

GROWTH EFFECTS OF LOCAL GOVERNMENT SPENDING:
EVIDENCE FROM OUTER SPACE

A THESIS SUBMITTED TO
THE GRADUATE SCHOOL OF SOCIAL SCIENCES OF
THE MIDDLE EAST TECHNICAL UNIVERSITY
BY

ELİF SEMRA CEYLAN

IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE
DEGREE OF MASTER OF SCIENCE
IN
THE DEPARTMENT OF ECONOMICS

SEPTEMBER 2016

Approval of the Graduate School of Social Sciences

Prof. Dr. Tülin Gençöz
Director

I certify that this thesis satisfies all the requirements as a thesis for the degree of Master of Science.

Prof. Dr. Nadir Öcal
Head of Department

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

Assoc. Prof. Dr. Semih Tümen
Co-Supervisor

Prof. Dr. Nadir Öcal
Supervisor

Examining Committee Members

Assoc. Prof. Dr. Ozan Eruygur (Gazi Üni, ECON)

Prof. Dr. Nadir Öcal (METU, ECON)

Assoc. Prof. Dr. Hakan Ercan (METU, ECON)

I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Name, Last name : Elif Semra, Ceylan

Signature :

ABSTRACT

GROWTH EFFECTS OF LOCAL GOVERNMENT SPENDING: EVIDENCE FROM OUTER SPACE

Ceylan, Elif Semra

Msc., Department of Economics

Supervisor: Prof. Dr. Nadir Öcal

Co-Supervisor: Assoc. Prof. Dr. Semih Tümen

September 2016, 71 pages

In this study, we estimate the local government spending multiplier for Turkey using the province-level variation in government spending for 2002-2013. The main difficulty is that there is no official province-level GDP reported for this period. We use the night lights data as a proxy to construct province-level GDP indices for Turkey between 2002-2013. Employing an instrumental variables (IV) strategy motivated by the structure/timing of local elections in Turkey, we find that 1 Turkish lira public investment generates up to 2.7 Turkish lira national income. This suggests that the fiscal multiplier is around 2.7 in Turkey, which is above the fiscal multiplier estimates reported in the literature. This results contributes to the recent debates on the effectiveness of government spending by showing that fiscal policy has a great potential to lift economic growth.

Keywords: Regional growth, local government spending, night lights, elections.

ÖZ

YEREL KAMU HARCAMALARININ BÜYÜME ETKİLERİ: UZAYDAN KANITLAR

Ceylan, Elif Semra

Yüksek Lisans, İktisat Bölümü

Tez Yöneticisi: Prof. Dr. Nadir Öcal

Ortak Tez Yöneticisi: Doç. Dr. Semih Tümen

Eylül 2016, 71 sayfa

Bu çalışma, 2002-2013 yıllarında Türkiye’de il düzeyinde gerçekleşen kamu harcamalarının yerel ekonomik kalkınma üzerine etkisini incelemektedir. Çalışma kapsamında gece ışıkları verisi kullanılarak Türkiye için il bazında, 2002-2013 yılları için GSYİH endeksi oluşturulmuş; yerel seçimlerin yapısı ve zamanlaması üzerinden bir Enstrümental Değişkenler (IV) yaklaşımı kurgulanarak kamu yatırımlarının yerel ekonomik kalkınma üzerine etkisi tahmin edilmiştir. Buna göre Türkiye’de il düzeyinde gerçekleşen 1 Türk lirası kamu yatırımı gece ışıkları kullanılarak hesaplanan GSYİH’yi 2.7 Türk lirası kadar artırmaktadır. Bu durum, Türkiye’de mali çarpanın 2.7 civarında, ilgili literatürdeki tahminlerinin yukarı bandında olduğunu göstermektedir. Sonuçlar Türkiye’de maliye politikasının ekonomik büyümeyi sağlamakta büyük bir potansiyele sahip olduğunu göstermekte ve kamu harcamalarının etkinliğine yönelik güncel tartışmalara katkıda bulunmaktadır.

Anahtar Sözcükler: Bölgesel büyüme, yerel kamu harcaması, gece ışıkları, seçimler.

To Mom

ACKNOWLEDGMENTS

I wish to express my deepest gratitude to my supervisor Prof Dr. Nadir Öcal for his guidance, advice and insight throughout the research. I am deeply indebted to my thesis co-advisor Assoc. Prof. Dr. Semih Tümen for his stimulating support and enlightening supervision from beginning to the end.

Besides my supervisor and co-supervisor, I would like to thank examining committee members, Assoc. Prof. Dr. Ozan Eruygur and Assoc. Prof. Dr. Hakan Ercan.

But mostly, I would like to thank my mother Hülya Balta for her assistance, and for providing me with all the motivation and encouragement I need to fulfill this study.

TABLE OF CONTENTS

ABSTRACT	iv
ÖZ.....	v
DEDICATION	vi
ACKNOWLEDGMENTS.....	vii
TABLE OF CONTENTS	viii
LIST OF TABLES	x
LIST OF FIGURES.....	xi
LIST OF ABBREVIATIONS	xii
CHAPTER	
1. INTRODUCTION.....	1
2. BACKGROUND DISCUSSION AND LITERATURE REVIEW	6
2.1. SVAR (Structural Vector Autoregressions) Approach.....	7
2.2. Ramey-Shapiro Narrative Approach	10
2.3. Cross-Sectional Studies/ (IV) Approach	11
3. DATA.....	16
3.1. Construction of the Night Lights Data.....	17
3.2. Description of the Public Investment Data.....	25
3.3. Description of the Elections Data.....	26
4. THE INSTRUMENTAL VARIABLE (IV) STRATEGY	28
3.1. The Empirical Problem	28
3.2. Description of the IV	31
5. RESULTS AND DISCUSSION	36
6. CONCLUSION	47

REFERENCES.....	49
APPENDICES	
A. Türkçe Özet.....	53
B. Tez Fotokopi İzin Formu.....	71

LIST OF TABLES

Table 1: Correlation between night lights and GDP in Turkey: Evidence from 1992-2001 province-level official GDP data, 1992-2001	24
Table 2: Changes in voter preferences at the province level over 2007 and 2011 general elections.....	26
Table 3: Changes in voter preferences at the province level over 2004, 2009 and 2014 local elections	27
Table 4: IV estimation (2SLS) Night Lights and Total Government Spending.....	37
Table 5: IV estimation (2SLS) Night Lights and Investment in Education	38
Table 6: IV estimation (2SLS) Night Lights and Investment in Health.....	39
Table 7: IV estimation (2SLS) Night Lights and Investment in Transportation and Communications	40
Table 8: IV estimation (2SLS) Night Lights and Investment in Agriculture	41
Table 9: IV estimation (2SLS) Night Lights and Investment in Housing.....	42
Table 10: IV estimation (2SLS) Manufacturing Employment and Total Public Investment	43
Table 11: IV estimation (2SLS) Total Deposits and Total Public Investment.....	44
Table 12: IV estimation (2SLS) Income Tax and Total Public Investment	45
Table 13: IV estimation (2SLS) Total International Trade Volume and Total Public Investment	46

LIST OF FIGURES

Figure 1: Night Lights, 2013.....	18
Figure 2: Changing lighting patterns of Turkey, 1992, 2002 and 2013.....	20
Figure 3: Quantifying the night light data and changing lighting patterns of Turkish provinces, 1992, 2002 and 2013	21
Figure 4: Relationship between night lights and GDP in Turkey, 1998-2013.....	22
Figure 5: Change in per-capita government spending after local election switch, 2004, 2009 and 2014 local elections	31

LIST OF ABBREVIATIONS

R&D	Research and Development
GDP	Gross Domestic Product
TFP	Total Factor Productivity
OLS	Ordinary Least Squares
IV	Instrumental Variable
2SLS	Two Stage Least Squares
SVAR	Structural Vector Auto-Regressive
VAR	Vector Auto-Regressive
ARRA	The American Recovery and Reinvestment Act
DN	Digital Number

CHAPTER 1

INTRODUCTION

After the onset of the 2008 global financial crisis, a return to Keynesian recipes has been widely called for both in the policy and academic platforms. As a response to the notable slowdown in the global economic growth rates, governments have collaborated through many international policy organizations such as the G7¹, G20², BIS³, OECD⁴, etc. to substantially increase government spending and enable a broader access to credit. Certain areas such as R&D, human capital, and infrastructure investments have received particular attention and governments have been continuously advised to invest public funds in these productivity-enhancing areas. Despite these global policy coordination efforts and actions, the overall usefulness of increased government spending in terms of its ability to lift up economic growth is still heavily debated among economists.

¹ The G7 is a group of Canada, France, Germany, Italy, Japan, the United Kingdom and the United States. The European Union (The EU) is also represented within the G7.

²The G20 is an international forum for the governments and central bank governors from 20 major economies. The EU is represented by the European Commission and by the European Central Bank.

³ The Bank for International Settlements (BIS) is the world's oldest international financial organization. The BIS has 60 member central banks, representing countries from around the world that together make up about 95% of world GDP.

⁴ Organization for Economic Co-operation and Development (OECD) is an intergovernmental economic organization with 35 member countries, founded in 1961 to stimulate economic progress and world trade.

The academic side of this debate mostly focuses identifying the causal effect of government spending on economic growth and the magnitude of this effect is often characterized in terms of the coefficient named as “fiscal multiplier.” There are two main problems related to the econometric identification of the fiscal multiplier. First, government spending is largely endogenous to economic activity; in particular, counter-cyclical and/or redistributive fiscal policy actions bias the OLS estimates toward zero. Second, data limitation is a serious problem. Aggregate data on government spending and economic growth impose certain restrictions in terms of econometric analysis. Using region-level data is an alternative, but the problem is that region-level GDP is not always available and, instead, several imperfect proxies are used such as employment, tax revenues, etc. to measure the level of regional economic activity.

In this study, we estimate the effect of local government spending on regional economic activity in Turkey using province-level data for the period 2002-2013. We use night light data to calculate the change in province-level economic activity over time; that is, the variable we use to proxy province-level economic activity is an index constructed from the night light data provided by the National Geophysical Data Center of the United States. There are several recent studies in the literature showing that night lights can be used as a viable proxy for GDP⁵.

