permanent, stabilization funds end up constantly accumulating or depleting assets which do not help reduce the volatility in the economy. However, this is a channel which has not been investigated in by the empirical literature on the effectiveness of stabilization funds. The evidence on whether the oil prices are mean-reverting though is mixed. Pindyck (1999) and Barnett and Vivanco (2003) show evidence on mean-reversion whereas Cashin, Liang

[9]Their analysis covers the oil-producing countries where fiscal revenue accounted for at least 20 percent of total fiscal revenue in 2004.

and McDermott (2000) and Engel and Valdes (2000) find evidence of persistence. Bartsch (2006) makes the point that the international oil prices show very weak mean reversion and studies the implications and fiscal policy design for Nigeria. The study suggests that Nigeria as an oil producing country should base its estimates of expected revenues and expenditures on the moving averages of past oil prices because the long-term average oil price is of little use for policy making due to weak mean reversion. Using moving averages of three to five years would lead to smallest forecast error, and reduce the risk of building large and persistent surpluses or deficits given the slow mean reversion of oil prices.

I believe that the existing studies, albeit enlightening do not sufficiently answer the question whether such funds are effective and should be prescibed for any resource rich country. The existing analyses do not differentiate between long-run trend or cyclical fluctuations, do not investigate the outcomes in line with optimal fiscal policy prescriptions, do not carefully handle the problem of potential endogeneity of GDP, the decision to establish a fund and th institutions. And finally, existing studies do not properly assess the volatility although the economic theory suggests that there are welfare costs of business cycle fluctuations. Moreover, I believe that those studies focus on the wrong fiscal policy outcomes which are usually not directly controllable by fiscal agencies. In this paper, I aim to contribute to the existing literature by addressing all these missing key dimensions, especially the endogeneity issue. More specifically, in order to address the endogeneity between the GDP and government expenditures, I use the external shock instrument for the GDP, as proposed by Jaimovich and Panizza (2007). As for the endogeneity of the 'decision to establish a fund', I use urbanization, and the lags of both the average years of schooling and percent of population with tertiary education in order to proxy for awareness for 'better management of people's resources'. As it will be explained in more detail in Section 3, as an extention, I interact the urbanization with the number of other oil-rich countries and use this new variable along the freedom of press rating as an alternative proxy for information for use of resources. And finally, in order to address the potential endogeneity of the institutions, I use 5^{th} and 10^{th} lags of average ICRG ratings of the neighouring countries for each of the oil-rich country in question. Table 3.4 summarizes each sets of instruments for the potentially endogenous variables.

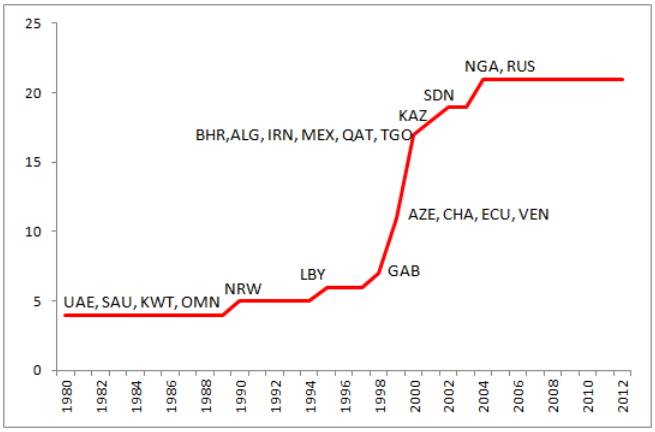
The paper is organized as follows: Section 2 discusses the empirical strategy and the data. Section 3 describes the results of the econometric analysis where I; i) investigate

the cyclical properties under existence of oil funds using OLS and Two Stage Least Squares Methods, ii) explore the decision to establish a stabilization fund *(which is not a truly exogenous event)* using several instruments, iii) instrument institutions which might potentially be endogenous, iv) investigate the short term growth and volatility of real general government expenditures, general government final consumption, household final consumption, and gross fixed capital formation as the variables of interest. Section 4 concludes.

3.2 Empirical Specification and Data

The experience with stabilization funds is relatively new as most of the funds were established by the end of 1990s and after year 2000. As Figure 1 shows, there were only 5 countries with oil stabilization funds as of 1994, whereas after that date, 16 more oil-rich countries adopted some sort of a fund arrangement. Although it is an important question whether these funds have been effective, the current empirical literature on the experience so far is limited.

Figure 3.1: Number of Countries with Oil Stabilization, Savings or Sovereign Funds



As summarized in the previous section, to my knowledge, there are only two studies that have the similar objectives as mine and their findings are somewhat contradictory. The study by Shabsigh and Ilahi (2007) which covers the period 1973-2003 for 15 oil-rich countries finds that countries with a stabilization fund are more likely to have less volatile broad money, real exchange rate and prices. And the study by Ossowski, Villafuerte, Medas and Thomas (2008) uses a panel data of 32 countries between 1992 and 2005

and cannot find evidence that having a stabilization fund leads to better fiscal outcomes measured by change in non-oil primary balance to non-oil GDP and real government expenditures. The major problem with respect to measuring fiscal policy performance through any definition of budget balance is that such outcomes are beyond the full control of the policy makers and can lead to misleading conclusions. Tax revenues are highly cyclical, and therefore even if government engages in a completely neutral policy of smooth fiscal expenditures, this measure would tell us that the fiscal policy is countercyclical, being in surplus in goodtimes and in deficit in bad times. This point has been raised by Kamisky, Reinhart, Vegh (2004), Jaimovich and Panizza (2007) and Ilzetzki and Vegh (2008) and Vegh and Vuletin (2013).[10] Therefore, we follow the advise and measure fiscal outcome as general government expenditures in real and detrended log terms, i.e. cyclical government expenditures.

The novelty of this paper is as follows; I embrace a different perspective focusing directly on the degree of procyclicality and volatility of expenditures when evaluating the performance under stabilization funds. Moreover, as compared to the previous studies on this issue, I am able to cover more recent data, namely the period between 1980 and 2012 for a sample of 29 oil-rich countries, namely; Algeria, Angola, Azerbaijan, Bahrain, Bolivia, Brazil, Cameroon, Chad, Republic of Congo, Ecuador, Gabon, Indonesia, Islamic Republic of Iran, Kazakhstan, Kuwait, Libya, Mexico, Nigeria, Norway, Oman, Qatar, Russian Federation, Saudi Arabia, Sudan, Trinidad and Tobago, United Arab Emirates, Venezuela, Vietnam and Yemen.[11] Table 1 provides the list of countries and Table 2, their various oil-dependency measures.

Experience shows that in oil rich countries government expenditures track oil revenues very closely which leads to an erratic fiscal performance and exacerbate the boom and bust cycles due to changing oil prices in the economy. The main rationale for establishing a stabilization fund should be to break this link, and maintain a smoother fiscal policy through savings in a fund. To a degree, it is perhaps unavoidable that the existence of stabilization funds may be weakly associated with lower growth of real government expenditures because many of the oil-rich countries are on a development trajectory with massive infrastructure needs. According to the World Economic Outlook

[10] Vegh and Vulent (2013) documents tax-policy procyclicality in developing countries and acyclicality in developed countries.

[11] Unfortunately, the panel is unbalanced due to missing data for various countries and due to the fact that some countries only recently gained independence such as Azerbaijan, Kazakhstan. The specifications with institutinal data (ICRG) cover the period 1984-2012)

data of IMF, for instance, the average nominal GDP per capita between 2005-2008 was \$11,742 for my sample.[12]. Excluding high per-capita income countries as United Arab Emirates, Qatar, Kuwait and Bahrain, the average in the sample drops to \$5,452. The ratio of gross-fixed capital investments to GDP was 23.5% between 1990-2008. Therefore, the objective of the fiscal policy in a developing country might not be achiving a lower expenditure growth profile, but instead a less volatile one where fiscal expenditures do not track revenues as closely. While optimal fiscal policy from a Keynesian perspective prescibes a countercyclical policy and from the Neoclassical point of view, a neutral one, with tax and expenditure smoothing, there is a growing literature showing that fiscal policy is actually mostly procyclical in many of the developing countries. I will come back to this point in Section 3 while discussing our choice of instrumental variables. In this paper, I also find that procyclicality is the fact for oil-rich countries and investigate whether those oil-rich countries with a stabilization fund has a 'less procyclical' fiscal policy- which should be one of the objectives of establishing the fund in the first place.

The main data source is International Monetary Fund's (IMF) World Economic Outlook (WEO) and Country Desk Data. I use annual general government expenditures, however very occasionaly, I rely on central government expenditures when the data is not available for general government. The same applies for total general government revenues, and government oil revenues. Data is reported in nominal terms, and I deflate it using the CPI index from the same database for each country. I extract the oil price data from IMF's WEO as well. The data used in my regressions are in detrended logs using the Hodrick Prescott Filter (except for the ratio of oil revenues to total revenues, oil prices and institutional variables). Using the Augmented Dickey Fuller and Im, Pesaran and Shin tests, I find that I can reject the null hypothesis of unit root for the our series i) detrended real government expenditures, ii) detrendeded real government revenues and iii) detrended real GDP with 99% confidence level. In order to capture institutional variables, I use International Country Risk Guide (ICRG) data which provides political risk ratings on democratic accountability, bureaucratic quality, law and order, government stability and corruption for 140 countries since 1984. However, my results are robust to inclusion of any institutional variable, and in fact, suprisingly most variables turn out to have no explanatory power on detrended real government expenditures. The data on household final consumption, general government consumption and gross fixed capital formation data are from WDI. All educational attainment variables are by Barro-Lee

[12]Excluding Algeria, Ecuador, Iran, Kazakshtan and Saudi Arabia due to non-existence of compatible data.

(2013) and are linearly interpolated.

The first variable of interest is the oil fund dummy which takes on the value of 1 if there is a sovereign, stabilization or a savings fund in place and 0 otherwise. In this paper, I do not differentiate between these funds as I consider them to serve mostly to the same purpose for the set of countries I focus on in the sample. However as explained above, I am not solely interested in whether the coefficient on the fund dummy is negative, i.e. pointing out to a "lower level" of government expenditures. Instead, I am interested in the coefficient of the interaction term that shows whether the real expenditures are less procyclical in those countries where there is a stabilization fund, i.e. *a statistically significantly negative coefficient for the interaction term.* More formally, I first estimate the following model:

$$g_{i,t} = \alpha_o + \delta D_{i,t} + \alpha_1 y_{i,t} + \alpha_2 D_{i,t} y_{i,t} + Z'_{i,t,}\beta + \eta_i + \lambda_t + \varepsilon_{i,t} \tag{3.1}$$

where $g_{i,t}$ represents detrended real government expenditures, $y_{i,t}$, detrended real GDP, $D_{i,t}$ stands for the stabilization fund dummy, $Z'_{i,t}$ is the set of other covariates, and $\eta_{i,t}$, λ_t are country and year fixed effects. In this setting, the relationship between the fiscal expenditures and GDP is given by:

$$\frac{\partial g}{\partial y} = \alpha_1 + \alpha_2 I_D \tag{3.2}$$

I_D is the indicator function which takes on the value 1 if there is a fund in place and 0 otherwise.

As econometricians, however, we face few challenges in establishing a robust and sound empirical relationship between the existence of funds and stability of fiscal policy. As I will explain in more detail in the next section, the endogeneity of GDP and potential reverse causality is a major concern which requires careful instrumental variables methods. Another crucial challenge is that the decision to adopt a stabilization fund is not truly exogenous, and countries that run high non-oil deficits might be more tempted to establish stabilization funds as a self-disciplining mechanism (Ossowski, Villafuerte, Medas and Thomas; 2008, p.32). In that case, introduction of a fund would seem to be positively associated with higher fiscal expenditures. Another view suggests that

countries that set up stabilization funds maybe more prudent to start with, therefore it would be inappropriate to attribute their good performance to the funds (Shabsigh and Ilahi;2007, p.4). In that case, a better fiscal outcome would be associated with the unobserved time invariant factors and not necessarily with the existence of a fund. Under all cases, OLS would yield biased estimates. While I handle the problem of unobserved time-invariant and time-variant factors through adopting the fixed effects estimator, random effects estimators and Arellano Bond estimators, admittedly it is a challange to find good instruments which are highly correlated with introduction of fund dummy but not directly correlated with fiscal expenditures to handle the endogeneity of 'introducing stabilization fund' problem.Later in Section 3.3, after I report the main results with respect to procyclicality, I rely on two possible instruments for the decision to establish a fund and I find that my results remain robust. Final challenge I face is that the introduction of an stabilization fund may coincide with the start of a boom in some countries. In that case oil expenditures might go up tracking high oil revenues and this would again appear as if the oil fund is associated with higher expenditure growth. I handle this problem (at least to a degree) by controlling for the ratio of oil revenues to total government revenues, which measures the governments' dependence on oil revenues.