To address the endogeneity problem, we design an instrumental variable (IV) strategy by exploiting (i) the differences between political parties in their use of government spending, (ii) exogeneity of the election timing, and (iii) election results. Given the differences between political parties in their views on the link

⁵ For recent papers using night lights for several aspects of human activity, see, Bleakley and Lin (2012), Henderson, Storeygard, and Weil (2012), Michalopoulos and Papaioannou (2013), Pinkovskiy (2013), Kahn, Li, and Zhao (2015), Hodler and Raschky (2014), Axbard (2016), and Storeygard (2016). Section 3 provides more details for our data construction procedures.

between government spending and economic growth, changes in local governments after elections are expected to generate notable shifts in the amount of government spending and those shifts can mostly be interpreted as exogenous to economic activity due to the exogenous nature of election timing.⁶

Accordingly, the first step of our IV regressions documents a strong relationship between the election results and the subsequent change in local government spending. Our estimate for the fiscal multiplier is in the interval of 2.3-2.7 depending on the IV specification, i.e., 1 Turkish lira increase in local government spending generates an increase in province-level GDP by 2.3-2.7 Turkish liras. The OLS estimates are close to zero and they are statistically insignificant. These conclusions have two basic implications. First, the downward bias generated by ignoring the potential endogeneities is substantial, which perhaps means that local government spending is highly countercyclical and/or redistributive policies are in effect. Second, local government spending can affect regional economic activity through a strong multiplier effect in Turkey and this suggests that Ricardian forces are not effective.

We also document that the impact of local government spending on province-level economic activity exhibits large variation across spending components. Most importantly, we report that government spending on education and R&D has the strongest contribution on regional economic growth, while other types of government spending including agriculture, health, housing, communications, etc. have much smaller and/or statistically insignificant effects.

There are two main research lines in the relevant literature. The first line mostly uses aggregate country-level or cross-country time series evidence to estimate the

⁶ Several empirical papers, see, e.g., Poterba (1994) and Levitt (1997) use the election timing and election results as instruments to remove certain endogeneities.

fiscal multiplier.⁷ The typical estimates obtained from aggregate time series data range between 0.6-1.5. In this strand, Auerbach and Gorodnichenko (2012) show that the fiscal multiplier is lower during expansions, and higher during recessions. The main disadvantage of the aggregate approach is that identifying assumptions in time series methods are not always convincing. Moreover, with aggregate data, it might be harder to describe the main mechanisms underlying the estimates. The main advantage is that the link between government spending and economic growth is directly constructed and the lag structure of the estimates can be clearly modeled.

The second line, on the other hand, uses cross-sectional variation and micro econometric techniques to identify the impact of government spending on economic growth. Except Clemens and Miran (2012), papers⁸ in this strand of the literature estimate quite large fiscal multipliers, typically around 2.

The main advantage of the cross-sectional estimates is that the identifying assumptions are much more credible and it is easier to separately test the relevance of the potential underlying mechanisms. The disadvantage is that mostly the regional (or local) variation in government spending and economic growth is exploited and the resulting estimates should be interpreted as local fiscal multipliers. Nakamura and Steinsson (2014) discuss the conditions under which local fiscal multipliers can be interpreted as aggregate fiscal multipliers: as the various versions of their model show, translating the state level estimates to aggregate estimates depends importantly on the type of spending and the assumptions of the theoretical model.

⁷ See, Evans (1969), Barro (1981), Ramey and Shapiro (1998), Blanchard and Perotti (2002), Beetsma, Guiliodori, and Klaassen (2008), Mountford and Uhlig (2009), Ramey (2011b), and Auerbach and Gorodnichenko (2012). See Beetsma and Guiliodori (2011) and Ramey (2011a) for comprehensive reviews of the related literature for EU and US, respectively.

⁸ See, Hooker and Knetter (1997), Clemens and Miran (2012), Wilson (2012), Nakamura and Steinsson (2014), Suarez Serrato and Wingender (2014), Shoag (2015), and Fishback and Kachanovskaya (2015)]. Except Clemens and Miran (2012)

Our study can be placed into the second strand of the literature as we utilize province-level variation in government spending and economic growth. Our estimates 2.3-2.7 are slightly larger than the median cross-sectional estimate for the U.S. which is around 2. This suggests that the stimulative power of fiscal policy may be larger than that in the US. Similar to Wilson (2012), Suarez Serrato and Wingender (2014), Fishback and Kachanovskaya (2015), and others, we use an instrumental variable strategy to identify the main parameters of interest. Unlike these papers, we use the exogenous variation in local government spending generated through the timing and results of elections in Turkey.

Our study is the first, in this literature, to use the night lights data for the purpose of generating a proxy for local economic activity. We also document a substantial degree of heterogeneity across the sub-sectors of government spending in terms of their impact on economic growth. In particular, we document that government spending on education and R&D has the highest contribution to economic growth, which is a novel result in the literature.

The plan of the study is as follows. Chapter 2 provides a background discussion and a detailed literature review. Chapter 3 provides the details of how we construct a proxy for province-level GDP in Turkey using night lights as well as the description of the local government spending data. Chapter 4 defines the econometric problem we face and the identification strategy we use to overcome that problem. Chapter 5 provides a detailed discussion of the empirical results. Chapter 6 concludes.

CHAPTER 2

BACKGROUND DISCUSSION AND LITERATURE REVIEW

After the onset of the 2008 global financial crisis, a return to Keynesian recipes has been widely called for both in the policy and academic platforms [see, e.g., Krugman (2008)]. As a response to the notable slowdown in the global economic growth rates, governments have collaborated through many international policy organizations such as the G7, G20, BIS, OECD, etc. to substantially increase government spending and enable a broader access to credit. Certain areas such as R&D, human capital, and infrastructure investments have received particular attention and governments have been continuously advised to invest public funds in these productivity-enhancing areas.

Despite these global policy coordination efforts and actions, the overall usefulness of increased government spending in terms of its lift up economic growth is still heavily debated among economists. The academic side of this debate mostly focuses identifying the causal effect of government spending on economic growth and the magnitude of this effect is often characterized in terms of a coefficient called fiscal multiplier. There are two main empirical problems. First, government spending is largely endogenous to economic activity; in particular, counter-cyclical and/or redistributive fiscal policy actions bias the OLS estimates toward zero. Second, data limitation is a serious problem. Aggregate data on government spending and economic growth impose certain restrictions in terms of econometric analysis.

Three main approaches have been used to address these empirical problems, mainly to isolate exogenous shocks to government spending,: (i) the structural vector autoregression approach (SVAR), (ii) the narrative approach, the natural experiment of large military build- ups in the U.S., and (iii) cross-sectional/ instrumental variables approach that primarily instruments for sub-national government spending.

2.1. SVAR (Structural Vector Autoregressions) Approach

There is a large literature that uses aggregate time series data to estimate the impact of government spending on welfare variables such as consumption, investment, and other output variables. To identify shocks to government expenditure, and to estimate fiscal multipliers for national government expenditure and taxes; the standard approach in this strand of the literature is to adopt an sVAR methodology

Blanchard and Perotti (2002) have a comprehensive approach to estimate the effect of government spending on national economic growth using VARs: To identify fiscal shocks, they first detect information on taxes, transfers, and government expenditure to set parameters, and then estimate the VAR. Using the VAR, predictable responses of endogenous variables are eliminated and it is assumed that if there is any correlation left between the residuals of government spending and output is mainly because of the impact of government spending on dependent variable.

This literature has followed the four identifying assumptions of Blanchard and Perotti (2002):

- Discretionary fiscal policy changes take long enough to implement that they cannot respond to macroeconomic shocks during the same quarter;

- Non-discretionary fiscal policy responses to output are consistent with auxiliary estimates of fiscal output elasticities;
- Innovations in fiscal variables not predicted within the sVARs form unexpected fiscal policy innovations;
- Fiscal multipliers do not vary over the business cycle.

Most of the studies in this strand focus on quarterly post-war data in the U.S. Blanchard and Perotti (2002) find a fiscal multiplier close to 1 in the U.S. for government spending. Other estimates for the U.S., using variations of the standard sVAR identifying assumption yield values of 0.65 on impact but -1 in the long run (Mountford and Uhlig, 2009) and larger than 1 (Fatas and Mihov, 2001). Barro (2009) argued that peace-time multipliers are around zero. At the other extreme, Romer (2009) used multipliers as 1.6 (which is at the upper bound estimates of this literature) to estimate the job creation that can be generated by the stimulus package approved by the U.S. Congress in February 2009.

Auerbach and Gorodnichenko (2010) employed a transition sVAR that the structural characteristics of the national economy are characterized by a time-changing linear combination of two different linear autoregressive structures. Their innovation is to use regime-switching sVAR models to estimate the effects of spending shocks on quarterly U.S. data. Their main hypothesis is that the government spending multiplier might be higher during recessions and lower during expansions. Their findings show that multipliers are similar on impact in recessions and expansions, but the impulse responses are quite different between recessions and expansions. They find the multiplier 0.3 to 0.8 during the expansion and 1 to 3.6 during recession.

Numerous studies have been conducted on a variety of countries other than U.S.; using international panel data, considering the variation in economic size, trade openness, labor market rigidities of countries. Perotti (2004a, 2007), uses quarterly

data of five OECD countries and finds that the spending multiplier estimates vary significantly across countries and across time. His estimates lay in a range of -2.3 to 3.7. Similar to the approach of Perotti (2007), Beetsma (2008) uses quarterly data on E.U. countries and estimate the fiscal multiplier in a panel sVAR and find a fiscal multiplier around 1.6.

Kraay (2012) uses quarterly data for 102 developing countries with different economic dynamics and estimates the fiscal multiplier. His estimates are around 0.4 but vary across countries; in countries less exposed to international trade, multipliers are larger in recessions, and in countries with rigid exchange rate regimes multipliers are smaller.

Ilzetzki, Mendoza and Vegh (2010), further provides the evidence that the effect of government spending shocks depends on economic dynamics of each country such as the level of socio-economic development, exchange rate regime, openness to trade, and public indebtedness. They find that the multiplier is smaller in developing countries and larger in developed ones; the effect of government expenditure is greater in countries with a pre-determined exchange rate and almost zero in countries with a flexible exchange rate. Lastly they document the evidence that fiscal multipliers in open economies are smaller and fiscal multipliers in high-debt countries are negative.

In epitome, the international evidence provided by Perotti (2005), Beetsma, Giuliadori, Klaasen (2008), Guajardo, Leigh and Pescatori (2010), Ilzetski, Mendoza, and Végh (2010), Beetsma and Giuliadori (2011) and others, tend to find multipliers in the range of the ones for the U.S.

The main advantage of the sVAR methods is they are easy to implement and do not require substantive data. However, the most crucial concern with sVARs is the identification of spending shocks: according to the Blanchard-Perotti methodology,

a change in taxes or spending as a policy shock might have been anticipated by individuals which prevents the elimination of predictable responses of endogenous variables within sVAR.

Ramey and Shapiro (1998), Ramey (2011), and Leeper, Walker, and Yang (2011) criticized the sVAR methods, though the concern above. They argue that many changes in government expenditure and taxes are anticipated by individuals and show that this can invalidate inferences and discussed that this approach is problematic for many forms of government purchases and can only be suitable for war-driven defense spending. Using this war-driven defense spending as the source of variation in government expenditure, the literature has advanced itself into another strand.

2.2.Ramey-Shapiro Narrative Approach

Second strand of the literature has followed Barro (1981) and evolved with the contributions of Ramey and Shapiro (1998). Barro (1981) observed that fluctuations in war-driven defense spending is an important source of fluctuation in general government spending in the U.S. and driven primarily by exogenous factors rather than endogenous national economic shocks. As a result, they can be seen as an exogenous source of fluctuation in government expenditure that can be used to estimate fiscal multipliers for U.S.

Because war-driven defense spending is accepted independent of general macroeconomic structure of the U.S., major changes in government spending provides opportunities to examine exogenous spending shocks.

Using war-driven defense spending as an important source of fluctuation in government spending, three periods of extensive expansions in the U.S. defense spending identified by Ramey and Shapiro: The Korean War, The Vietnam War,

and The Carter–Reagan Buildup. Fisher (2004), Edelberg, Eichenbaum, and Fisher (1999), Cavallo (2005), Romer and Romer (2010) and Ramey (2011) used these three periods of extensive expansions in the U.S. defense spending to examine the effect of government spending shocks.

Using Ramey-Shapiro episodes and U.S. Quarterly data, Ramey-Shapiro (1998), Edelberg, Eichenbaum, and Fisher (1999), Eichenbaum-Fisher (2005), Cavallo (2005) employ dynamic simulations and VARs and estimate spending multipliers in the range of 0.6 - 1.2, depending on the sample. Barro (1981), Hall (1986; 2009), and Barro-Redlick (2011) use annual U.S. data and war-driven military spending as instrument for government expenditure and estimate the multiplier in the range of 0,6 - 1.

While the sVAR literature finds that an increase in government spending shock raises national GDP through consumption and the labor productivity, studies using the Ramey-Shapiro episodes generally find that increase in government spending shock results in GDP and labor productivity to increase, but lowers consumption and the real wage. In spite of the differences in experiments, building different identification methods, and sample sizes, both strands both strands of the literature estimate fiscal multipliers in the range of 0.6 to 1.8.

2.3. Cross-Sectional Studies (IV Approach)

Angrist and Pishke (2010), in their recent discussion on empirical economics, spoke in praise of the improvements in empirical standards and touched upon the many advances in applied microeconomics. They stated that the new approaches and design-based experiments of microeconomics are providing new insights and perspectives to macroeconomics and to policy makers in particular. According to

Ramey (2014) the new, nascent literature on cross-sectional effects of government spending and different IV methodologies adopted in them are kind of an answer to Angrist and Pishke.

This third strand of the literature on the effect of government spending on welfare variables is different than sVAR and Ramey-Shapiro approaches in scale: using panel data or state cross-sectional data they estimate the effects of sub-national government spending on state/region economies, which provides a variety of different approaches, such as IVs, to isolate exogenous components of fluctuations in sub-national government spending. This literature has focused both income and employment effects of region or state level government spending.

These studies estimate fiscal multipliers, holding national effects constant. Thus, these studies basically try to answer the question: "What happens to income in one specific region, when the government redistributes \$1 more to one region than to other regions?"

Using cross-sectional data to estimate the effect of sub-national government spending on a locality's economy, provides an opportunity to clearly identify the source of exogenous variation in government spending. Exploiting this cross-sectional variation further allows for precise estimates through increasing the sample size.

There is a large body of studies in this strand with many interesting identification strategies and exciting experiment designs. For example Serrato and Wingender (2010), Wilson (2011) and Chodorow-Reich, Feiveson, Liscow and Woolston (2011) emphasize specific institutional characteristics in the U.S. economy, driving federal-state transfers that are likely to be orthogonal to state-level economic activity.

Serrato and Wingender (2015) analyze both growth and employment effects of local government spending. They use government spending of a panel of U.S. counties, 1970-2009. To isolate exogenous variation in government spending at the local level, they employ changes in sub-national government spending on states caused by corrections of population estimates based on the Census as an instrument. Their IV estimates imply that government spending has a local income multiplier of 1.57. They also show that sub-national government spending helps to eliminate income growth inequality across counties. One of the most important insight that their study provides is that their IV results for return to government spending is almost sixteen times larger than the corresponding OLS estimates. This shows that the OLS estimates are downward biased due to the obvious concerns about endogeneity.

Chodorow-Reich, Feiveson, Liscow and Woolston (2011) and Wilson (2011) analyze employment effects of the American Recovery and Reinvestment Act (ARRA)⁹ spending and estimate job creation multipliers for post-crisis period in the U.S.

Similar to Serrato and Wingender (2015), Chodorow-Reich et. al. (2011) also stress the fact that state fiscal relief outlays are endogenous to a state's economic environment, therefore OLS results are downward biased. They address this endogeneity problem by using a state's pre-2008 health spending to instrument for ARRA spending in post-2008 recovery period. Their IV results suggest a local income multiplier around 2.

⁹ The American Recovery and Reinvestment Act of 2009 (ARRA) is a stimulus package enacted in February 2009 to respond to the Great Recession in the U.S. The main purpose for ARRA is consistent with the Keynesian macroeconomic theory: during recessions, the government should increase the public spending to cope with negative economic impacts and to generate new jobs.

Shoag (2011) and Clemens and Miran (2010) analyze local government spending shocks driven by national level balanced-budget rules and pension fund windfalls in the U.S.

Clemens and Miran (2012) use state level government spending cuts on budget deficits to estimate a local spending multiplier for the U.S. Unlike other studies, their reduced form estimates also react changes in tax liabilities: their multiplier estimate for income growth is around 0.8 at the annual level which suggests that Ricardian forces are effective at local. Shoag (2010), on the other hand, uses the variation in returns to state pension funds among states as fiscal shocks that estimates ensuing spending patterns. He estimates a local income multiplier around 2.

Cohen, Covall and Malloy (2010) and Fishback and Kachanovskaya (2010) have exploited political determinants of federal transfers to states. They employed different IV methodologies based on the effect of political factors on state level investment motivation of federal government in the U.S. Fishback and Kachanovskaya (2010) study the effect of federal spending on welfare variables at state level (e.g. state income, consumption and employment) during the Great Depression. They construct an IV methodology which instrumented the interaction between swing voting in previous presidential elections and federal spending outside of the state for government expenditure at the state level. They find a local income multiplier around 1.1. Their results suggests that state level government spending increases income through crowding in private consumption with no significant effect on labor productivity.

Key innovation of Cohen, Covall and Malloy (2010) is to use the changes in congressional committee chairmanship of a state as a source of exogenous variation in state-level federal expenditures. They find that powerful political representation of a state in national level increases the amount of public investment. Without

estimating a solid multiplier, they mainly show that government spending shocks appear to significantly crowd out corporate sector investment and employment activity which suggests that Ricardian forces are effective at local level.

Despite of different approaches, identification methodologies and samples, in terms of income multipliers, most estimates lie in the range of 0.5 to 2. Several studies also find that the multiplier is significantly higher, between 2.2 to 3.0 during times of higher slack¹⁰.

Our study can be placed into the last strand of the literature as we utilize province-level variation in government spending and economic growth. Our estimates 2.3-2.7 are slightly larger than the median cross-sectional estimate for the US which is around 2. This suggests that the stimulative power of fiscal policy may be larger than that in the U.S. and E.U. Similar to Wilson (2012), Suarez Serrato and Wingender (2014), Fishback and Kachanovskaya (2015), and others, we use an instrumental variable strategy to identify the main parameters of interest. Unlike these papers, we use the exogenous variation in local government spending generated through the timing and results of elections in Turkey.

Our study is the first in this literature to use the night lights data, provided by the NGDC Earth Observation Group, for the purpose of generating a proxy for local economic activity in this literature. We also document a substantial degree of heterogeneity across the sub-sectors of government spending in terms of their impact on economic growth. In particular, we document that government spending on education and R&D has the highest contribution to economic growth, which is a novel result in the literature.

¹⁰ Shoag (2010), Serrato and Wingender (2011), Nakamura and Steinsson (2011).

CHAPTER 3

DATA

In this study, we estimate the effect of local government spending on regional economic activity in Turkey using province-level panel data for the period 2002-2013.

Adopting a cross-sectional panel data analysis had provided us a wide variety of theoretical results and techniques that could not be studied with a time series settings. The advantages of using panel data are also stated by According to Greene (1997) and can be listed as follows:

- Allows for a greater degree of freedom by increasing the sample size¹¹ which increases the precision and the statistical power of the estimates.
- Allows to clearly identify the source of plausibly exogenous variation.
- Improves the efficiency of estimations by reducing the possible collinearity between explanatory variables.

The units of analysis in this study are Turkish provinces because of their large number and stable boundaries for the period under study. We develop a panel of 81 provinces over the period 2002-2013, covering province-level annual data on total public investment by function, the difference between the votes between the ruling party and the closest competitor at the corresponding city to examine how political representation translates to public investment, and night light data to calculate the change in province-level economic activity over time; that is, the variable we use to

¹¹ Which is essential when the sample size is small.

proxy province-level economic activity is an index constructed from the night light data provided by the National Geophysical Data Center of the U.S.

3.1. Construction of the Night Lights Data

Night light data measured by satellites have recently begun to be used more by economists¹². Its strong correlation with other welfare proxies has proved it to be a good proxy for local economic activity. Night light data is particularly well suited for studies and researches in which a policy with highly localized effects is being analyzed, or for policy evaluation in countries or regions with poor or not available GDP data (Lowe, 2014).

Nordhaus and Chen's analysis is a good example where GDP data is poor or not available for regions to evaluate the effect of a policy. Nordhaus and Chen states that for countries, regions and cities of the developing world where data limitation is a big problem, the lights data provides very useful and reliable insights on economic development. They also states that usage of night light data is especially promising in estimating density of economic activity and output for these countries with low data quality¹³.

These findings are in line with Henderson and his colleagues (2012), who signifies that the night light data's greatest contribution to the literature on urban economics and policy analysis is where there is poor or non-available data on

¹² Bleakley and Lin 2012, Henderson et al.. 2012, Michalopoulos and Papaioannou, 2013, Storeygard 2012, Nordhaus and Chen 2014, and Pinkovskiy, 2013.