I start by running several sets of estimations in Section 3. In the first set, I focus on the degree of procyclicality and run OLS estimators, ignoring the potential endogeneity problem. In the second set, I handle the endogeneity problem by using instrumental variables for GDP. Then I address the other potential endogeneity problems, which are namely the decision to establish a fund again and institutions. In Section 3.4 I turn to the question of volatility differences. I measure volatility in terms of moving standard deviations. In all my regressions in Section 3, I control for the oil dependency (which I measure as the ratio of oil revenues to total revenues), oil price growth and institutional quality measures.

3.3 Results

3.3.1 Procyclicality of Fiscal Policy

In my paper, I test the degree of procyclicality for oil rich countries first by usual OLS methods and then use the 2SLS approach as in Jaimovich and Panizza (2007). [13] For each specification, I run two sets of estimations, one for the whole sample of oil-rich countries, and another for only the countries with stabilization funds, excluding those which do not have a fund. The rationale is to see whether the procyclicality results differ when we focus only on the countries with funds. In all my regressions, I use detrended (log) real government expenditures as the dependent variable and detrended (log) real GDP, oil dummy, oil price (log) and share of oil revenues in total government revenue (revenues not detrended) as independent variables. The latter variable is used to control for the degree of oil-dependency in the economy. I also include WDI's natural resource rents as a percent of GDP as another control for oil dependency.[14] In testing the degree of procyclicality across countries with and without stabilization funds, I am interested in the sign and significance of the following coefficients in equation (1);

$$\frac{\partial g}{\partial y} = a_1 \text{ for those countries without/before stabilization funds} \tag{3.3}$$

$$\frac{\partial g}{\partial y} = a_1 + a_2 \text{ for those countries with/after stabilization funds} \tag{3.4}$$

Table 3.3 shows first set of results. Using the Fixed Effects, Random Effects and Arellano Bond estimators, I find in the first panel of Table 3.3 that fiscal policy in a sample of 29 oil rich countries are on average highly procyclical. The coefficient is around 0.65-0.73 and highly significant in all specifications using the pooled sample. The results, however also show that the coefficients of interaction terms are negative and highly statistically significant, indicating that the government expenditures are associated significantly less with GDP, i.e. the fiscal policy is acyclical or mildly procyclical in

[13] Note that in all my instrumental variables estimations, I also instrument for the interaction term along with the GDP to avoid the "forbidden regression" problem.

[14] WDI reports total natural resource rents as the difference between the price of a commodity and the average cost of producing it whereby the unit rents are multiplied with physical quantities.

those countries where/after there is a stabilization fund for the whole sample. The coefficient on the stabilization fund dummy is not statistically significant, indicating that there is no difference on the level of government expenditures as deviations from the trend across two groups of countries. Suprisingly, the institutional quality measures are not significant, except for socioeconomic conditions. The institutional quality measures in the ICRG dataset are constructed such that higher points indicate better outcomes and therefore lower risk.[15] Hence, the sign of the socioeconomic conditions is indicating that a higher rating of social conditions (therefore lower social risk) is negatively associated with cyclical fiscal expenditures. The insignificance of other institutional quality measures especially the corruption rating could be due to the fact that in our sample most countries have similar ratings without significant cross country and time variation except for Norway whereas there is enough variability in socioeconomic conditions among the rich income per capita and poor income per capita countries in the sample.

The second panel of Table 3.3 replicates the results for countries only with stabilization funds. In all specifications, the coefficients on both the GDP and the interaction terms are reduced significantly, suggesting that fiscal policy was mildly procyclical before the establishment of the stabilization funds, and is acyclical or mildly procyclical after the fund. The statistical significance of the cyclicality coefficients now are not as significant as in the pooled set of estimations listed in the first panel of Table 3.3, but the signs are in the expected direction. Institutional quality measures again do not seem to be statistically associated with the cyclical component of the government expenditures except for the socio-economic conditions.

The OLS estimates present evidence in favor of stabilization funds. However, as explained above there is a vast literature on the evidence of government expenditures and GDP in general being endogenously determined. In order to address the endonegenity problem, I rely on 2SLS methods, although I believe that the endogeneity problem could be less severe for the oil-producing countries as opposed to a typical developing country without a dominant sector based on natural resources. The rationale is as follows: As Table 2 shows, oil production is the biggest contributor to overall GDP and oil related exports constitute almost the whole exports in many of those countries. Therefore the dependency on oil resources makes it more likely that the oil production drives the GDP as a determinant of government expenditures rather than the other way around. But nevertheless in order to avoid the risk of biased estimations due to reverse causality, I

[15] http://www.prsgroup.com/ICRG_Methodology.aspx

rely on 2SLS.

To address the endogeneity problem for GDP, I use the instrument suggested by Jaimovich and Panizza (2007), namely the weighted GDP growth of each country's trade partners. The authors claim that this is a valid instrument for the GDP growth because those external shocks should be expected to have no impact on government expenditures other than their indirect impact through the GDP. Jaimovich and Panizza (2007) show that the first-stage F statistics are above 10 and the coefficients in the first stage are highly significant for all groups of countries, except the low income countries. More specifically, they define the real external shock instrument as:

$$SHOCK_{i,t} = \frac{EXP_i}{GDP_i} \sum_j \varphi_{i,j,t-1} GDPGR_{j,t} \tag{3.5}$$

Where $\varphi_{ij,t}$ is the fraction of exports from country i to country j, and EXP_i/GDP_i is country i's average exports expressed as a share of GDP.[16] Using the contemporaneous value and the three lags of the external shocks to instrument the GDP growth, I run 2SLS regressions with country fixed effects. The results are summarized in Table 3.5. The 2SLS estimations (columns 1-4) also confirm that the fiscal policy is overall procyclical on average in the pooled sample albeit with lower coefficients as compared to the OLS coefficients. However, as in the OLS case, coefficient on the interaction term is negative and statistically significant suggesting that the degree of procyclicality falls under the existence of stabilization funds. More interestingly, the coefficient of the stabilization fund dummy is negative and significant suggesting that real expenditure growth is lower on average in countries with funds, an argument that goes in favour of funds. In the second panel of Table 3.5 (columns 5-8), I replicate the results for countries only with stabilization funds. Once again, similar to the OLS case, the coefficients on GDP growth and the interaction term are no longer significant (except for column 5) albeit with the expected signs. Column 5 shows that among the countries which have stabilization funds if one does not control for the institutional quality differences, fiscal policy seems procyclical however, once institutional quality measures are included, procyclicality is no longer significant in columns to 6-8. In other words, when one excludes the countries that never adopted such funds, the procyclicality result as well as the reduction effect before

[16] Jaimovich and Panizza (2007: p.13) suggest that using a time-invariant measure of exports over GDP would be less subject to real exchange rate fluctuations and domestic factors.

and after the funds dissappears for those countries which already adopted funds. This might support the view that those countries which adopted stabilization funds were more prudent to start with and procyclicality might not have been a serious fiscal problem initially.

In Table 3.6, I report the first stage results. The first stage F statistics for the excluded instruments (which test the weak identification of individual endogenous regressors by partialling out the linear projections of remaining endogenous regressors) are all well above 10. Hansen J statistics suggests that the instruments are uncorrelated with the error term, and that the excluded instruments are correctly excluded from the estimated equations. Finally, I run the Wu-Hausman endogeneity test which uses the difference of two Sargan-Hansen statistics: one for the equation with the smaller set of instruments, where the suspect regressor(s) are treated as endogenous, and one for the equation with the larger set of instruments, where the suspect regressors are treated as exogenous.[17]In line with my priors, I cannot reject the null hypothesis that the real GDP growth can actually be treated as exogenous. All first stage statistics point out to the validity of instruments. Generally speaking, earlier findings of OLS remain robust albeit with reduced coefficients, there is evidence of procyclical fiscal policy on average whereas the relationship dissappears when we exclude the countries without funds. The fact that the evidence for procyclicality dissappears across the pooled and seperate regressions might be suggesting that the countries with funds could be more prudent even before establishing such funds as the results show that procyclicality was not statistically significant before or after the establishment. In other words, this might suggest that stabilization funds themselves are no magic tools and a certain degree of prudence is needed to achieve more desirable fiscal outcomes as opposed to the view that such funds necessarily tie the hands of the governments which cannot impose discipline otherwise.

3.3.2 Potential Endogeneity of the "Decision to Establish a Stabilization Fund"

As discussed in the earlier sections, the decision to adopt a fund might not be truly exogenous and there might be various of reasons why some countries chose to adopt

[17]Baum, C.F., Schaffer, M.E., Stillman, S. 2010. ivreg2: Stata module for extended instrumental variables/2SLS, GMM and AC/HAC, LIML and k-class regression. http://ideas.repec.org/c/boc/bocode/s425401.html

one, and why some other countries don't. An example which shows the complications with respect to establishing a sound empirical link between funds and fiscal performance is the following: countries that run high deficits might be more tempted to establish stabilization funds as a self-disciplining mechanism, therefore in a limited time series, introduction of a fund might appear to be positively associated with higher fiscal expenditures as it might require some moderate time for the fund to be fully operational. Or countries which already have a tradition of fiscal prudence might be more tempted to establish funds as a reflection of fiscal accountability and responsibility practises. However, in that case it would be again wrong to assign causality going from having stabilization funds to achieving more desirable fiscal outcomes especially in a limited time series. In order to address this endogeneity problem which the previous studies suffer from, I instrument the decision to establish a stabilization fund. Table 3.4 displays all the alternative sets of instruments that are employed for the decision to establish oil stabilization funds.

I contemplate the following hypothesis; a country's willingness to establish a stabilization fund might increase if there is a growing awareness within the society with respect to the best use of "people's resources" -oil endowments in our case. In what follows, I use two sets of measures to proxy for the awareness. In the first set, I use the percent of urban population, lags of Barro-Lee's average years of education and percent of population with tertiary education.[18] The identifying assumption is that urbanization and lags of educational attainment have an impact on the awareness on the best use of country resources, but otherwise has no direct effect on the cyclical component of the contemporary government expenditures. The rationale for urbanization is that information and participatory ideas are more accessible in urban areas as opposed to the rural areas. Urbanization is a **very slow process**, taking many decades whereas the decision to establish a fund can even happen overnight. It is hard to imagine that such a slowly changing indicator might have a direct impact on cyclical expenditures, or visa versa.

One key problem with Barro-Lee educational attainment dataset is that it is missing for some oil-rich countries, reducing the number of countries available to 20 for the whole set, and 14 for the sub-sample of countries with funds. So as a robustness check, I explore an alternative second set for which the data is complete for 24 countries. This alternative instrument set consists of the interaction of the percent of urban population with the number of other oil-rich countries which already adopted a stabilization fund. The

[18]Barro-Lee series are linearly interpolated using Stata's ipolate command

reasoning is that the awareness might especially increase if other resource rich countries have already adopted such funds. This could be because of positive perceptions about how a fund might help as a buffer-stock, it might be because of following international organizations "sound policy" prescriptions, it could be due to the transformation in the economy where a need for new reforms arise, or simply it could be because 'stabilization/sovereign funds are the new global fashion'. This is an alternative instrument which can also be thought as a proxy for 'increasing awareness'. In this set of estimations, I also use 'freedom of press rating' of the Freedom House. My identifying assumptions are that i) *the number of other oil-rich countries in which there is a stabilization fund should be purely exogenous for the cyclical component of fiscal expenditures of a country.* In order words, there is no reason to expect that the number of countries with funds should have an impact on the fiscal expenditures in a country, other than its indirect impact through affecting the willingness to adopt a fund in the country in question and ii) *higher fraction of population living in urban areas with better access to information is directly associated with the decision to adopt a stabilization fund, but otherwise it is exogenous to the cyclical component of government expenditures.*

Table 3.7 displays the results of the first set of instruments. In columns 1-3-5-7 the percent of urban population and 5^{th} lags of educational attainment indicators are used as instruments for the oil fund, whereas in columns 2-4-6-8, 10^{th} lags of educational attainment indicators are used. The coefficient estimates are less than those of OLS, highly significant and showing procyclicality under the absence of funds and acyclicality or mild countercyclicality under the existence of funds for the whole sample. The second panel of estimations, displayed in columns 5-8, excludes non-fund countries and shows the estimations for the countries with funds only. The coefficients of both the GDP and the interaction terms are now significant at the 10% significance level and again point out to a acyclical or mildly countercyclical fiscal policy after the establishment of the funds. None of the institutional quality measures show up as significant. Table 3.8 summarizes the first stage statistics. Coefficients of the instruments are positive as expected and statistically significant in general, except for the 10^{th} lag of the tertiary education. F statistics are above 10, except for column 4 and 8. According to the Wu-Hausman test, I cannot reject the null hypothesis that oil fund dummy can be treated as exogenous, and Kleibergen-Paap Wald statistics are also above the Stock-Yogo critical values for 10 percent IV relative bias, again except for column 4 and 8.

As a robustness check, I explore the procyclicality using the second set of instruments

for the decision to establish funds at Table 3.9. As explained above, I use the interaction between the number of other oil-rich countries with funds and the urbanization and freedom of press as instruments. The coefficients as well as the standard errors are close to the OLS coefficients in Table 3.3 and institutional quality variables are again not significant. Table 3.10 reports the first stage statistics. All coefficients with respect to the awareness instrument in the first stage is highly statistically positive (all at 1% level). The Freedom House ratings assign lower values to free press, and higher values to not free press.[19] Therefore, as expected the sign of our free press indicator is negative and also statistically significant at the 1% level, indicating that more freedom for press is positively associated the decision to establish a fund. F statistics of the first stages are high, and the instruments passes the weak instrument tests under all specifications except for specification 4. Wu-Hausman endogeneity test suggests that I cannot reject the null hypothesis that the specified endogenous variables can actually be treated as exogenous. Overall, earlier findings remain robust; **the government expenditures are highly procyclical in countries under the absence of stabilization funds and they are acyclical or mildly countercyclical in countries with such funds**.

3.3.3 Endogeneity of the Institutions

In addressing the last of the three endogeneity problems existing in the literature, I finally attempt to instrument the institutional quality measures. The most common instrument used widely in the literature are the settler mortality rates between the 17^{th} and 19^{th} centuries and the latitude, as suggested by Acemolu, Johnson and Robinson (2001). The settler mortality rates and colonial indicators however do not seem to be appropriate for my sample of countries because I have a small subset of countries in my sample (24 with instutional quality data) and mortality data is unfortunately missing almost for half of the countries in the sample which makes the estimates very imprecise. Therefore, I search for another variable which has to be correlated with instutional quality measures of the country in question but should not have a direct impact on the cyclical component of the government expenditures.

One potential instrument is the lags of average institutional quality measures of the neighbouring countries for each oil-rich country. The identifying assumption is that

[19]More specifically, ratings between 0-30 indicate Free Press, 31-60 indicate Partly Free and 61-100 indicate Not Free.

the instutitions are contagious through trade or regional political agreements and the lags of the institutional quality measures of the neighbours might have an impact on the institutions of the country in question, but do not have a direct impact on cyclical component of the government expenditures. One exception might be military conflict with neighbours (which the ICRG index accounts for), however, using the lags rather than the contemporaneous values of the instrument should at least partially address this concern.

Table 3.12 displays the first stage statistics and Table 3.11 summarizes the 2SLS findings for the pooled sample and the sub-sample of oil fund countries. As the first stage results show, the 5^{th} and the 10^{th} lags of the average institutional quality measure of the neighbours are highly statisticaly significant for both the whole sample and the sub-sample of countries with stabilization funds only. Statisticaly, the 5^{th} lag of the neighbours institutions seem to be a better instrument, as the F statistics and the weak identification tests show, however, as far as the economics is concerned, 10^{th} lag is more intuitive and more reasonable to address endogeneity concerns as institutions are very slow changing arrangements. As Table 3.11 shows, even when instrumented, the instutitional quality measure as proxied by the ICRG composite index shows up as insignificant. As mentioned before, this might be due to the fact the oil rich countries with the exception of Norway have similar ICRG ratings. The coefficients of the GDP and the interaction terms are again similar to the OLS estimates for the whole sample and the sub-sample as columns 1-4 show. Therefore the findings under instrumenting institutions also confirm that earlier finding that the fiscal policy is procyclical in countries under the absence of funds and mildly-procyclical or acyclical in countries with funds.

3.3.4 Treating Both the Fiscal Policy and the Stabilization Fund as Endogeneous

In this section instead of instrumenting the potentially endogenous real gdp and the stabilization fund dummy one at a time, I treat both of them as endogenous and use instruments all at once. Although using multiple instruments are generally not recommended, I attempt to put both sets of instruments together to check whether the results are sensitive to treatment of variables of interest as exogenous or endogenous. [20]

[20] See Angrist and Pischke (2009), "'Mostly Harmless Econometrics" for a discussion of using multiple endogenous variables

In order to keep the analysis and the interpretation simple(r), I treat the institutions also as predetermined with respect to the fiscal policy.[21]

The instrument that is used for real gdp growth is once again the external shocks variable as proposed by Pannizza and Jaimovich (2007) but without any lags.[22] As for the decision to establish a stabilization fund, the instruments I use are the urbanization rate and the fifth lag of the population with tertiary education as a proxy for awareness of best use of countries' resources.[23] Table 3.13 displays the first stage statistics and Table 3.14 summarizes the 2SLS findings for the pooled sample and the sub-sample of oil fund countries for the two endogenous varaible case.

Starting from the first stage, results show that the coefficients for the instruments are mostly insignificant for the pooled sample whereas the external shocks seem to significantly correlate with real GDP growth and the proxy measures for the awareness seems to be positively and significantly correlated with the decision to establish stabilization funds for the sub sample. The F test of excluded instruments are sufficiently higher than the rule of thumb of 10.[24] On the other hand, weak identification test point out that the excluded instruments might be weakly correlated with the endogenous regressors, although the Kleibergen-Paap Wald F statistics were mostly above the critical points when the potentially endogenous regressors were instrumented one at a time in the previous sections. Hansen J statistics suggest that we cannot reject the null hypothesis that the instruments are uncorrelated with the error terms.

Despite the possibly weak identification, the second stage results are similar to the previous sets of estimations: i) for the pooled sample the fiscal policy on average seems to be mildly counter-cyclical under the existence of funds and, ii) procyclicality does not seem to be an issue before or after when one looks only at the countries which already adopted such funds. Although the signs of the coefficients for the sub-sample are as

[21]The results treating institutions as endogenous along with the former two are similar to the two endogenous variable case, i.e. treating only the real gdp growth and stabilization fund dummy as endogenous. The results are available upon request.

[22]In the case of multiple excluded instruments per each endogenous variable, the number of clusters turn out to be insufficient to calculate robust covariance matrix, i.e. there are more regressors than the country clusters.

[23]Unlike in the previous section, I exclude the average years of education to reduce the number of instruments due to the restricted number of country clusters which affects the robustness of covariance matrix for the sub-sample of countries with funds.

[24]In order to avoid the " forbidden regression problem" the interaction term is also intrumented in the first stage.

expected, they are not statistically significant suggesting that there is no evidence for fiscal policy procyclicality in countries which adopted funds.

3.3.5 Volatility of Fiscal Expenditures

In this section, I focus on the short term cyclical volatility of various variables, which I measure by the standard deviation on a rolling window (after removing the trend). More specifically, I am interested in whether the cyclical volatility of the real household final consumption, real general government final consumption, real gross fixed capital formation, real GDP, real general government expenditures and revenues are reduced in those countries with stabilization funds.[25] As the economic theory outlines, business cycle fluctuations have welfare costs and it is only natural to check whether there is a difference in volatility between the two groups of countries. I am also interested in whether short term growth of the variables of interest is more likely to be higher in oil fund countries. I believe this is important from a developmental perspective: whether we can argue that "having this buffer of savings" helps countries sustain higher growth paths. I focus on short term growth, as measured over 3 and 4 years instead of longer terms because as mentioned before the oil funds are relatively young which restricts the database from looking into longer horizon.

One way would be to analyze the volatility and growth differentials is to divide the countries into control and treatment groups on the basis of having a stabilization fund, estimate volatility and growth for the control group and the treatment groups. This method however, is problematic due to the nature of the data which does not let me properly control for the external conditions and shocks that might have affected countries uniformly over time in a difference in difference approach. This stems from the fact that since the decision to establish a fund is different for each country in the treatment group, I do not have a reference date to compute volatility "before" and after" for the control group.

Hence, my methodology is the following. My focus is short term growth and cyclical volatility. I estimate moving growth rates and standard deviations of variables of interest

[25]The data source for real household final consumption, real general government final consumption and real gross fixed capital formation is World Development Indicators and the data source for real general government expenditures and revenues is WEO and IMF Country Desks.

over 3 and 4 year windows. In all volatility estimations, variables are measured as detrended logs except for growth. If oil funds are indeed succesful, I expect to find that short term growth is higher on average and volatility is reduced in oil fund countries. In order to measure this, I generate a new binary variable for the oil fund which takes on the value 1 in the third and correspondingly in the fourth year of the establishment of the fund. I do not divide the fund countries on the basis of establishment year because in that case, the estimates for first couple of years would be wrongly attributed to "after fund" performance. To be more specific, since I am looking at moving rates at 3-4 year windows, the growth and volatility estimates in the first year of the oil fund in fact would measure the performance of the last 3 or 4 years when actually there was no fund in place. Therefore assigning binary variable to the third and fourth years after establishment would only properly account for the fund period. Following this route, I provide t-tests of means and present graphical analysis.

I report the findings with respect to short term growth differences in Table 3.15 which presents simple means tests without controlling for various possible covariates. The first panel shows the differences over 3 year growth performances of key variables and the second panel shows the 4 year growth differences. In all cases, except for the real government revenue growth over 3 year windows, the countries with stabilization funds have statistically significantly higher growth rates. The results indicate that there is no statistically significant difference between revenue growth for countries with or without funds but growth rates of gdp, consumption, investments are statistically significantly higher for those countries with (or after establishing) stabilization funds.

The findings with respect to cyclical volatility differences are reported in Tables 3.16 and 3.17. Simple t tests in Table 3.16 show that volatility of real general government expenditures, government consumption and real gross fixed capital formation is statistically significantly lower in countries with stabilization funds, but there is no significant difference between real household consumption and government revenue volatility across countries. In Table 3.17, I report the relative standard deviations (relative to GDP) across countries. Once again, simple t tests show that not only the relative volatility of real general government expenditures, government consumption and real gross fixed capital formation are statistically significantly lower in countries with stabilization funds, but also the relative real household consumption and government revenue volatility.

And finally, I present some graphical analysis in Figures 2 to 11. In Figure 2, I show the volatility of household final consumption by the age of the oil fund. Figure

3 shows the volatility in countries that never established oil stabilization funds and the volatility in those countries before they established funds, so in a way, the second figure shows the volatility in the "control group"Ẇe see in the second figure that the volatility is dispersed over time even though some non-fund countries indeed managed to achieve lower consumption volatility. Figures show a disperse consumption volatility performance across oil fund countries and no-fund countries. Therefore as the means tests and regressions have shown, graphical analysis also suggest that there does not seem to be a systematic volatility difference in consumption between countries with and without funds. What is worth-noting is though that the consumption volatility seems to be lower on average and more concentrated in a lower band in those countries with a long history of oil fund. However, these are mainly consisted of top oil producer and high income per capita countries like Saudi Arabia, United Arab Emirates, Kuwait and Oman where consumption risk is lower on average as compared to the rest of the countries. Therefore it is hard to establish a sound empirical link between the age of the oil fund and consumption volatility.

Figures 4, 5, 10 and 11 show the volatility of gross fixed capital formation across group of countries and by the age of oil fund. Gross investment volatility seem to be decreasing on average for all countries, however, as Figure 4 and 10 show, it has been decreasing more starkly for countries with oil funds. This is in line with my earlier findings. And finally, Figures 6-9 show the scatters of volatility of government expenditures between group of countries over time and by the age of oil fund. In this last case, the pattern is similar, i.e., overall volatility has been declining on average for all countries, but more so for countries with funds. Moreover, as in the consumption volatility case, countries with longer history of oil stabilization funds are more likely to have lower volatility of government expenditures and consumption.