¹³ Their analysis on Somalia, where the last population census data was collected in 1975 and for Congo, where the most recent regional level GDP data was collected in 1981 simply relies on their proxy calculated through night lights.

economic activity or for a much localized region, night light data provides a great degree of geographic accuracy.

The light data is actually high resolution satellite images originate from the Defense Meteorological Satellite Program (DMSP) Operational Linescan System (OLS) to detect cloud cover, provided by the Earth Observation Group (2015) of the National Geophysical Data Center of the United States. These satellites across Earth are circling the earth 14 times per day recording the intensity of Earth-based lights with their OLS sensors since the 1970s, with a digital archive beginning in 1992.

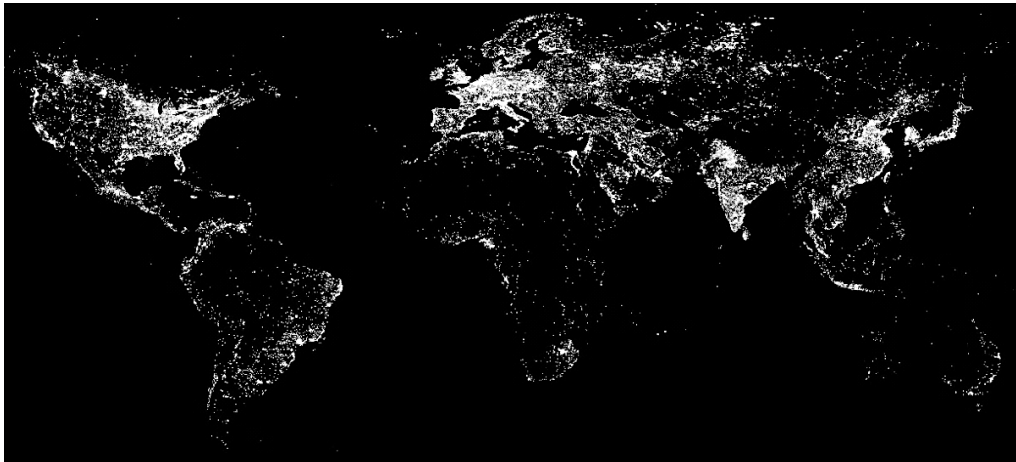


Figure 1: Night Lights, 2013.

Source: Nighttime satellite images derived from the Defense Meteorological Satellite Program's Operational Line scan System (DMSP-OLS)

DMSP states that these sensors were basically designed to collect data to detect moonlit clouds, but it eventually paved the way for recording and analyzing lights from human settlements. Scientists at the National Oceanic and Atmospheric Administration's (NOAA) National Geophysical Data Center (NGDC) process these raw data and distribute the final data to the public through their web site. The night-

time light data is available for 1992-2013 (National Geophysical Data Center, 2016).

The most extensive series of night-time light data is in the form of average Digital Number (DN) values. Accordingly, each satellite-year dataset is a grid reporting the intensity of lights as a six-bit digital number, for every 30 arc-second output pixel (approximately 0.86 square kilometers at the equator) between 65 degrees south and 75 degrees north latitude (National Geophysical Data Center, 2016).

A quick look at Turkey in Figure 2 suggests that lights do indeed reflect human economic activity. In the figure, unlit areas are black and lights appear with intensity increasing from gray to white over time. Lights in an area reflect total intensity of income, which is increasing in both income per person and number of people.

In Istanbul and Eastern Aegean regions, where living standards are relatively high, the higher concentration of lights in coastal reflects the higher population densities there. The comparison of lights in inner regions reflects huge differences in income with similar population densities. Given cultural differences and habits in use of lights and geographic differences in unlit and top-coded areas, our focus is on using lights to measure income growth and fluctuations.

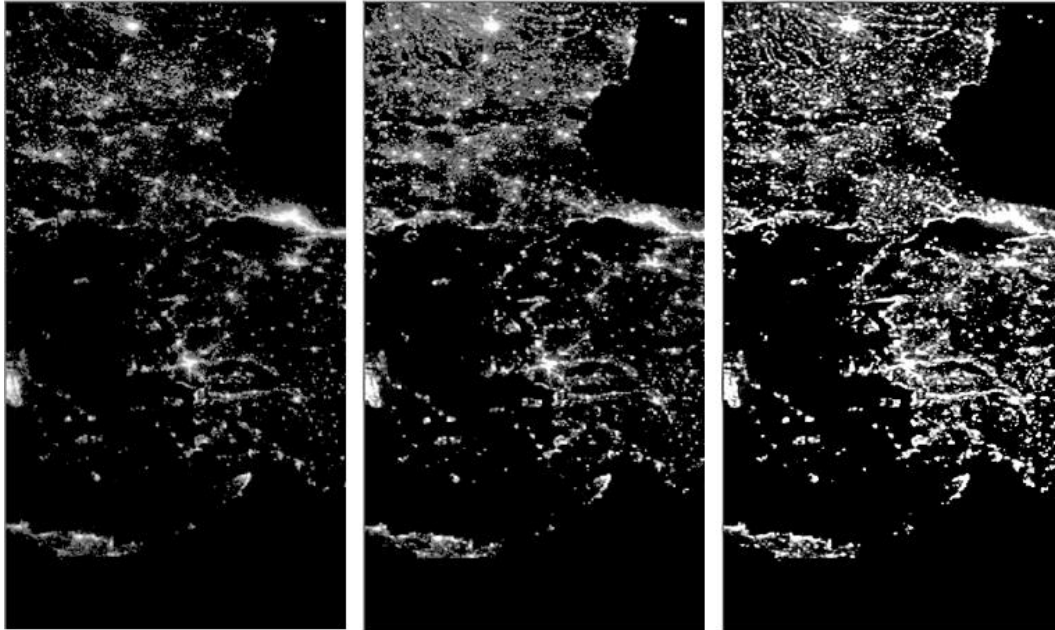


Figure 2: Changing lighting patterns of Turkey, 1992, 2002 and 2013.

Source: Nighttime satellite images derived from the Defense Meteorological Satellite Program's Operational Line scan System (DMSP-OLS)

The units of analysis in this study are Turkish provinces because of their large number and stable boundaries for the period under study. Administratively, Turkey is divided into 81 contiguous provinces. To derive a measure of economic activity out of Average Stable Light data for each Turkish provinces for 2002-2013 we followed the detailed description of the satellite instrumentation, data manipulation and processing Geographical Information Methods, provided by Doll (2008), Lowe (2014) and Elvidge, et al (2006).

Using ArcMap 10.3, the digitized province level administrative boundaries of Turkey are overlaid to the corresponding year's night light image to restrict the lights data within province boundaries.

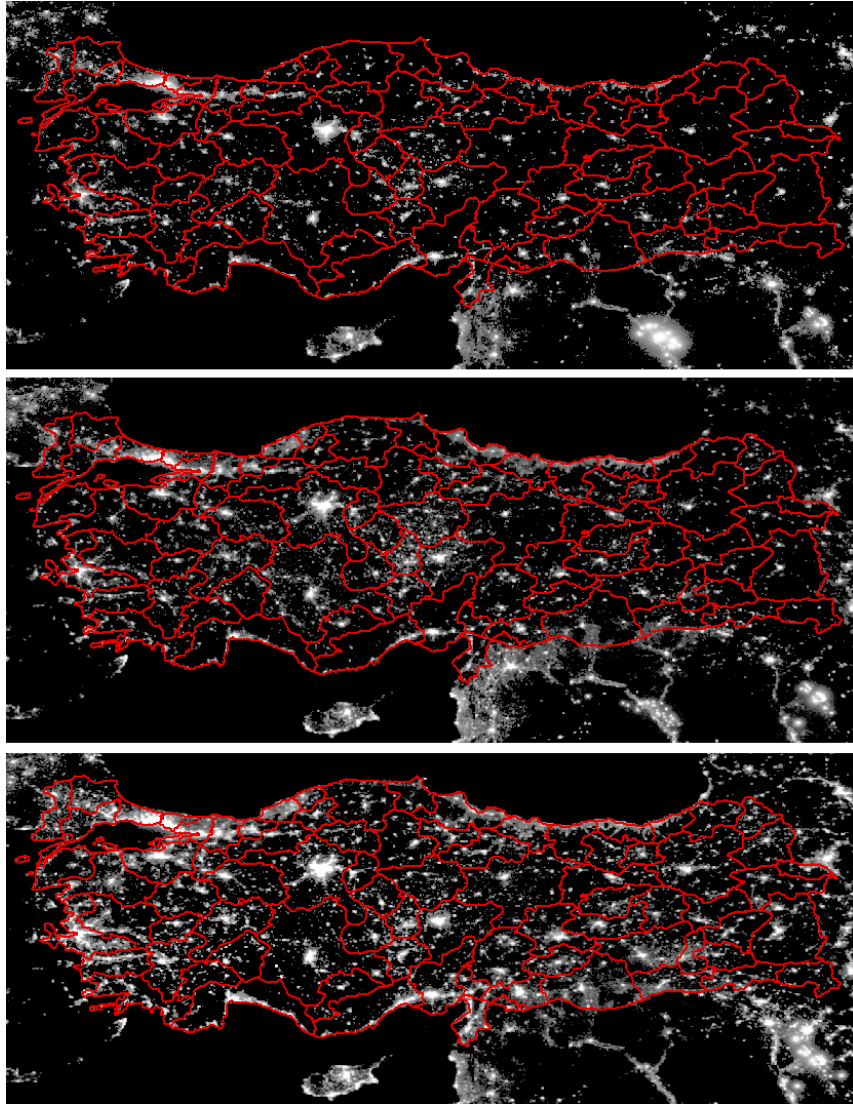


Figure 3: Quantifying the night light data and changing lighting patterns of Turkish provinces, 1992, 2002 and 2013.

Source: Nighttime satellite images derived from the Defense Meteorological Satellite Program's Operational Line scan System (DMSP-OLS)

For each province, pixels remaining within the boundaries are counted in accordance to corresponding digital number (DN) values. DN value is an integer between 0 (no light) and 63 (top-coded areas with dense economic activity).

Calculating the sum of light intensity values and total light value for each province, the numbers of pixels are multiplied by their DN.

In Figure 4, we illustrate the relationship between income changes and night lights in Turkey in 1998-2013. Comparing the night lights data with seasonally and calendar adjusted gross domestic product in constant prices - at basic prices at 1998, to see how night lights reflect long-term economic growth.

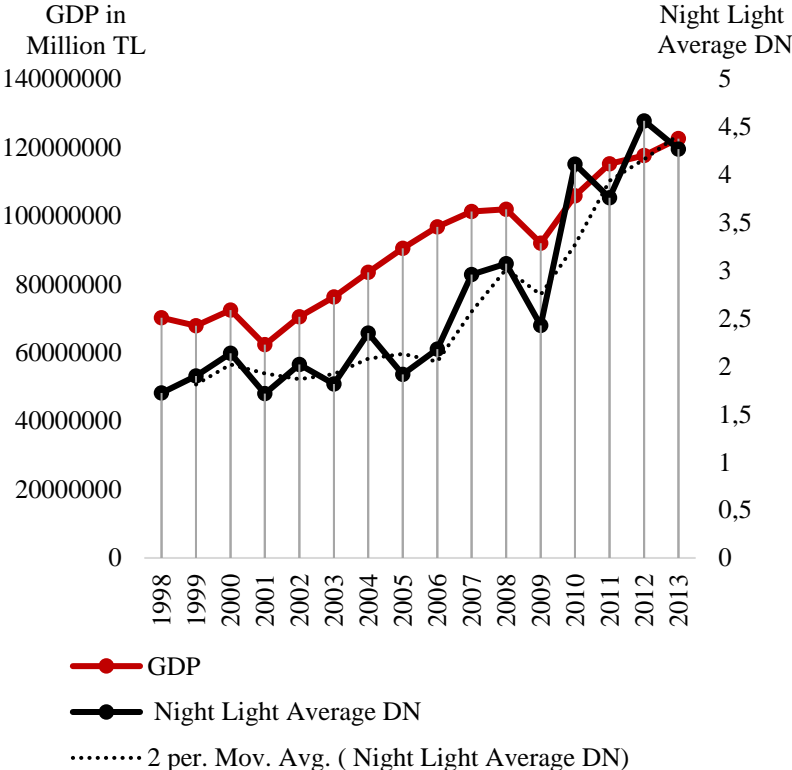


Figure 4: Relationship between night lights and GDP in Turkey, 1998-2013

Source: Average Digital Number indices of Turkey calculated through nighttime satellite images derived from the Defense Meteorological Satellite Program’s Operational Line scan System (DMSP-OLS); TurkStat Seasonally and calendar adjusted gross domestic product in constant prices at basic prices at 1998 of Turkey, 1998-2013.

To illustrate the high-frequency response of lights to economic activity in Turkey, we compare the night lights data with GDP to see how night lights reflect long-term economic growth.

The Asian and Russian crises in 1997 and 1998 negatively affected the confidence of foreign investors in Turkey. As a result, economic growth slowed down from 7.5 percent in 1997 to 2.5 percent in 1998 (IHS, 2000). Heavy fall in capital inflows and the devastating effects of the earthquake in 1999 pushed the economy into even a deeper recession. In 1999, the economy shrank by 3.6 percent (Cömert and Çolak, 2014).

These worsening conditions were followed by one of the worst downturns in Turkey's history, a severe banking crisis in 2000-2001. The economy shrank by 5.3 percent in 2001. GDP per capita in this period even declined by 6.5 percent. This shrinkage is accompanied with a decline in night lights. Night light average DN value for Turkey decreased by 19 percent in 2000.

In 2002-2008 period, Turkish economy did not experience a large financial account shock. Actually in that period, the Turkish economy benefited from financial flows through both their positive impacts on inflation and credit growth; positive domestic and international conditions provided the Turkish economy with a momentum with high growth and low inflation (Cömert and Çolak, 2014). This overall growth in GDP in Turkey is matched in the figure by increasing lights intensity, with expanding areas of high and medium coding. The average DN value for Turkey increased by 52 percent in this period.

The last global crisis hitting the Turkish economy began in the third quarter of 2008 and the negative impacts maintained till the last quarter of 2009. The Turkish economy experienced 0.7 percent annual real GDP growth in 2008, real GDP shrank by -4.8 percent in 2009 (Cömert and Çolak, 2014). This decline in real

GDP is accompanied with a sharp decline in night lights too. Night light average DN value for Turkey decreased by 21 percent in 2009.

The evidence provided above, the general picture of the Turkish economic in 1998-2013 and the night lights, showed the high-frequency response of lights to an economic downturn and how lights reflect long-term growth. To have a more precise analysis on how night lights reflect to economic activity, we compare the official province level GDP for 1992-2001 available for Turkish provinces to our night lights data for the corresponding period.

Table 1: Correlation between night lights and GDP in Turkey: Evidence from 1992-2001 province-level official GDP data, 1992-2001

Dependent Variable: ln (GDP)
 Method: Panel Least Squares
 Date: 09/02/16 Time: 21:13
 Sample: 1992 2001
 Periods included: 10
 Cross-sections included: 81
 Total panel (unbalanced) observations: 783

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-2.429625	0.273893	-8.870692	0.0000
ln(Night Lights)	0.911851	0.027964	34.39581	0.0000
R-squared	0.602357	Mean dependent var		6.951291
Adjusted R-squared	0.601848	S.D. dependent var		1.116321
S.E. of regression	0.704391	Akaike info criterion		2.139585
Sum squared resid	387.5061	Schwarz criterion		2.151496
Log likelihood	-835.6474	Hannan-Quinn criter.		2.144165
F-statistic	1183.072	Durbin-Watson stat		0.299010
Prob(F-statistic)	0.000000			

Source: Average Digital Number indices of Turkey calculated through nighttime satellite images derived from the Defense Meteorological Satellite Program's Operational Line scan System (DMSP-OLS); TurkStat province level gross domestic product in constant prices of Turkey, 1987-2001.

As it is seen in the table above, province level official GDP data and our index constructed from the night light data provided by the National Geophysical Data Center of the United States have a strong correlation: 1 Turkish lira increase in our GDP index constructed from the night light data generates an increase in official province-level GDP by 0.91 Turkish liras.

3.2 Description of the Public Investment Data

Department of Project Analysis at the Ministry of Development (in Turkey) publishes annual data on total public investment by province and by function. The functions include agriculture, manufacturing, energy, transportation communications, tourism, education, and health. Data is available for 1999-2015 at annual frequency.

Data on accrued income tax, accrued corporate income tax, banking and insurance transaction tax, special consumption tax, and value added tax by province for 2004-2014 are provided by the Republic of Turkey General Directorate of Public Accounts.

Data on registered bank deposits by province are provided by the Banks Association of Turkey. Data on province-level manufacturing exports, imports, and the number of exporters for the 2002-2014 are provided by the Turkish Statistical Institute (TurkStat). Data consist of province-level exports in 2-digit ISIC Rev.3 classification. We complement our dataset with data on province-level population, also provided by the TurkStat.

3.3 Description of the Elections Data

To construct our instruments, we use both local (i.e., municipal) and general elections from 2002 to 2013. We obtain these data from Election Archives of Grand National Assembly of Turkey. For general elections, we use both the share of the ruling party votes and the number of parliament members for each city. The general election data are obtained from 2002, 2007, and 2011 elections.

Our local election data come from the 2004, 2009, and 2014 elections. For local elections, we simply take 1 if the ruling party wins the election at the city level and 0, otherwise. Then group the provinces according to changes in voter preferences at the city level over elections.

Table 2: Changes in voter preferences at the province level over 2007 and 2011 general elections

Ruling Party's vote share decreased	Adana, Adıyaman, Afyonkarahisar, Ağrı, Aydın, Balıkesir, Batman, Bingöl, Bitlis, Bolu, Bursa, Çanakkale, Denizli, Diyarbakır, Edirne, Erzincan, Eskişehir, Hakkari, Hatay, Karabük, Kars, Kayseri, Kırklareli, Kilis, Kocaeli, Kütahya, Manisa, Mardin, Mersin, Muğla, Ordu, Samsun, Siirt, Şırnak, Tekirdağ, Tokat, Trabzon, Tunceli, Uşak, Van, Yalova, Zonguldak, İzmir, Ankara, İzmir
Ruling Party's vote share increased	Aksaray, Amasya, Antalya, Ardahan, Artvin, Bartın, Bayburt, Bilecik, Burdur, Çankırı, Çorum, Düzce, Elazığ, Erzurum, Gaziantep, Giresun, Gümüşhane, Iğdır, Isparta, Kahramanmaraş, Karaman, Kastamonu, Kırıkkale, Kırşehir, Konya, Malatya, Muş, Nevşehir, Niğde, Osmaniye, Rize, Sakarya, Sinop, Sivas, Şanlıurfa, Yozgat.

Source: Results of 2007 and 2011 general elections, Grand National Assembly of Turkey Election Archives

Table 3: Changes in voter preferences at the province level over 2004, 2009 and 2014 local elections¹⁴

1-1-1	Adıyaman, Afyon, Aksaray, Amasya, Ankara, Bayburt, Bilecik, Bingöl, Bolu, Bursa, Çankırı, Çorum, Denizli, Düzce, Erzincan, Erzurum, Gaziantep, İstanbul, Kahramanmaraş, Karaman, Kayseri, Kırıkkale, Kırşehir, Kilis, Kocaeli, Konya, Kütahya, Malatya, Muş, Nevşehir, Rize Sakarya, Samsun, Tokat, Yozgat
1-1-0	Ağrı, Bitlis, Burdur, Hatay, Kars, Van, Yalova
1-0-0	Adana, Aydın, Giresun, Isparta, Karabük, Manisa, Osmaniye, Siirt, Tekirdağ, Zonguldak
1-0-1	Antalya, Balıkesir, Sivas, Şanlıurfa, Uşak
0-0-0	Bartın, Batman, Çanakkale, Edirne, Eskişehir, İzmir, Kırklareli, Muğla, Sinop, Şırnak, Tunceli, Hakkari, Mersin, Iğdır
0-1-1	Ardahan, Elazığ, Niğde, Trabzon
0-0-1	Gümüşhane, Kastamonu, Ordu, Artvin
0-1-0	Mardin

Source: Results of 2004, 2009, and 2014 local elections, Grand National Assembly of Turkey Election Archives

¹⁴ 1 if the ruling party wins the election at the city level and 0 otherwise.

CHAPTER 4

THE INSTRUMENTAL VARIABLE (IV) STRATEGY

Our goal is to estimate the coefficient characterizing the effect of local government spending on regional economic growth. This coefficient is generally named as the fiscal multiplier and is interpreted as the capacity of government spending in generating economic growth. Estimating the fiscal multiplier has gained importance recently as fiscal policies have been attributed a greater importance following the global financial crisis.