3.4 Conclusion

The end of 1990s was a period where many oil rich countries started establishing funds with stabilization purposes in light of fluctuating commodity prices and the boom and bust cycles associated with it. In a world with perfect insurance markets, we would not expect to see countries to rely on savings or stabilizations funds. However, the evidence shows that more and more commodity rich countries joined the club of stabilization-fund-

owners. Moreover, there is a vast literature following Kaminsky, Reinhart and Vegh (2004) showing that the capital inflows to many developing countries are procyclical whether the recipient country is commodity-rich or not. The problem of boom and bust cycles is more of a problem for oil rich, or commodity rich countries in general, as the rising international prices makes borrowing easier, leading to procyclical fiscal policies while the optimal fiscal policy the economic literature suggests is either counter-cyclical or acyclical. Under the lack of perfect insurance markets, stabilization funds provide a mechanism to enforce oil-rich countries to save during good times and use these resources during contractionary times, making the fiscal policy either countercyclical or acyclical. Therefore it is an important policy question whether these funds actually help countries to achieve better fiscal policy outcomes. I believe that the current literature puts too little emphasis on the impact of stabilization funds on the cyclicality of fiscal policy.

In my paper, I used IMF's World Economic Outlook Annual Data, World Bank's Development Indicators and International Country Risk Guide data for oil-rich countries between 1980-2012. The task of establishing a sound empirical relationship between the stabilization funds and fiscal policy performance is not an easy task. First of all, the decision to establish a fund might not be truly endogenous, i.e. countries with strong institutions who already have more desirable fiscal policy outcomes might be inclined to establish funds in the first place. Second the endogeneity between the GDP and the fiscal policy is an important problem that can lead to biased estimations. Moreover, the institutions themselves are not truly exogenous. In my paper, I contribute to the existing literature by addressing all these problems by instrumenting the GDP, the existence of a stabilization fund (or the decision to establish a fund) and the institutions.

In measuring the impact of the stabilization funds, my main variable of interest is an interaction term between the GDP and the Fund dummy, as this shows the degree of cyclicality in countries with funds as compared to countries without funds. In most of my specifications, either using the detrended GDP or using instruments for GDP, I find that the fiscal policy is countercyclical but becomes either acyclical or countercyclical after stabilization funds. The instrument that I use for the detrended GDP is the contemporaneous and three lags of the weighted GDP growth of each country's trade partner.I find that the results when the GDP is instrumented are similar to OLS estimations. Running seperate estimations for countries with oil fund only shows that the procyclicality result statistically dissappears.

Next, I address the problem of the 'endogenous decision of establishing funds' by

introducing several instruments for the fund dummy. All instruments that I use are aimed to proxy 'awareness for the best use of country resources'. In the first set of 2SLS estimations, I use the 5^{th} and 10^{th} lags of linearly interpolated Barro-Lee educational attainment indicators as well as urbanization. In the second set, I construct a new instrument which is the interaction of the number of other oil-rich countries with funds with urbanization. I include free press index by Freedom House as an additional instrument. My identifying assumptions are that the countries that have better informed citizens (also informed about other countries' performance and the need for saving) are more likely to establish funds, but otherwise these instruments are exogenous to the cyclical component of government expenditures. My first stage results show that these are valid instruments, and that our second stage results show that the countries with stabilization funds have either acyclical or midly cyclical fiscal policy.

In order to address the potential endogeneity of the institutions, I construct two new variables which are the 5^{th} and 10^{th} lags of the average ICRG ratings of neighbouring countries for each oil-rich country. The identifying assumption is that institutions might be transmitted through regional trade or political agreements and the lags of the institutional ratings of the neighbour countries do not have a direct impact on the cyclical component of the government expenditures. Instrumented or not, I find no evidence of institutional quality on cyclicality of fiscal policy although all first stage estimations show that institutional measures have an explanatory power over the decision to establish stabilization funds.

And finally, I compare the growth performance and volatility performance of real government expenditures, household final consumption, government consumption and gross fixed capital formation between the oil-rich countries with and without stabilization funds over three and four year windows. I use simple means tests in measuring the growth and volatility performance. I find that the government expenditure, gross fixed formation growth rates are higher in countries with stabilization funds, whereas these variables are less volatile. I find no evidence of a statistically meaningful association between household final consumption and existence of a stabilization fund.

In sum, I find that most stabilization funds indeed serve their purposes rather than being just another government account. The countries with stabilization funds have fiscal policy performances with more desirable cyclical properties parallel with the prescriptions of the optimal fiscal policy literature. However, there is a clear divide in results when I consider the whole sample or exclude the countries without funds. The countries which

adopted such funds seem to have less procyclical fiscal policies before and after as opposed to countries without funds for the whole sample period although degree of procyclicality seem to decline further after the establishment of the funds. This finding might suggest that stabilization funds per se are no magic tools and a certain degree of prudence is needed to achieve more desirable fiscal outcomes as opposed to the view that such funds necessarily tie the hands of the governments which cannot impose discipline otherwise. This is in line with the evidence by Frankel et al. (2012) which suggests that those countries which graduated from fiscal procyclicality into counter or acyclicality are the ones with better institutions.

The next step for this line of research is to expand the sample to include all commodity-rich countries rather than just oil-rich countries. There are several countries that are dependent to minerals and other types of commodity production, as copper is like oil to Chile and diamonds to Botswana, and some of those countries have successful experience with stabilization funds. To my knowledge, this line of research is overlooked in the literature and there is a need for further research.

3.5 References

[1] Acemoglu, D., S. Johnson, and J.A. Robinson. 2001. The Colonial Origins of Comparative Development: An Empirical Investigation. *American Economic Review*. Vol 91. No. 5. pages 1369-1401.

[2] Angrist, J., D and J-S. Pischke. 2009. Mostly Harmless Econometrics: An Empiricist's Companion. Princeton University Press, ISBN: 9780691120355

[3] Arellano, M., and S. Bond. 1991. Some Tests of Specification for Panel Data: Monte Carlo Evidence and an Application to Employment Equations. *Review of Economic Studies*, Vol. 58(2), pages 277-97, April.

[4] Arrau, P., and S. Claessens. 1992. Commodity Stabilization Funds. Policy Research Working Paper No. 835. January. (Washington: World Bank)

[5] Barnett, S., and A. Vivanco. 2003. in J.M. Davis, R. Ossowoski and Al Fedelino, (eds). Fiscal Policy Formation and Implementation in Oil-Producing Countries. pages 1-12. August (Washington: International Monetary Fund).

[6] Barro, R. and J.W. Lee. 2010. A New Data Set of Educational Attainment in the World, 1950-2010. NBER Working Paper No. 15902. April (Cambridge, Massachusetts: National Bureau of Economic Research)

[7] Bartsch, U. 2006. "How much is Enough? Monte Carlo Simulations of an Oil Stabilization Fund for Nigeria." IMF Working Paper 06/142 (Washington: International Monetary Fund).

[8] Baum, C.F., Schaffer, M.E., and S. Stillman. 2010. Ivreg2: Stata module for extended instrumental variables/2SLS, GMM and AC/HAC, LIML and k-class regression. [Online] Available at: http://ideas.repec.org/c/boc/bocode/s425401.html

[9] Cashin, P., Liang, H., and J.C. McDermott. 2000. How Persistent Are Shocks to World Commodity Prices?. IMF Staff Papers Vol. 47(2). December. (Washington: International Monetary Fund).

[10] Collier, P., Van Der Ploeg, R., Spence, M., and A. J. Venables. 2010. Managing

Resource Revenues in Developing Countries. IMF Staff Papers Vol. 57(1). October. (Washington: International Monetary Fund).

[11] Das, S. U., Lu, Y., Mulder, C., and S. Amadou. 2009. Setting up a Sovereign Wealth Fund: Some Policy and Operational Considerations. IMF working Paper, 09/179. August. (Washington: International Monetary Fund).

[12] Devlin, J. and S. Titman. 2004. Managing Oil Price Risk in Developing Countries. *The World Bank Research Observer*, Vol. 19(1) Spring. (Washington: International bank for Reconstruction and Development/The World Bank)

[13] Engel, E., and R. Valdes. 2000. Optimal Fiscal Strategy for Mineral Exporting Countries. IMF Working Paper 00/118. (Washington: International Monetary Fund).

[14] Fasano, U. 2000. Review of the Experience with Oil Stabilization and Savings Funds in Selected Countries. IMF Working Paper 00/112. June. (Washington: International Monetary Fund).

[15] Frankel, J. 2010. The Natural Resource Curse: A Survey. NBER Working Paper No.15836. March. (Cambridge, Massachusetts: National Bureau of Economic Research)

[16] Frankel, J. C. Vegh and G. Vuletin. 2012. On Graduation from Fiscal Procyclicality. *Journal of Development Economics* Elsevier, vol. 100(1), pages 32-47.

[17] Freedom House, Freedom of Press Surveys. [Online] Available at: http://www.freedomhouse.org/template.cfm?page=1

[18] Gali, J. and R. Perotti. 2003. Fiscal policy and monetary integration in Europe. *Economic Policy*, CEPR & CES and MSH, Vol. 18(37), pages 533-572, October.

[19] Gavin, M. and R. Perotti. 1997. Fiscal Policy in Latin America. NBER Chapters, in: NBER Macroeconomics Annual 1997, Vol. 12, pages 11-72 (Cambridge, Massachusetts: National Bureau of Economic Research)

[20] Hausmann, R. and R. Rigobon. 2002. An Alternative Interpretation of the Resource Curse: Theory and Implications. NBER Working Paper No. 9424. January. (Cambridge, Massachusetts: National Bureau of Economic Research)

[21] Husain, A. M., H., Tazhibayeva, K., and A. Ter-Martirosyan. 2008. Fiscal Policy and Economic Cycles in Oil-Exporting Countries. IMF Working Paper 08/253. November. (Washington: International Monetary Fund).

[22] Ilzetzki, E. 2011. Rent-seeking Distortions and Fiscal Procyclicality. *Journal of Development Economics* Vol. 96(1), pages 30-46, September

[23] Ilzetzki, E. and C. Vegh. 2008. Procyclical Fiscal Policy in Developing Countries: Truth or Fiction. NBER Working Paper No. 14191. July. (Cambridge, Massachusetts: National Bureau of Economic Research)

[24] International Working Group on Sovereign Wealth Funds. 2008. Sovereign Wealth Funds, Generally Accepted Principles and Practices-Santiago Principles. October. [Online] Available at: www.iwg-swf.org/pubs/eng/santiagoprinciples.pdf

[25] International Monetary Fund. 2012. World Economic Outlook (Edition: October 2012). ESDS International. University of Manchester.
DOI: http://dx.doi.org/10.5257/imf/weo/201210

[26] International Monetary Fund. 2013. Direction of Trade Statistics (Edition: June 2013). Mimas, University of Manchester.DOI: http://dx.doi.org/10.5257/imf/dots/2013-06

[27] Jaimovich, D. and U. Panizza. 2007. Procyclicality or Reverse Causality?. Inter-American Development Bank Working Paper No:599. March

[28] Kaminsky, G.L., Reinhart, C. M, and C. Vegh. 2004. When It Rains, It Pours: Procyclical Capital Flows and Macroeconomic Policies. NBER Working Paper, No: 10780. September. (Cambridge, Massachusetts: National Bureau of Economic Research)

[29] Ossowski, R., Villafuerte, M., Medas, P. A., and T. Thomas. 2008. Managing the Oil Revenue Boom: The Role of Fiscal Institutions. IMF Occasional Paper No:260. April. (Washington: International Monetary Fund)

[30] PRS Group. 2012. International Country Risk Guide Researchers Dataset. http://www.prsgroup.com/ICRG.aspx

[31] Pyndick, R. 1999. The Long-run Evolution of Energy Prices. *Energy Journal*

20(2): 127

[32] Shabsigh, G. and N. Ilahi. 2007. Looking Beyond the Fiscal: Do Oil Funds Bring Macroeconomic Stability?. IMF Working Paper 07/96 (Washington: International Monetary Fund). April.

[33] Sovereign Wealth Fund Institute. SWF Rankings. http://www.swfinstitute.org/fund-rankings/

[34] Vegh, C. and G. Vuletin. 2013. Tax policy procyclicality. Avaliable Online: http://www.voxeu.org/article/tax-policy-procyclicality

Table 3.1: List of Countries

Country	Stabilization F.	Saving F.	Name	Inception	Natural Resource
Algeria	1	0	Revenue Regulation Fund	2000	oil
Azerbaijan	1	1	State Oil Fund	1999	oil
Bahrain	1	0	Reserve Fund for Strategic Projects	2000	oil
Chad	0	1	Fund for Future Generations	1999-2006	oil
Ecuador	1	0	Oil Stabilization Fund	1999	oil
Gabon	0	1	Fund for Future Generations	1998	oil
Iran	1	0	Oil Stabilization Fund	2000	oil
Kazakhstan	1	1	Kazakhstan National Fund	2001	oil
Kuwait	1	1	KIA	1960	oil
Libya	1	1	LIA/Oil Reserve Fund (replaced in 2006)	1995	oil
Mexico	1	1	Oil Stabilization Fund	2000	oil
Nigeria	1	0	Excess Crude Account	2004	oil
Norway	1	1	The Government Pension Fund of Norway	1990	oil
Oman	0	1	State General Reserve Fund	1980	oil and gas
Qatar	1	1	QIA/Stabilization Fund (replaced in 2005)	2000	oil
Russia	1	0	National Welfare Fund/Oil Stabilization Fund (replaced in 2008)	2004	oil
Saudi Arabia	0	1	SAMA Foreign Holdings	1952	oil
Sudan	1	0	Oil Saving Account	2002	oil
Trinidad and Tobago	1	1	Heritage and Stabilization Fund/Interim Rev.Stab. Fund (replaced in 2007)	2000	oil
Venezuela	1	0	FEM	1999	oil
UAE	0	1	ADIA	1976	oil
Angola	0	0	-	-	oil
Brazil	0	0	-	-	oil
Bolivia	0	0	-	-	oil and gas
Cameroon	0	0	-	-	oil
Republic of Congo	0	0	-	-	oil
Indonesia	0	0	-	-	oil
Vietnam	0	0	-	-	oil
Yemen	0	0	-	-	oil

Note: We exclude Brunei, Equatorial Guinea, and Timor-Leste from the list

Table 3.2: Oil Indicators, 2005-2008

	Oil GDP to Total GDP	Oil Exports to Total Exports of Goods &Services	Oil Revenue Total Gov. Revenue	Stab. Fund
Africa				
Angola	58.3	94.0	80.4	No
Cameroon	9.6	37.7	33.9	No
Chad	46.1	84.2	61.3	Yes
Republic of Congo	67.1	88.3	83.3	No
Gabon	51.2	80.8	62.4	Yes
Nigeria	37.2	86.2	82.3	Yes
Sudan	18.2	89.4	58.5	Yes
Middle East and Central Asia				
Algeria	44.8	93.7	76.9	Yes
Azerbaijan	52.1	88.8	54.6	Yes
Bahrain	26.3	62.0	79.5	Yes
Islamic Republic of Iran	26.2	76.2	69.6	Yes
Kazakhstan	29.2	56.2	37.9	Yes
Kuwait	57.3	83.5	94.5	Yes
Libya	79.1	95.6	73.9	Yes
Oman	48.5	74.3	84.6	Yes
Qatar	58.5	80.2	62.9	Yes
Saudi Arabia	26.7	84.5	90.3	Yes
United Arab Emirates	35.7	42.3	75.4	Yes
Yemen	32.3	81.3	73.4	No
Asia and Pacific				
Indonesia	9.6	9.7	26.8	No
Vietnam	n.a.	16.8	28.2	No
Western Hemisphere				
Bolivia	6.5	6.3	29.6	No
Ecuador	n.a.	53.6	n.a.	Yes
Mexico	n.a.	15.0	n.a.	Yes
Trinidad and Tobago	35.7	50.1	58.8	Yes
Venezuela	34.9	86.9	n.a.	Yes
Europe				
Russian Federation	n.a.	44.7	30.9	Yes

Source: IMF

Table 3.3: OLS Estimates of Fiscal Cyclicality

Dependent Variable: (Detrended Log) Real Government Expenditures

	ALL OIL RICH COUNTRIES: (1)-(6)						OIL RICH COUNTRIES WITH FUNDS: (7)-(12)					
VARIABLES	(1) FE	(2) RE	(3) AB	(4) FE	(5) RE	(6) AB	(7) FE	(8) RE	(9) AB	(10) FE	(11) RE	(12) AB
Real GDP (det. log)	0.681***	0.679***	0.655***	0.734**	0.731**	0.729***	0.472**	0.469**	0.335***	0.220	0.227	0.240
	(0.186)	(0.185)	(0.072)	(0.301)	(0.295)	(0.096)	(0.213)	(0.210)	(0.088)	(0.239)	(0.246)	(0.147)
SF Dummy*Real GDP (det.log)	-0.498*	-0.492*	-0.499***	-0.710**	-0.711**	-0.732***	-0.291	-0.283	-0.228**	-0.275	-0.274	-0.326**
	(0.255)	(0.256)	(0.101)	(0.292)	(0.290)	(0.117)	(0.248)	(0.248)	(0.114)	(0.239)	(0.249)	(0.154)
Stabilization Fund Dummy	-0.013	-0.004	-0.013	-0.010	0.004	-0.008	-0.020*	-0.012*	-0.023	-0.031	-0.004	-0.028
	(0.008)	(0.004)	(0.014)	(0.020)	(0.009)	(0.017)	(0.011)	(0.007)	(0.015)	(0.025)	(0.011)	(0.018)
Oil Prices (in logs)	0.005	-0.004	0.029	0.026	0.116**	0.033	0.022	0.010	0.048	0.032	0.133**	0.052
	(0.011)	(0.009)	(0.074)	(0.020)	(0.047)	(0.047)	(0.015)	(0.010)	(0.073)	(0.024)	(0.065)	(0.044)
Nat. Resource Rent	-0.000	0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000	0.000	0.000	-0.000	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.000)	(0.001)
Share of Oil Rev. in Total				0.001	0.000*	0.001**				0.001	0.000	0.001**
				(0.001)	(0.000)	(0.000)				(0.001)	(0.000)	(0.001)
Dem. Accountability				-0.004	-0.001	-0.004				0.004	0.003	0.003
				(0.007)	(0.005)	(0.006)				(0.008)	(0.006)	(0.007)
Bur. Quality				-0.002	0.003	0.001				-0.005	-0.001	-0.002
				(0.011)	(0.006)	(0.011)				(0.012)	(0.006)	(0.012)
Law and Order				0.004	0.004	0.000				0.004	0.006	-0.000
				(0.009)	(0.005)	(0.010)				(0.011)	(0.008)	(0.010)
Government Stability				-0.001	-0.002	-0.001				-0.001	-0.002	0.002
				(0.005)	(0.003)	(0.004)				(0.006)	(0.004)	(0.005)
Corruption				-0.005	-0.002	-0.004				-0.009	-0.004	-0.010
				(0.009)	(0.005)	(0.009)				(0.011)	(0.007)	(0.011)
Socioeconomic Conditions				-0.009**	-0.004**	-0.008*				-0.011**	-0.004	-0.008*
				(0.003)	(0.002)	(0.004)				(0.005)	(0.003)	(0.005)
L.Real Gov. Exp. (det. log)			-0.004			-0.009			0.050			0.127**
			(0.037)			(0.045)			(0.042)			(0.053)
L.Real GDP (det. log)			0.070			0.121*			0.199***			0.281***
			(0.059)			(0.071)			(0.062)			(0.079)
Constant	-0.011	0.024	-0.124	-0.097	-0.515**	-0.140	-0.075	-0.026	-0.192	-0.110	-0.592**	-0.211
	(0.043)	(0.032)	(0.342)	(0.078)	(0.203)	(0.215)	(0.055)	(0.037)	(0.331)	(0.107)	(0.288)	(0.200)
Observations	717	717	660	455	455	426	519	519	477	332	332	311
R-squared	0.230			0.294			0.184			0.211		
Number of code	29	29	29	24	24	24	21	21	21	17	17	17
Year FE	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.4: List of Endogenous Variables and Instruments

Endogenous Variable	**Alternative (1)**	**Alternative (2)**	**Alternative (3)**	**Alternative (4)**
GDP Growth	i) Growth of trade partners (Jaimovich and Panizza)	-	-	-
Stabilization Fund	i) Urban Population (% of Total) ii) 5^{th} lag of Average Years of Schooling (Barro-Lee) iii) 5^{th} lag of Pop. With Tertiary Education (%) (Barro-Lee)	i)Urban Population (% of Total) ii) 10^{th} lag of Average Years of Schooling (Barro-Lee) iii) 10^{th} lag of Pop. With Tertiary Education (%) (Barro-Lee)	Urban Population (% of Total) x No. of Oil-Rich Countries with Funds	i) Urban Population (% of Total) x No. of Oil-Rich Countries with Funds ii) Freedom of Fress
Institutions	i) 5^{th} lag of ICRG Rating of the Neighbouring Countries	i) 10^{th} lag of ICRG Rating of the Neighbouring Countries	-	-

Table 3.5: Two Stage Least Squares Estimates Using IV by Panizza and Jaimovich (2007)[(1)]

Dependent Variable: (Detrended Log) Real Government Expenditure Growth

	ALL OIL RICH COUNTRIES: (1)-(4)				OIL RICH COUNTRIES WITH FUNDS: (5)-(8)			
VARIABLES	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) 2SLS
Real GDP Growth	0.585***	0.461***	0.489***	0.449***	0.491**	0.244	0.328	0.263
	(0.146)	(0.154)	(0.136)	(0.135)	(0.231)	(0.213)	(0.208)	(0.205)
SF Dummy*Real GDP Growth	-0.437***	-0.305*	-0.338**	-0.323**	-0.371	-0.133	-0.207	-0.193
	(0.167)	(0.169)	(0.156)	(0.155)	(0.251)	(0.231)	(0.227)	(0.222)
Oil Prices (in logs)	0.007	0.014	0.008	0.010	0.010	0.017*	0.010	0.014
	(0.007)	(0.010)	(0.008)	(0.008)	(0.008)	(0.009)	(0.008)	(0.009)
Stabilization Fund Dummy	-0.039***	-0.037***	-0.043***	-0.041***	-0.044***	-0.041***	-0.050***	-0.054***
	(0.010)	(0.010)	(0.014)	(0.013)	(0.011)	(0.013)	(0.017)	(0.018)
Natural Resource Rent	0.000	0.000	0.000	0.000	0.001	0.001**	0.001***	0.001***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)
Share of Oil Revenues in Total	0.002**	0.002**	0.002**	0.002**	0.001*	0.001	0.001	0.002
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Democratic Accountability			-0.003				0.000	
			(0.003)				(0.004)	
Bureaucratic Quality			-0.009				-0.015	
			(0.013)				(0.015)	
Law and Order			-0.014*				-0.021**	
			(0.007)				(0.009)	
ICRG Composite Index		-0.001				-0.002		
		(0.001)				(0.002)		
Government Stability				0.000				0.001
				(0.003)				(0.005)
Corruption				0.007				0.007
				(0.005)				(0.007)
Socioeconomic Conditions				-0.005				-0.008*
				(0.004)				(0.005)
Observations	453	449	449	449	331	327	327	327
R-squared	0.195	0.156	0.164	0.157	0.107	0.067	0.077	0.072
Number of countries	24	24	24	24	17	17	17	17
Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES

(1) Using the contemporeanous value and the three lags of growth of trade partners weighted by export shares
Robust standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.6: First Stage Statistics: 2SLS Estimations Using IV by Panizza and Jaimovich (2007)

Dependent Variable: Real GDP Expenditure Growth

	ALL OIL RICH COUNTRIES: (1)-(4)				OIL RICH COUNTRIES WITH FUNDS: (5)-(8)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Coefficients of Excluded Instruments								
Real GDP Growth								
External Shocks	0.0511***	0.0525***	0.0521***	0.0539***	0.0505***	0.0509***	0.0522***	0.0532***
	(0.008)	(0.009)	(0.009)	(0.009)	(0.008)	(0.01)	(0.012)	(0.010)
L1.External Shocks	0.001	-0.0127	-0.0132	-0.0138	0.007	-0.0187***	-0.0188***	-0.0182***
	(0.015)	(0.006)	(0.005)	(0.006)	(0.025)	(0.004)	(0.005)	(0.005)
L2.External Shocks	-0.0151	-0.0041	-0.0053	-0.0038	-0.0084	0.0106	0.0099	0.0102
	(0.013)	(0.011)	(0.011)	(0.010)	(0.017)	(0.012)	(0.013)	(0.012)
L3.External Shocks	0.0032	0.0014	-0.0027	0.0012	0.0013	-0.0019	-0.0058	-0.004
	(0.004)	(0.004)	(0.004)	(0.005)	(0.004)	(0.005)	(0.005)	(0.006)
*Oil dummy*Real GDP Growth*								
Oil Dummy*External Shocks	0.0685***	0.0689***	0.0679***	0.0652***	0.0693***	0.0686***	0.0671***	0.0643***
	(0.004)	(0.004)	(0.005)	(0.006)	(0.005)	(0.006)	(0.006)	(0.007)
Oil Dummy*L1.External Shocks	-0.0119	-0.0124	-0.0132	-0.0145	-0.011	-0.012	-0.0141	-0.0143
	(0.007)	(0.007)	(0.007)	(0.008)	(0.008)	(0.008)	(0.009)	(0.009)
Oil Dummy*L2.External Shocks	-0.0363***	-0.0363***	-0.0364***	-0.0376***	-0.0381***	-0.0381**	-0.0385**	-0.0393**
	(0.011)	(0.012)	(0.012)	(0.013)	(0.012)	(0.013)	(0.0126)	(0.014)
Oil Dummy*L3.External Shocks	-0.0097	-0.0097	-0.0099	-0.0110	-0.0082	-0.0083	-0.0101	-0.0101
	(0.009)	(0.009)	(0.009)	(0.009)	(0.009)	(0.01)	(0.009)	(0.010)
F test of excluded instruments								
Real GDP Growth	52.98	54.80	42.24	65.72	146.39	681.12	392.54	308.98
Oil Dummy*Real GDP Growth	74.53	48.53	49.01	60.71	100.6	82	151.84	414.49
Tests of Weak Inst.-Robust Inf.								
Hansen J Statistic (Overident. Test)(1)	13.13	12.25	12.98	13.13	13.79	11.81	15.77	13.90
	p-val (0.16)	p-val (0.27)	p-val (0.37)	p-val (0.36)	p-val (0.13)	p-val (0.29)	p-val (0.26)	p-val (0.38)
Wu-Hausman Test of Endogenous Regressors(2)	1.87	0.18	0.28	0.81	1.34	0.049	0.59	0.88
	p-val (0.39)	p-val (0.91)	p-val (0.87)	p-val (0.67)	p-val (0.49)	p-val (0.98)	p-val (0.74)	p-val (0.65)
Weak Identification Test (K.-Paap Wald F)	6.41	6.41	9.09	8.92	23.21	31.55	139.13	51.07
(Stock-Yogo Crit Val. for 10% IV Rel. Bias)	10.69	10.78	10.89	10.89	10.69	10.78	10.89	10.89