4.1. The Empirical Problem

The standard empirical approach to estimate the fiscal multiplier is to regress the economic growth variable on government spending along with a set of appropriately chosen control variables. The coefficient of government spending would be our main parameter of interest. However, attributing causal meanings to this coefficient in a simple regression model would not be straightforward. The main problem is that there might be an unobserved variable that is correlated with both economic growth and government spending. Existence of such an unobserved correlation would mask the econometric identification of causal effects.

To address this endogeneity problem, we use an IV strategy. A relevant instrument would be correlated with local government spending and uncorrelated with regional economic growth. To construct such an IV, we exploit (1) the differences between political parties in their view of the link between government spending and

economic growth, (2) the exogenous nature of the election timing, and (3) general and local election results. Changes in voter preferences at the region level affect the level of local government spending. Assuming that the short-term changes in regional voting behavior is correlated with economic growth only through the level of local government spending; this setup would offer a relevant IV.

There are many examples in the literature using election results as instruments¹⁵. Although these studies focus on different questions in different settings, the main purpose in all of these papers is to address the potential endogeneity of interest using the exogenous variation generated by the timing and/or outcomes of elections.

Formally speaking, the baseline regression model is:

$$\ln(y_{c,t}) = \beta_0 + \beta_1 \ln(g_{c,t}) + \beta' X_{c,t} + f_c + f_t + \varepsilon_{c,t} \quad (4.1)$$

Where c and t index cities and years, respectively, y is the city-level GDP, g is the local government spending, X is a vector of observed covariates, f_c and f_t are city and year fixed effects, respectively, and ε is the usual error term.

Our main parameter of interest is β_1 ; it describes what happens to the local GDP when we double local government spending. The main problem here is that y and g may be correlated due to the existence of an unobserved factor, i.e., it may be the case that:

$$E[\varepsilon_{c,t} | \ln(g_{c,t})] \neq 0 \quad (4.2)$$

¹⁵ Poterba (1994), Levitt (1997), Kubik and Moran (2003), Knight (2002 and 2005), Gruber and Hungerman (2007) and Hanson (2009).

Therefore, estimates of β_1 obtained from this naive regression would likely be biased. Based on the IV definition provided above, the first and second stages of our IV estimation can be written as follows:

$$\ln(g_{c,t}) = \gamma_0 + \gamma_1 E_{c,t} + \gamma'_2 X_{c,t} + f_c + f_t + \eta_{c,t} \quad (4.3)$$

$$\ln(y_{c,t}) = \beta_0 + \beta_1 \ln(g_{c,t}) + \beta'_2 X_{c,t} + f_c + f_t + \varepsilon_{c,t} \quad (4.4)$$

Where all the variable definitions are same as above except that $\eta_{c,t}$ is the error term for the first-stage equation. This IV strategy says that the variable (E) describing the election results at the local level can affect the economic growth only through local government spending. To put it differently, the variable E is correlated with g, while it should be uncorrelated with y. This is the main identifying assumption in the study. Various speculations are used for E.

Next we provide a detailed description of these instruments.

4.2 Description of the IV

The political environment of Turkey experienced enormous turmoil in 1980s and 1990s. Political instability was accompanied by severe economic crises, which generated high budget deficits, indebtedness, high inflation, and continuous currency depreciation. After the 2002 general elections, political stability was reached by the single-party rule of the Justice and Development Party. Not only political stability, but significant economic achievements, high economic growth rates, sharp divination, reduced external debt stock, healthy banking system, balanced budget were also reached in the aftermath of the 2002 elections.

One major observation during the post-2002 era is that there have been significant differences between the ruling party and the opposition parties in terms of their view on the role of government spending on economic growth. (It is necessary to emphasize at this stage that higher government spending did not lead higher budget deficits in the post-2002 era. In fact, just the opposite is true; that is, budget deficits came down significantly, which suggests that the efficiency of public spending also improved under the single-party rule). The ruling party implemented economic policies based on the view that government spending is an important catalyst for economic growth; thus, the government should heavily invest in large public projects such as highways, bridges, energy plants, airports, seaports, railways, urban underground transportation facilities, etc.

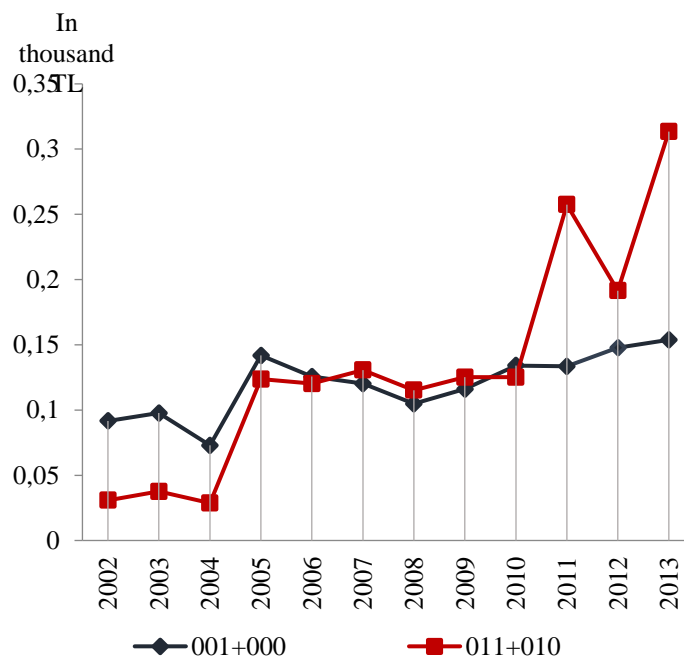


Figure 5: Change in per-capita government spending after local election switch, 2004, 2009 and 2014 local elections.

Source: Annual total public investment by province, Department of Project Analysis at the Ministry of Development of Turkey. Results of 2004, 2009, and 2014 local elections, Grand National Assembly of Turkey Election Archives

The graph captures three local elections: 2004, 2009, and 2014. The blue line¹⁶ shows per-capita government spending in cities with municipalities that are ruled by the nation-level opposition party for all three election periods also includes the cities that switched to the ruling party only in the 2014 elections. The red line¹⁷ demonstrates per capita government spending in cities with municipalities that are ruled by the nation-level opposition party until the 2009 elections, but are switched to the ruling party from 2009 on.

To demonstrate these differences and construct our instruments, we use both local (i.e., municipal) and general elections from 2002 to 2013. For local elections, our instrument takes 1 if the ruling party wins the election at the city level and 0 otherwise. Our local election data come from the 2004 and 2009 elections. For general elections, we use both the share of the ruling party votes and the number of parliament members for each city. The general election data are obtained from 2002, 2007, and 2011 elections. We observe a sharp difference in terms of the amount of government spending in the cities with high versus low vote concentration for the ruling party.

We also observe sharp changes in government spending in a given city as the local municipality switches between the ruling party and opposition parties. This shift may be due to many reasons. The ruling party may have greater preference for government spending as an economic policy tool. It may also be the case that the ruling party may have more administrative flexibility in directing public funds to the cities in which they get higher public support. We are not interested in the sources of this observation. We only consider the observed correlations.

¹⁶ Blue Line, 011+010: Ardahan, Elazığ, Niğde, Trabzon, Mardin, Kocaeli, Sakarya

¹⁷ Red Line, 011+010: Gümüşhane, Kastamonu, Ordu, Artvin, Bartın, Batman, Çanakkale, Edirne, Eskişehir, İzmir, Kırklareli, Muğla, Sinop, Şırnak, Hakkari, Mersin, Iğdır.

Figure 5 exemplifies the validity of this observation using data from 2004, 2009, and 2014 local election results. We clearly observe a sharp increase in per capita government spending for city-level municipalities that are ruled by the opposition party until the 2009 elections, but switched to the ruling party after the 2009 local elections. The first-stage regression results [see Tables 4-13] provide an econometric support for this picture. In almost all first-stage regressions, we find a positive and statistically significant relationship between the ruling party votes and local government spending, controlling for the observed covariates.

The use of election results as instrumental variables is a common practice in the literature. Such an IV strategy is adopted by many breakthrough papers in different contexts. Poterba (1994) uses the timing of gubernatorial elections to estimate the state responses to fiscal crises. Levitt (1997) uses the timing of local elections and its relationship between the sizes of police forces as an instrument to estimate the causal effect of police on crime. Kubik and Moran (2003) uses the exogenous election timing to explain politically motivated action.

Knight (2002) uses the political power of state congressional delegations as an instrument to test whether federal grants crowd out state-level government spending. Hanson (2009) employs political representation as an instrument for the purpose of estimating the impact of the federal Empowerment Zone program in the US on employment and poverty outcomes. Knight (2002 and 2005) uses communication and transportation committee membership to instrument for state level government spending in the US. Gruber and Hungerman (2007) use the political strength of appropriations committee members to instrument for New Deal spending in the US during the great depression. Although these studies focus on different questions in different settings, the main purpose in all of these papers is to address the potential endogeneity of interest using the exogenous variation generated by the timing and/or outcomes of elections.

CHAPTER 5

RESULTS AND DISCUSSION

We assess the empirical results for the impact of local government spending on economic growth in three steps. The first step provides a direct estimate of the fiscal multiplier, while the second step assesses the potential roles of the sub categories of public investment on economic growth. Finally, we test the relationship between local government spending and other proxies of local economic activity—such as manufacturing employment, deposits, income tax, and international trade volume.

Table (4) provides direct estimates for the fiscal multiplier—specifically, the local government spending multiplier. The night lights data set yields a proxy index for the province-level GDP in Turkey. To convert this index into Turkish lira terms, we use the 2001 province-level official GDP measurement and the associated growth rates.

The OLS estimates yield insignificant estimates, suggesting that local government spending has no impact on province-level economic growth. But, as we discuss before, these naive estimates may yield highly biased results in the sense that local government spending is likely endogenous to province-level economic growth. In other words, it is highly likely that the density of public investment may be high in high growth provinces—or, alternatively, government may be selectively allocating more public funds to low-growth provinces. These selectivity patterns likely generate biases in a regression of local economic growth on local government spending.

To address this potential endogeneity problem, we employ an IV strategy using the exogenous nature of the timing and results of elections in Turkey. Our 2SLS IV estimates suggest that the fiscal multiplier lies in the range of 2.3–2.7, which is slightly above the upper bound of the interval of fiscal multiplier estimates reported in the related literature. To be concrete, our estimates say that 1 Turkish lira increase in local government spending generates up to 2.7 Turkish lira increase in province-level GDP in Turkey. This results contributes to the recent debates on the effectiveness of government spending by showing that fiscal policy has a great potential to lift economic growth.