(1) Null Hypothesis: instruments are valid instruments, i.e., uncorrelated with the error term

(2) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.7: Instrumenting for the Introduction of the Stabilization Fund

Dependent Variable: (Detrended Log) Real Government Expenditures

Instruments:
Columns (1)-(3)-(5)-(7): Urban Population (% of total), 5th Lags of Ave. Years of Education and Population with Tertiary Education (% of total)
Columns (2)-(4)-(6)-(8): Urban Population (% of total), 10th Lags of Ave. Years of Education and Population with Tertiary Education (% of total)

	ALL OIL RICH COUNTRIES: (1)-(4)				OIL RICH COUNTRIES WITH FUNDS: (5)-(8)			
VARIABLES	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS	(5) 2SLS	(6) 2SLS	(7) 2SLS	(8) 2SLS
Stabilization Fund Dummy	-0.031	-0.057	-0.033	-0.065	-0.051	-0.053	-0.069	-0.077
	(0.051)	(0.060)	(0.055)	(0.070)	(0.053)	(0.057)	(0.064)	(0.074)
Real GDP (detrended log)	0.457***	0.429***	0.460***	0.433***	0.502*	0.497*	0.510*	0.501*
	(0.157)	(0.161)	(0.152)	(0.156)	(0.273)	(0.285)	(0.282)	(0.290)
SF Dummy*Real GDP (detrended log)	-0.508***	-0.499**	-0.508***	-0.497***	-0.583**	-0.580*	-0.557*	-0.550*
	(0.195)	(0.195)	(0.191)	(0.190)	(0.294)	(0.297)	(0.306)	(0.308)
Oil Prices (in logs)	0.010	0.014	0.004	0.009	0.021	0.022	0.024	0.026
	(0.012)	(0.013)	(0.013)	(0.016)	(0.016)	(0.017)	(0.021)	(0.025)
Share of Oil Revenues in Total	0.000	0.000	0.000	0.001	0.000	0.000	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Natural Resource Rent	0.001*	0.001*	0.001	0.001	0.001*	0.001*	0.001	0.001
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
ICRG Composite Index	-0.001	-0.001			-0.001	-0.001		
	(0.001)	(0.001)			(0.001)	(0.001)		
Democratic Accountability			-0.005	-0.005			0.002	0.002
			(0.006)	(0.006)			(0.008)	(0.008)
Bureaucratic Quality			-0.011	-0.014			-0.016	-0.017
			(0.012)	(0.013)			(0.014)	(0.014)
Law and Order			-0.013*	-0.013			-0.013	-0.013
			(0.008)	(0.008)			(0.010)	(0.010)
Government Stability			0.001	0.002			0.004	0.004
			(0.004)	(0.004)			(0.006)	(0.006)
Corruption			0.004	0.002			-0.004	-0.005
			(0.008)	(0.009)			(0.013)	(0.014)
Socioeconomic Conditions			0.001	0.001			-0.003	-0.004
			(0.005)	(0.005)			(0.006)	(0.007)
Observations	382	382	382	382	275	275	275	275
R-squared	0.089	0.075	0.098	0.084	0.076	0.075	0.082	0.076
Number of countries	20	20	20	20	14	14	14	14
Country Fixed Effects	YES	YES	YES	YES	YES	YES	YES	YES

Robust standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.8: First Stage Statistics: 2SLS Estimations Using Proxy for Awareness

Dependent Variable: Oil Stabilization Fund Dummy

	ALL OIL RICH COUNTRIES: (1)-(4)				OIL RICH COUNTRIES WITH FUNDS: (5)-(8)			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Coefficients of Excluded Instruments								
Urban population (% of total)	0.003	0.012*	0.008	0.016**	0.029***	0.039***	0.029***	0.038***
	(0.006)	(0.006)	(0.007)	(0.007)	(0.007)	(0.007)	(0.009)	(0.009)
L5.Averge years of schooling	0.165***		0.136***		0.112**		0.035	
	(0.041)		(0.042)		(0.046)		(0.057)	
L5.Population with tertiary edu. (% of total)	0.041**		0.056***		0.025		0.044**	
	(0.016)		(0.016)		(0.017)		(0.018)	
L10.Averge years of schooling		0.108**		0.087*		0.056		-0.024
		(0.042)		(0.046)		(0.046)		(0.059)
L10.Population with tertiary edu. (% of total)		0.022		0.033		-0.013		0.007
		(0.023)		(0.023)		(0.024)		(0.027)
F test of excluded instruments	21.20	10.37	23.46	9.0	26.83	16.33	15.06	7.29
Tests of Weak Inst.-Robust Inf.								
Hansen J Statistic (Overident.Test)(1)	1.99	0.702	2.54	1.35	1.76	0.557	4.70	2.67
	p-val (0.36)	p-val (0.704)	p-val (0.28)	p-val (0.51)	p-val (0.41)	p-val (0.75)	p-val (0.10)	p-val (0.26)
Wu-Hausman Test of Endog. Reg.(2)	0.23	0.41	0.007	0.14	0.30	0.23	0.008	0.05
	p-val (0.64)	p-val (0.52)	p-val (0.93)	p-val (0.70)	p-val (0.58)	p-val (0.62)	p-val (0.93)	p-val (0.83)
Weak Ident. Test (K-P. Wald F)	21.2	10.37	23.5	9.00	26.8	16.3	15.1	7.3
(Stock-Yogo Crit. Val. for 10% IV Rel. Bias)	9.08	9.08	9.08	9.08	9.08	9.08	9.08	9.08

(1) Null Hypothesis: instruments are valid instruments, i.e., uncorrelated with the error term

(2) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.9: Instrumenting for the Introduction of the Stabilization Fund-All Oil Rich Countries

Dependent Variable: (Detrended Log) Real Government Expenditures
Instruments:
Columns (1) and (3): Proxy for Awareness (Number of Other Countries with a Fund Interacted with Urbanization)
Columns (2) and (4): Proxy for Awareness and Freedom of Press Index

VARIABLES	(1) 2SLS	(2) 2SLS	(3) 2SLS	(4) 2SLS
Stabilization Fund Dummy	-0.052	0.010	-0.108	-0.018
	(0.054)	(0.058)	(0.078)	(0.087)
Real GDP (detrended log)	0.732***	0.818***	0.667***	0.771***
	(0.155)	(0.158)	(0.178)	(0.186)
SF Dummy*Real GDP (detrended log)	-0.752***	-0.571***	-0.684***	-0.538**
	(0.206)	(0.190)	(0.210)	(0.209)
Oil Prices (in logs)	0.018	-0.001	0.027	0.003
	(0.017)	(0.016)	(0.020)	(0.020)
Natural Resource Rent	0.001	0.001	0.001*	0.001
	(0.001)	(0.001)	(0.001)	(0.001)
Share of Oil Revenues in Total	-0.000	-0.000	-0.000	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Democratic Accountability			0.001	-0.003
			(0.007)	(0.008)
Bureaucratic Quality			-0.011	-0.006
			(0.013)	(0.015)
Law and Order			-0.007	-0.013
			(0.009)	(0.014)
Government Stability			0.004	0.001
			(0.005)	(0.005)
Corruption			-0.012	-0.006
			(0.011)	(0.010)
Socioeconomic Conditions			-0.006	0.000
			(0.004)	(0.006)
Observations	433	382	428	377
R-squared	0.200	0.235	0.149	0.213
Number of countries	24	24	24	24
Country Fixed Effects	YES	YES	YES	YES

Robust standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.10: First Stage Statistics: 2SLS Estimations Using Urbanization and Freedom of Press as Instruments-All Oil Rich Countries

	(1)	(2)	(3)	(4)
Coefficients				
Proxy for Awareness	0.0003***	0.0003***	0.0002***	0.0002***
	(0.00003)	(0.00005)	(0.00005)	(0.00006)
Free Press		-0.004***		-0.004***
		(0.002)		(0.002)
F test of excluded instruments				
Stabilization Fund Dummy	50.27	20.19	22.26	11.22
Tests of Weak Instruments-Robust Inference				
Hansen J Statistic (Overidentification Test)(1)		0.622		1.057
		p-val (0.43)		p-val (0.30)
Wu-Hausman Test of Endogenous Regressors(2)	0.04	0.68	0.079	0.30
	p-val (0.84)	p-val (0.41)	p-val (0.78)	p-val (0.60)
Weak Identification Test (Kleibergen-Paap Wald F)	50.27	20.19	22.26	11.22
(Stock-Yogo Critical Values for 10 percent IV Relative Bias)	16.38	19.93	16.38	19.93

(1) Null Hypothesis: instruments are valid instruments, i.e., uncorrelated with the error term

(2) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.11: Instrumenting for the Institutions (As Proxied by ICRG Composite Index)

Dependent Variable: (Detrended Log) Real Government Expenditures

Instruments:
Columns (1) and (3): 5th Lag of Average ICRG Index of Neighbouring Countries
Columns (2) and (4): 10th Lag of Average ICRG Index of Neighbouring Countries

VARIABLES	(1) 2SLS All Oil Count.	(2) 2SLS All Oil Count.	(3) 2SLS Count. with Oil Funds	(4) 2SLS Count. with Oil Funds
Real GDP (detrended log)	0.699***	0.733***	0.272	0.155
	(0.181)	(0.206)	(0.212)	(0.242)
SF Dummy*Real GDP (detrended log)	-0.661***	-0.514**	-0.276	0.044
	(0.225)	(0.233)	(0.245)	(0.251)
Stabilization Fund Dummy	-0.018	-0.016	-0.028	-0.040
	(0.022)	(0.030)	(0.026)	(0.031)
Oil Prices (in logs)	0.006	0.006	0.017	-0.005
	(0.019)	(0.049)	(0.016)	(0.030)
Natural Resource Rent	0.001	0.000	0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)
Share of Oil Revenues in Total	0.000	0.000	0.001	-0.001
	(0.001)	(0.001)	(0.001)	(0.002)
ICRG Composite Index	-0.001	0.000	-0.002	0.008
	(0.003)	(0.010)	(0.003)	(0.010)
Observations	441	368	318	255
R-squared	0.165	0.199	0.055	0.040
Number of countries	24	24	17	17
Country Fixed Effects	YES	YES	YES	YES

Robust standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.12: First Stage Statistics: 2SLS Estimations Instrumenting for Institutions

VARIABLES	(1) All Countries	(2) All Countries	(3) Countries with Oil Funds	(4) Countries with Oil Funds
Coefficients of Excluded Instruments				
ICRG Composite Index				
L5.Average icrg index of neighbouring countries	0.327***		0.37***	
	(0.06)		(0.07)	
L10.Average icrg index of neighbouring countries		0.095**		0.096**
		(0.04)		(0.04)
F test of excluded instruments	29.48	5.12	29.13	4.67
Tests of Weak Instruments-Robust Inference				
Wu-Hausman Test of Endogenous Regressors(1)	0.04	0.00	0.18	0.28
	p-val (0.84)	p-val (0.98)	p-val (0.67)	p-val (0.59)
Weak Identification Test (Kleibergen-Paap Wald F)	29.48	5.12	29.13	4.67
(Stock-Yogo Critical Values for 10% IV Relative Bias)	16.38	16.38	16.38	16.38

(1) Null Hypothesis: specified endogenous regressors can actually be treated as exogenous

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.13: First Stage Statistics: Instrumenting for the Real GDP Growth and the Stabilization Fund

Instruments: External Shocks (Panizza and Jaimovich (2007)) and Proxy For Awareness
Column (1): ALL OIL RICH COUNTRIES
Column (2): OIL RICH COUNTRIES WITH FUNDS

	(1)	(2)
Coefficients		
Real GDP Growth		
External Shocks	0.0378	0.0686***
	(0.023)	(0.012)
Oil dummy		
Urban population (% of total)	0.0128	0.0364*
	(0.027)	(0.018)
L5.Population with tertiary education (% of total)	0.1767	0.3351***
	(0.125)	(0.096)
F test of excluded instruments		
Real GDP Growth	39.91	187.32
Oil Dummy	11.96	53.16
Tests of Weak Instruments-Robust Inference		
Hansen J Statistic (Overidentification Test)(1)	11.08	9.75
	p-val (0.35)	p-val (0.46)
Weak Identification Test (Kleibergen-Paap Wald F)	3.316	10.09
(Stock-Yogo Critical Values for 10% IV Relative Bias)	10.14	10.14

(1) Null Hypothesis: instruments are valid instruments, i.e., uncorrelated with the error term

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.14: Instrumenting for the Real GDP Growth and the Stabilization Fund

Dependent Variable: (Detrended Log) Real Government Expenditures
Instruments: External Shocks (Panizza and Jaimovich (2007)) and Proxy For Awareness
Column (1): ALL OIL RICH COUNTRIES
Column (2): OIL RICH COUNTRIES WITH FUNDS

VARIABLES	(1) 2SLS	(2) 2SLS
Real GDP Growth	0.670***	0.543
	(0.217)	(0.613)
SF Dummy*Real GDP Growth	-0.625**	-0.444
	(0.286)	(0.672)
Stabilization Fund Dummy	-0.024	-0.032
	(0.035)	(0.034)
ICRG Composite Index	0.005	0.017
	(0.008)	(0.013)
Oil Prices (in logs)	0.002***	0.002***
	(0.001)	(0.001)
Natural Resource Rent	0.001	0.001
	(0.001)	(0.001)
Share of Oil Revenues in Total	-0.002	-0.002
	(0.001)	(0.002)
Observations	380	273
R-squared	0.086	0.100
Number of countries	20	14
Country Fixed Effects	YES	YES

Robust standard errors in paranthesis
(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively

Table 3.15: T-tests of Growth Differences

	Mean(Fund=1)[1]	Mean (Fund=0)	Difference[2]
3 Year Growth			
Real Household Final Consumption	0.2001	0.1134	0.0868***
	(0.0153)	(0.017)	(0.0243)
Real Government Final Consumption	0.2376	0.1298	0.1078***
	(0.0194)	(0.0194)	(0.0291)
Real Fixed Gross Capital Formation	0.3753	0.1584	0.2168***
	(0.0404)	(0.0236)	(0.0440)
Real GDP	0.1617	0.1316	0.0301**
	(0.0113)	(0.0081)	(0.0136)
Real General Government Expenditures	0.2064	0.1576	0.0488*
	(0.0183)	(0.0175)	(0.0259)
Real General Government Revenues	0.2367	0.2106	0.0260
	(0.0207)	(0.0205)	(0.0300)
4 Year Growth			
Real Household Final Consumption	0.2784	0.165	0.1133***
	(0.0200)	(0.0203)	(0.0300)
Real Government Final Consumption	0.3387	0.193	0.1457***
	(0.0271)	(0.0245)	(0.0375)
Real Fixed Gross Capital Formation	0.5577	0.2281	0.3295***
	(0.058)	(0.0284)	(0.0585)
Real GDP	0.2251	0.1872	0.037**
	(0.0153)	(0.0107)	(0.0181)
Real General Government Expenditures	0.2932	0.2167	0.076**
	(0.0236)	(0.0234)	(0.0330)
Real General Government Revenues	0.3246	0.2983	0.0262
	(0.0278)	(0.0254)	(0.496)

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively
(1)Oil Fund dummy takes on the value 1 in the 3rd year (4th for the second panel) of oil fund
(2)Null Hypothesis = Mean Gr.(Fund=1) - Mean Gr.(Fund=0) == 0
(3) Data source for cons. and inv. are WDI and for GDP,
Expenditures and Revenues from WEO and IMF Country Desk

Table 3.16: T-tests of Volatility Differences

	Standard Dev.(Fund=1)[(1)]	Standard Dev.(Fund=0)	Diff.[(2)]
Volatility over 3 Year Window			
Real Household Final Consumption	0.0459	0.0514	-0.0054
	(0.0035)	(0.003)	(0.0047)
Real Government Final Consumption	0.0464	0.0744	-0.0279***
	(0.0029)	(0.0037	(0.0052)
Real Fixed Gross Capital Formation	0.0782	0.0977	-0.0195***
	(0.0041)	(0.0038)	(0.0059)
Real GDP	0.0616	0.0547	0.0069
	(0.0038)	(0.0026)	(0.0045)
Real General Government Expenditures	0.067	0.088	-0.0214***
	(0.0033)	(0.0040)	(0.0056)
Real General Government Revenues	0.1130	0.1131	-0.0001
	(0.0057)	(0.0048)	(0.0076)
Volatility over 4 Year Window			
Real Household Final Consumption	0.0486	0.055	-0.0063
	(0.0036)	(0.0029)	(0.0047)
Real Government Final Consumption	0.0502	0.08	-0.0298***
	(0.003)	(0.0037)	(0.0053)
Real Fixed Gross Capital Formation	0.0794	0.0993	-0.0198***
	(0.004)	(0.0037)	(0.0058)
Real GDP	0.0675	0.0579	-0.0095**
	(0.0037)	(0.0024)	(0.0043)
Real General Government Expenditures	0.0712	0.0932	-0.0220***
	(0.0033)	(0.0037)	(0.0054)
Real General Government Revenues	0.1220	0.1195	0.0005
	(0.0066)	(0.0041)	(0.007)

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively
(1)Oil Fund dummy takes on the value 1 in the 3rd year (4th for the second panel) of oil fund
(2)Null Hypothesis = Mean Std.(Fund=1) - Mean Std.(Fund=0) == 0
(3) Data source for cons. and inv. are WDI and for GDP,
Expenditures and Revenues from WEO and IMF Country Desk
(4)All variables are in detrended logs and s.deviations are rolling over 3 and 4 year windows

Table 3.17: Test of Volatility Differences, Relative to GDP Volatility

	Relative Std.(Fund=1)[(1)]	Relative Std.(Fund=0)	Diff.[(2)]
Volatility over 3 Year Window			
Real Household Final Consumption	1.201	1.627	-0.418**
	(0.1416)	(0.1203)	(0.188)
Real Government Final Consumption	1.379	2.582	-1.2032***
	(0.119)	(0.2181)	(0.2875)
Real Fixed Gross Capital Formation	2.336	3.725	-1.388***
	(0.1968)	(0.279)	(0.3812)
Real General Government Expenditures	1.8371	2.9251	-1.088***
	(0.1580)	(0.2617)	(0.3295)
Real General Government Revenues	2.5710	3.9149	-1.3432*
	(0.1592)	(0.6156)	(0.7653)
Volatility over 4 Year Window			
Real Household Final Consumption	0.9422	1.1942	-0.2519**
	(0.1048)	(0.066)	(0.1185)
Real Government Final Consumption	1.1467	2.0856	-0.9388***
	(0.0912)	(0.1073)	(0.1549)
Real Fixed Gross Capital Formation	1.747	2.883	-1.1359***
	(0.131)	(0.1639)	(0.2348)
Real General Government Expenditures	1.4732	2.3981	-0.9249***
	(0.1039)	(0.1198)	(0.1720)
Real General Government Revenues	2.2656	3.2264	-0.9608**
	(0.1170)	(0.3692)	(0.4746)

(*), (**) and (***) denote significance at 10%, 5% and 1%, respectively
(1)Oil Fund dummy takes on the value 1 in the 3rd year (4th for the second panel) of oil fund
(2)Null Hypothesis = Mean of Relative Std.(Fund=1)-Mean of Relative Std.(Fund=0) == 0
(3) Data source for cons. and inv. are WDI and for GDP,
Expenditures and Revenues from WEO and IMF Country Desk
(4)All variables are in detrended logs and s.deviations are rolling over 3 and 4 year windows

Figure 3.2: Volatility of Household Final Consumption in Countries With Funds (Detrended)

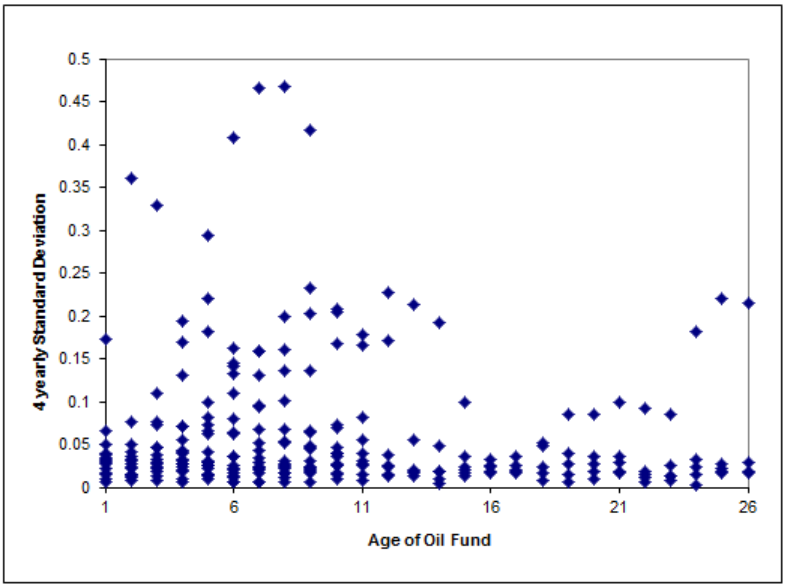


Figure 3.3: Volatility of Household Final Consumption in Countries Without Funds (Detrended)

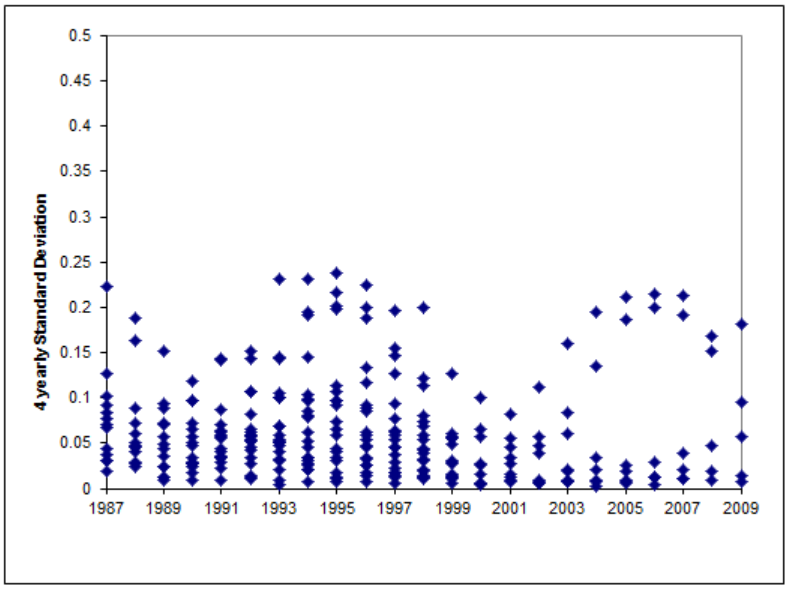


Figure 3.4: Volatility of Gross Fixed Capital Formation in Countries With Oil Funds (Detrended)