Next we ask whether the fiscal multiplier exhibits heterogeneity across the sub-categories of local government spending. We repeat our regressions for the sub-categories: Education and R&D, Health, Communications, Agriculture, and Housing [see Tables (5)–(9)]. Since we do not have province-level GDP measures from 2001, we cannot interpret the coefficients directly as fiscal multipliers for each public investment sub-category. But the estimates can give us an idea about the sub-components of our total fiscal multiplier estimate.

We find that the biggest chunk of the estimate comes from “Education and R&D” expenditures, while housing investments are also relevant. We could not find statistically significant estimates for health, communications, and agriculture investments. This composition suggests that public investment in high productivity areas—such as human capital and R&D—has been the main determinant of the magnitude of the fiscal multiplier. Two forces may be operating in the background: first, education and R&D expenditures may be directly affecting the productivity of government funds and, second, increased education and R&D expenditures may be serving a complementary role in the sense that they may be lifting the productivity of other investments (both private and public) so that higher public spending on human capital and R&D leads to a high fiscal multiplier.

Finally, we test whether local government spending affects other measures of economic activity such as manufacturing employment, deposits, incomes tax receipts, and international trade volume at the province level [see Tables (10)–(13)]. These tests will verify our fiscal multiplier estimates in the sense if local government spending causally affects province level GDP, then we should also observe positive reflections on other measures of economic activity. Our estimates suggest that local government spending positively and statistically significantly affects province-level manufacturing employment, deposits, income tax receipts, and the volume of international trade.

We should also note that caution should be exercised in comparing the local government spending multipliers with the multiplier estimates obtained from aggregate time-series data¹⁸. The reason is that the sources of local variations are potentially much different than the sources of times series and/or cross-country variation, which suggests that the nature of econometric identification may be different across these two categories. But these differences do not lower the value of local government spending multipliers.

¹⁸ See Su´arez Serrato and Wingender (2014) for detailed discussion

Table 4: IV estimation (2SLS) Night Lights and Total Government Spending

IV estimation (2SLS) – Total Public Investment					
Dependent Variable: Province-level GDP (constructed from Night Lights)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0101** (0.0041)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	0.0092 (0.0278)	-	-	-
RP Votes (Local Elections, %)	-	-	0.0089** (0.0039)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	0.1771*** (0.0583)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	0.0066*** (0.0021)
Second Stage					
Log of Total Gov. Spending	2.764*** (0.3414)	2.678*** (0.2653)	2.545*** (0.2997)	2.597*** (0.2495)	2.345*** (0.2908)
Gov.Spending/GDP	0.096	0.096	0.096	0.096	0.096
OLS					
Log of Total Gov. Spending	0.0163 (0.0184)	0.0163 (0.0184)	-0.0021 (0.0141)	-0.0021 (0.0141)	-0.0021 (0.0141)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	960	960	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to "Ruling Party." "Gap" refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 5: IV estimation (2SLS) Night Lights and Investment in Education

IV estimation (2SLS) – Investment in Education					
Dependent Variable: Province-level GDP (constructed from Night Lights)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0214*** (0.0056)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	0.0344 (0.0312)	-	-	-
RP Votes (Local Elections, %)	-	-	0.0102*** (0.0033)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	0.1214** (0.0544)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	0.0064*** (0.0022)
Second Stage					
Log of Education Investment	0.3632*** (0.0145)	0.3534*** (0.0143)	0.3454*** (0.0154)	0.3497*** (0.0149)	0.3491*** (0.0158)
OLS					
Log of Education Investment	0.0046 (0.0134)	0.0046 (0.0134)	-0.0157 (0.0145)	-0.0157 (0.0145)	-0.0157 (0.0145)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	960	960	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to “Ruling Party.” “Gap” refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 6: IV estimation (2SLS) Night Lights and Investment in Health

IV estimation (2SLS) – Investment in Health					
Dependent Variable: Province-level GDP (constructed from Night Lights)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0294* (0.0191)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	-0.0745 (0.1114)	-	-	-
RP Votes (Local Elections, %)	-	-	-0.0344* (0.0199)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	-0.5865* (0.3003)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	-0.0244* (0.0114)
Second Stage					
Log of Health Investment	0.0345 (0.0204)	0.0328 (0.0222)	0.0114 (0.0298)	0.0221 (0.0299)	0.0203 (0.0301)
OLS					
Log of Health Investment	0.0067*** (0.0016)	0.0067*** (0.0016)	0.0019 (0.0026)	0.0019 (0.0026)	0.0019 (0.0026)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	960	960	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to "Ruling Party." "Gap" refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 7: IV estimation (2SLS) Night Lights and Investment in Transportation and Communications

IV estimation (2SLS) – Investment in Communications					
Dependent Variable: Province-level GDP (constructed from Night Lights)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0544*** (0.0141)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	0.2431** (0.1199)	-	-	-
RP Votes (Local Elections, %)	-	-	0.0162 (0.0168)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	0.9220*** (0.1977)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	0.0246*** (0.0071)
Second Stage					
Log of Communication Investment	0.0294 (0.0211)	0.0265 (0.0251)	-0.0114 (0.0225)	0.0304 (0.0298)	0.0342 (0.0323)
OLS					
Log of Communication Investment	-0.0134 (0.0176)	-0.0134 (0.0176)	0.0087 (0.0098)	0.0087 (0.0098)	0.0087 (0.0098)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	960	960	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to “Ruling Party.” “Gap” refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 8: IV estimation (2SLS) Night Lights and Investment in Agriculture

IV estimation (2SLS) – Investment in Agriculture					
Dependent Variable: Province-level GDP (constructed from Night Lights)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	-0.0198 (0.0144)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	0.0881 (0.0966)	-	-	-
RP Votes (Local Elections, %)	-	-	-0.0110 (0.0174)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	0.2987 (0.2845)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	-0.0043 (0.0091)
Second Stage					
Log of Agricultural Investment	0.0144 (0.0121)	0.0175 (0.0138)	0.0189 (0.0178)	0.0188 (0.0199)	0.0187 (0.0191)
OLS					
Log of Agricultural Investment	0.0004 (0.0052)	0.0004 (0.0052)	0.0011 (0.0061)	0.0011 (0.0061)	0.0011 (0.0061)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	960	960	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to "Ruling Party." "Gap" refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 9: IV estimation (2SLS) Night Lights and Investment in Housing

IV estimation (2SLS) – Investment in Housing					
Dependent Variable: Province-level GDP (constructed from Night Lights)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0696*** (0.0264)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	-0.4650** (0.2236)	-	-	-
RP Votes (Local Elections, %)	-	-	0.0092 (0.0282)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	-0.2393 (0.4850)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	0.0268* (0.0161)
Second Stage					
Log of Housing Investment	0.0209*** (0.0055)	0.0216*** (0.0054)	0.0456*** (0.0145)	0.0459*** (0.0147)	0.0447*** (0.0149)
OLS					
Log of Housing Investment	0.0027 (0.0021)	0.0027 (0.0021)	0.0007 (0.0021)	0.0007 (0.0021)	0.0007 (0.0021)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	960	960	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to “Ruling Party.” “Gap” refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 10: IV estimation (2SLS) Manufacturing Employment and Total Public Investment

IV estimation (2SLS) – Total Public Investment					
Dependent Variable: Manufacturing Employment (Province-level)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0067* (0.0039)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	-0.0145 (0.0294)	-	-	-
RP Votes (Local Elections, %)	-	-	0.0089** (0.0039)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	0.1771*** (0.0583)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	0.0066*** (0.0021)
Second Stage					
Log of Total Public Investment	0.6232*** (0.1098)	0.6228*** (0.1099)	0.6230*** (0.1097)	0.6229*** (0.1098)	0.6228*** (0.1097)
OLS					
Log of Total Public Investment	0.0092 (0.0570)	0.0092 (0.0570)	0.0092 (0.0570)	0.0092 (0.0570)	0.0092 (0.0570)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	800	800	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to "Ruling Party." "Gap" refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 11: IV estimation (2SLS) Total Deposits and Total Public Investment

IV estimation (2SLS) – Total Public Investment					
Dependent Variable: Total Deposits (City-level)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0101** (0.0041)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	0.0092 (0.0278)	-	-	-
RP Votes (Local Elections, %)	-	-	0.0089** (0.0039)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	0.1771*** (0.0583)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	0.0066*** (0.0021)
Second Stage					
Log of Total Public Investment	0.9852*** (0.0778)	0.9853*** (0.0778)	0.9886*** (0.1200)	0.9884*** (0.1200)	0.9885*** (0.1199)
OLS					
Log of Total Public Investment	0.0372 (0.0284)	0.0372 (0.0284)	0.0541** (0.0246)	0.0541** (0.0246)	0.0541** (0.0246)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	960	960	800	800	800

***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to “Ruling Party.” “Gap” refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 12: IV estimation (2SLS) Income Tax and Total Public Investment

IV estimation (2SLS) – Total Public Investment					
Dependent Variable: Income Tax (City-level)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0101** (0.0041)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	0.0092 (0.0278)	-	-	-
RP Votes (Local Elections, %)	-	-	0.0089** (0.0039)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	0.1771*** (0.0583)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	0.0066*** (0.0021)
Second Stage					
Log of Total Public Investment	0.8158*** (0.1058)	0.8158*** (0.1058)	0.8157*** (0.1058)	0.8156*** (0.1058)	0.8156*** (0.1058)
OLS					
Log of Total Public Investment	0.0309** (0.0139)	0.0309** (0.0139)	0.0309** (0.0139)	0.0309** (0.0139)	0.0309** (0.0139)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	800	800	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to "Ruling Party." "Gap" refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base year.