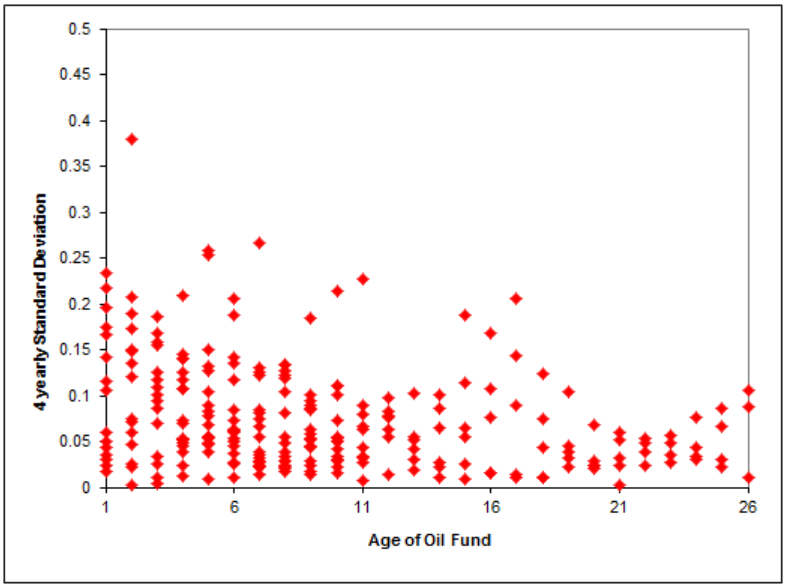


Figure 3.5: Volatility of Gross Fixed Capital Formation in Countries Without Funds (Detrended)

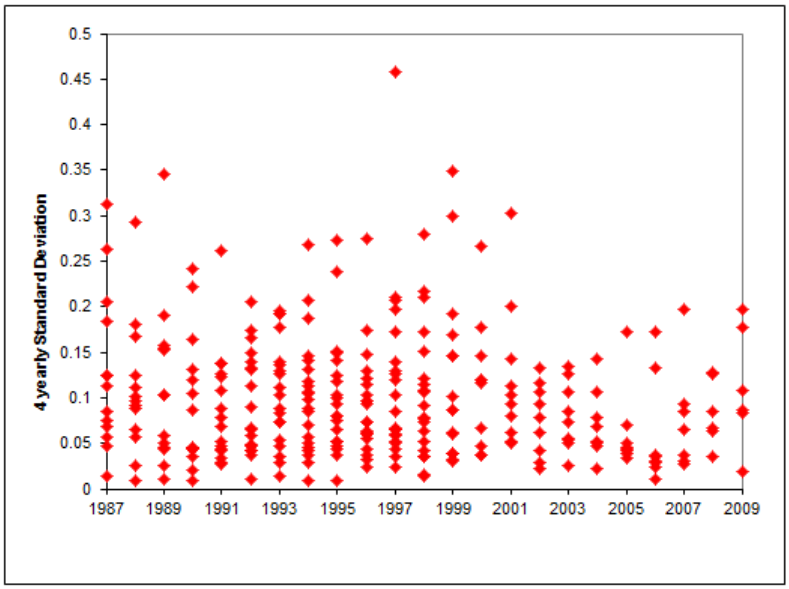


Figure 3.6: Volatility of General Government Expenditures in Countries With Oil Funds (Detrended)

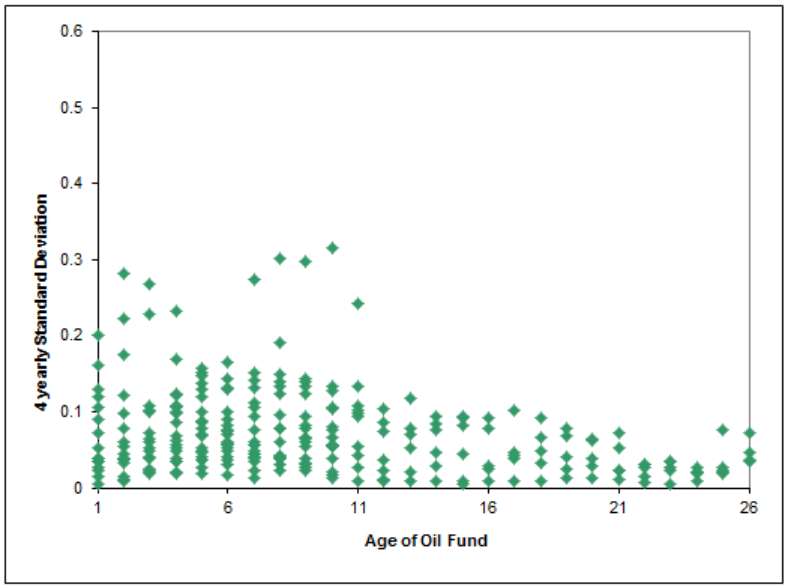


Figure 3.7: Volatility of General Government Expenditures in Countries Without Oil Funds (Detrended)

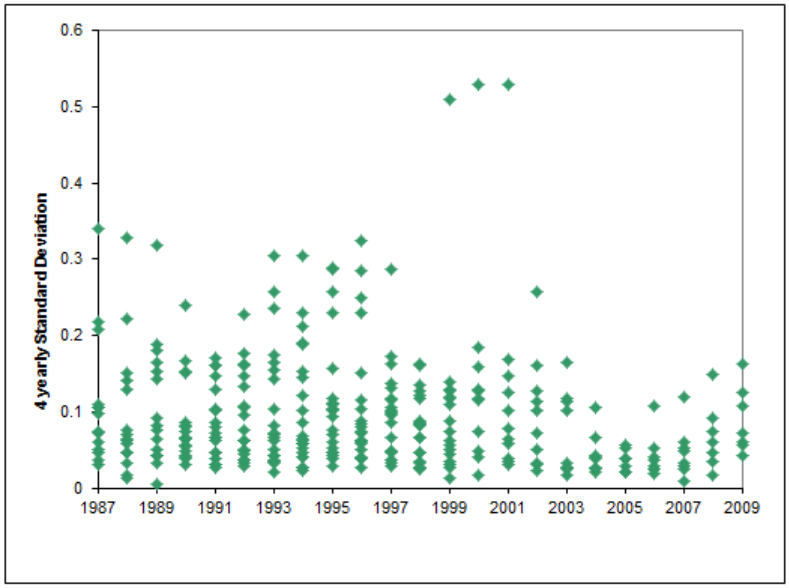


Figure 3.8: General Government Expenditure Volatility Over Time in Countries With Funds

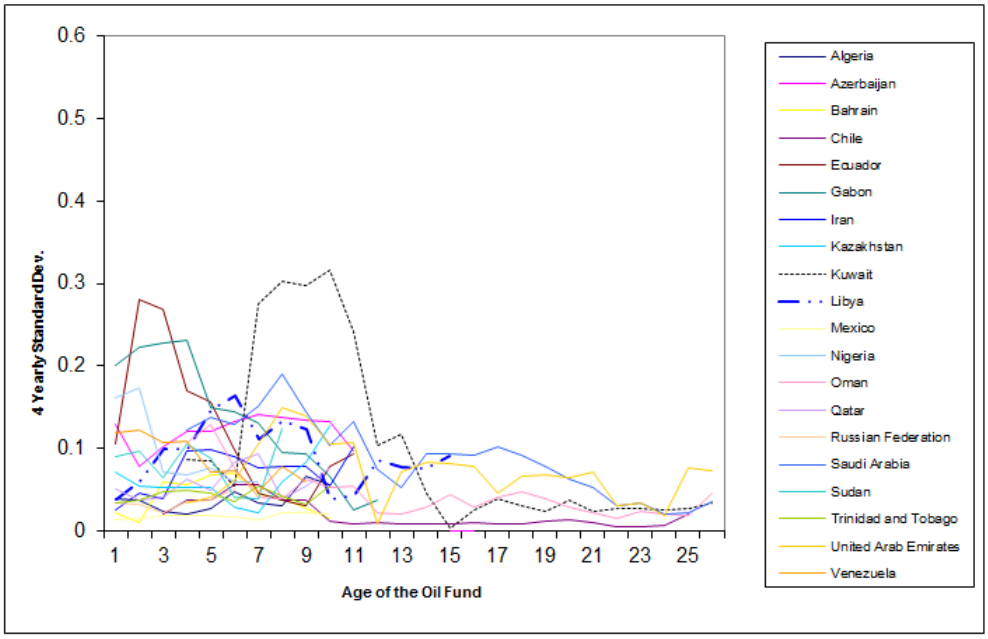


Figure 3.9: General Government Expenditure Volatility Over Time in Countries Without Funds

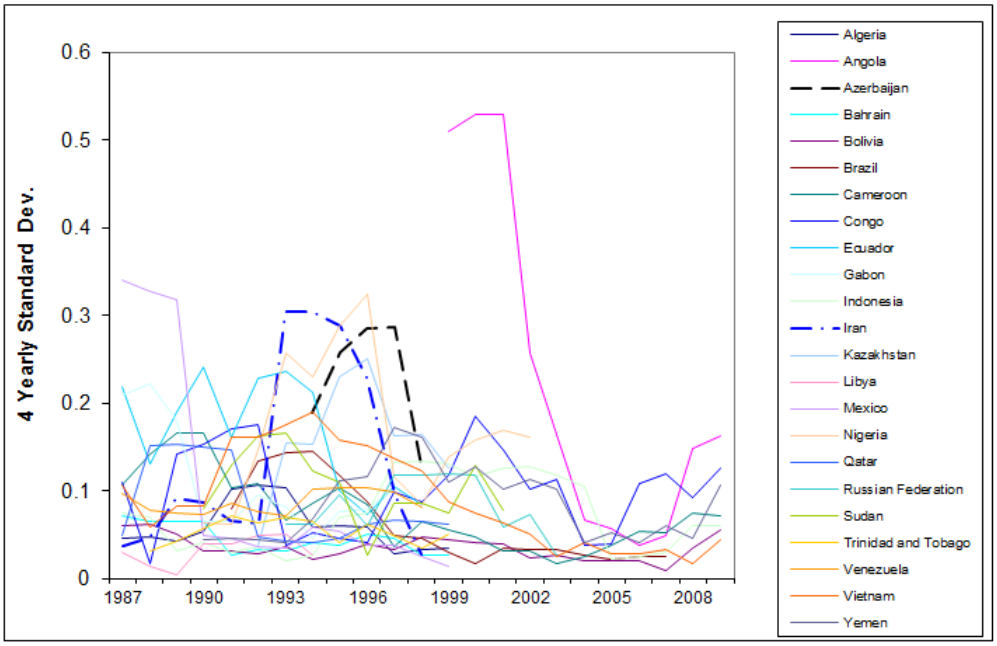


Figure 3.10: Investment Volatility by Oil Fund Country

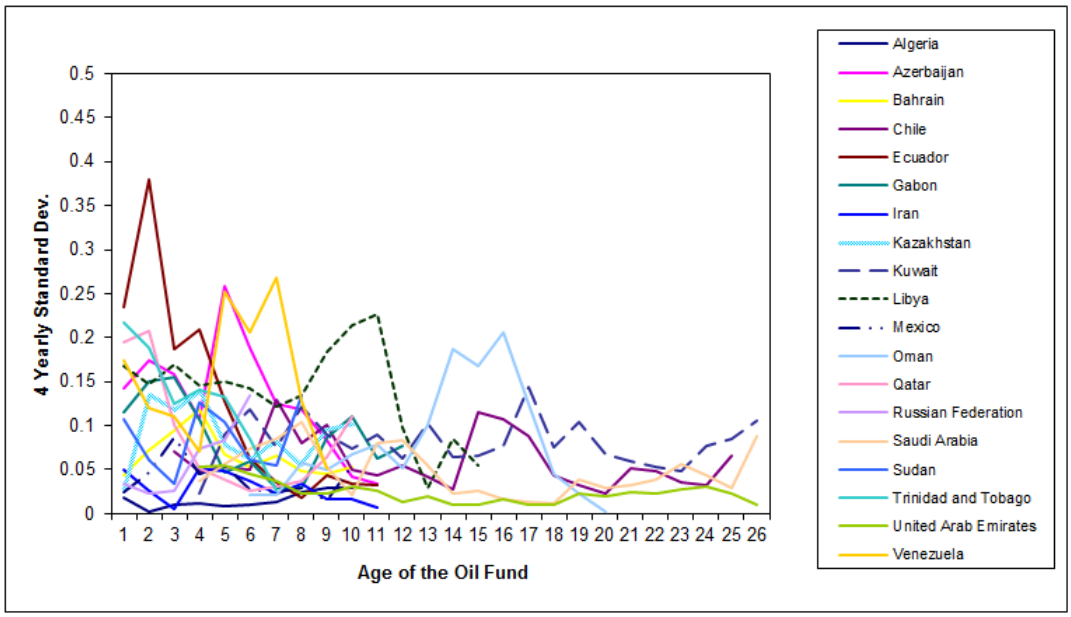


Figure 3.11: Investment Volatility in Countries Without Funds