Table 13: IV estimation (2SLS) Total International Trade Volume and Total Public Investment

IV estimation (2SLS) – Total Public Investment					
Dependent Variable: Total International Trade Volume (City-level)					
	[1]	[2]	[3]	[4]	[5]
First Stage (Instruments)					
RP Votes (General Elections, %)	0.0101** (0.0041)	-	-	-	-
RP Votes (Number of Parl. Memb.)	-	0.0092 (0.0278)	-	-	-
RP Votes (Local Elections, %)	-	-	0.0089** (0.0039)	-	-
RP Votes (Local Elections, Win=1)	-	-	-	0.1771*** (0.0583)	-
RP Votes (Local Elections, Gap, %)	-	-	-	-	0.0066*** (0.0021)
Second Stage					
Log of Total Public Investment	0.8478*** (0.0827)	0.8478*** (0.0828)	0.8727*** (0.1289)	0.8722*** (0.1290)	0.8724*** (0.1290)
OLS					
Log of Total Public Investment	0.0747 (0.0638)	0.0747 (0.0638)	0.1102* (0.0581)	0.1102* (0.0581)	0.1102* (0.0581)
Controls	Yes	Yes	Yes	Yes	Yes
# of Observations	960	960	800	800	800

Notes: ***, **, and * refer to 1%, 5%, and 10% significance levels, respectively. Standard errors are clustered at the province level. RP refers to "Ruling Party." "Gap" refers to the difference between the votes (in percentage terms) between the ruling party and the closest competitor at the corresponding province. Controls include province population, year fixed effects, province fixed effects, and the first lag of the outcome variable. Istanbul is excluded from the sample. Investment variable is converted into real terms taking 2002 as the base

CHAPTER 6

CONCLUSION

As the GDP and TFP growth rates slow down globally and major central banks hit the zero lower bound, governments seek alternative sources of policy interventions to lift up the pace of economic activity. There is an ongoing debate on the effectiveness of government spending in providing economic stimulus. The academic literature focuses on estimating fiscal multipliers for the purpose of measuring the potential impact of government spending on economic growth.

The estimates are mixed, but they can be classified in a comprehensive manner. The aggregate time series estimates yield lower fiscal multipliers (generally smaller than 1), while the local cross-sectional estimates yield much larger estimates (generally above 1, mostly around 1.5).

We estimate the local government spending multiplier for Turkey using the province-level variation in government spending between 2002-2013. The main difficulty is that there is no official province-level GDP reported for this period. We use the high-resolution night lights data provided by the National Geophysical Data Center of the United States as a proxy to construct province-level GDP indices for Turkey between 2002-2013.

Employing an instrumental variables strategy motivated by the structure/timing of local elections in Turkey, we find that 1 Turkish lira public investment generates up to 2.7 Turkish lira national income. This suggests that the fiscal multiplier is around 2.7 in Turkey, which is above the fiscal multiplier estimates reported in the literature. This result contributes to the recent debates on the effectiveness of

government spending by showing that fiscal policy (in the form of targeted local public investment spending) has a great potential to lift economic growth. We also find that government spending on education and R&D has the greatest contribution to the magnitude of the fiscal multiplier.

REFERENCES

- Auerbach, A. J. and Y. Gorodnichenko (2012): "Measuring the Output Responses to Fiscal Policy," *American Economic Journal: Economic Policy*, 4, 1-27.
- Axbard, S. (2016): "Income Opportunities and Sea Piracy in Indonesia: Evidence from Satellite Data," *American Economic Journal: Applied Economics*, 8, 154-194.
- Barro, R. J. (1981): "Output Effects of Government Purchases," *Journal of Political Economy*, 89, 1086-1121.
- Beetsma, R. and M. Guiliodori (2011): "The Effects of Government Purchases Shocks: Review and Estimates for the EU," *Economic Journal*, 121, F4-F32.
- Beetsma, R., M. Guiliodori, and F. Klaassen (2008): "The Effects of Public Spending Shocks on Trade Balances and Budget Deficits in the European Union," *Journal of the European Economic Association*, 6, 414-423.
- Blanchard, O. and R. Perotti (2002): "An Empirical Characterization of the Dynamic Effects of Changes in Government Spending and Taxes on Output," *Quarterly Journal of Economics*, 117, 1329-1368.
- Bleakley, H. and J. Lin (2012): "Portage and Path Dependence," *Quarterly Journal of Economics*, 127, 587-644.
- Clemens, J. and S. Miran (2012): "Fiscal Policy Multipliers on Subnational Government Spending," *American Economic Journal: Economic Policy*, 4, 46-68.
- Cömert, H., & Colak, S. (2014). *The Impacts of the Global Crisis on the Turkish Economy and Policy Responses* (No. 1417). ERC-Economic Research Center, Middle East Technical University.
- Evans, M. K. (1969): "Reconstruction and Estimation of the Balanced Budget Multiplier," *Review of Economics and Statistics*, 51, 14-25.

- Fishback, P. V. and V. Kachanovskaya (2015): "The Multiplier for Federal Spending in the States During the Great Depression," *Journal of Economic History*, 75, 125-162.
- Gruber, J., & Hungerman, D. M. (2007). Faith-based charity and crowd-out during the great depression. *Journal of Public Economics*, 91(5), 1043-1069.
- Hanson, A. (2009): "Local Employment, Poverty, and Property Value Effects of Geographically-Targeted Tax Incentives: An Instrumental Variables Approach," *Regional Science and Urban Economics*, 39, 721-731.
- Henderson, J. V., A. Storeygard, and D. N. Weil (2012): "Measuring Economic Growth from Outer Space," *American Economic Review*, 102, 994-1028.
- Hodler, R. and P. A. Raschky (2014): "Regional Favoritism," *Quarterly Journal of Economics*, 129, 995-1033.
- Hooker, M. A. and M. M. Knetter (1997): "The Effects of Military Spending on Economic Activity: Evidence from State Procurement Spending," *Journal of Money, Credit, and Banking*, 29, 400-421.
- HS (2000), *Bank Privatisation Finally Agreed*
- Kahn, M. E., P. Li, and D. Zhao (2015): "Water Pollution Progress at Borders: The Role of Changes in China's Political Promotion Incentives," *American Economic Journal Economic Policy*, 7, 223-242.
- Knight, B. (2002): "Endogenous Federal Grants and Crowd-Out of State Government Spending: Theory and Evidence from the Federal Highway Aid Program," *American Economic Review*, 92, 71-92.
- Krugman, P. R. (2008): *The Return of Depression Economics and the Crisis of 2008*, Norton.
- Kubik, J. D. and J. R. Moran (2003): "Lethal Elections: Gubernatorial Politics and the Timing of Executions," *Journal of Law & Economics*, 46, 1-25.
- Levitt, S. D. (1997): "Using Electoral Cycles in Police Hiring to Estimate the Effect of Police on Crime," *American Economic Review*, 87, 270-290.

- Lowe, M. (2014): "Night Lights and ArcGIS: A Brief Guide," Unpublished manuscript, MIT.
- Michalopoulos, S. and E. Papaioannou (2013): "Pre-Colonial Ethnic Institutions and Contemporary African Development," *Econometrica*, 81, 113-152.
- Mountford, A. and H. Uhlig (2009): "What are the Effects of Fiscal Policy Shocks?" *Journal of Applied Econometrics*, 24, 960-992.
- Nakamura, E. and J. Steinsson (2014): "Fiscal Stimulus in a Monetary Union: Evidence from U.S. Regions," *American Economic Review*, 104, 753-792.
- Pinkovskiy, M. (2013): "Economic Discontinuities at Borders: Evidence from Satellite Data on Lights at Night," Unpublished manuscript, Federal Reserve Bank of New York.
- Poterba, J. M. (1994): "State Responses to Fiscal Crises: The Effects of Budgetary Institutions and Politics," *Journal of Political Economy*, 102, 799-821.
- Ramey, V. A. (2011b): "Identifying Government Spending Shocks: It's All in the Timing," *Quarterly Journal of Economics*, 126, 1-50.
- Ramey, V. A. (2011a): "Can Government Purchases Stimulate the Economy?" *Journal of Economic Literature*, 49, 673-685.
- Ramey, V. A. and M. D. Shapiro (1998): "Costly Capital Reallocation and the Effects of Government Spending," *Carnegie Rochester Conference Series on Public Policy*, 48, 145-194.
- Shoag, D. (2015): "The Impact of Government Spending Shocks: Evidence on the Multiplier from State Pension Plan Returns," Unpublished manuscript, Harvard University.
- Storeygard, A. (2016): "Farther on Down the Road: Transport Costs, Trade, and Urban Growth," Forthcoming, *Review of Economic Studies*.
- Suarez Serrato, J. C. and P. Wingender (2014): "Estimating Local Fiscal Multipliers," Unpublished manuscript, Duke University.

Wilson, D. J. (2012): "Fiscal Spending Multipliers: Evidence from the 2009 American Recovery and Reinvestment Act," *American Economic Journal: Economic Policy*, 4, 251-282.

APPENDICES

A. TÜRKÇE ÖZET

1. Giriş

2008 küresel finansal kriz sonrasında Keynesyen yöntemlere dönüş, politik ve akademik platformlarda daha çok anılır olmuştur. 2008 sonrası dönemde küresel ekonomik büyüme oranlarındaki önemli yavaşlamaya tepki olarak hükümetler kamu harcamalarını artırmak ve küresel kredilere daha geniş bir erişimi sağlamak amacıyla G7, G20, BIS, OECD gibi uluslararası politika örgütleri ile işbirliği yapmışlardır. Ar-Ge, beşeri sermaye ve altyapı yatırımları gibi verimlilik artırıcı alanlara özellikle dikkat çekilmiş; hükümetler bu alanlara yönelik kamu harcamalarına ağırlık vermiştir. Bu gibi küresel politika koordinasyonu çabaları ve eylemlerine rağmen, artak kamu harcamalarının ekonomik büyümeyi ivmelendirme kabiliyeti, ekonomistler tarafından sıkça tartışılan bir konu olmuştur.

Bu tartışmanın akademik tarafı çoğunlukla kamu harcamalarının ekonomik büyüme üzerindeki nedensel etkisi ve bu etkinin büyüklüğünü tanımlamak için bir “mali çarpan” tahmin etmek üzerine odaklanmıştır. Mali çarpanın ekonometrik olarak tanımlanmasında iki temel problem vardır. İlgili ilk endişe, kamu harcamalarının ekonomik aktiviteye büyük ölçüde içsel (endojen) olduğudur: özellikle, karşı-konjonktürel ve/veya yeniden dağıtım maliye politikası eylemleri EKK (En Küçük Kareler) tahminlerini 0’a doğru çekmektedir. İkinci endişe ise veri sınırlamasıdır. Kamu harcamalarına ve ekonomik aktiviteye yönelik “toplam veri” ekonometrik analiz açısından belirli ve kritik kısıtlamalar empoze etmektedir. Bu noktada bölgesel veri kullanmak bir alternatif olsa da, bölge düzeyinde yeterli örneklem ve

güvenilirlikte GSYİH (Gayri Safi Yurtiçi Hasıla) verisi bulunmamakta ve bu nedenle çoğu analizde ekonomik aktiviteyi temsil etmek amacıyla kusurlu temsili değişkenler – istihdam, vergi gelirleri vb. – kullanılmaktadır.

Bu çalışmada, 2002-2013 dönemi için Türkiye'de, il düzeyinde, bölgesel iktisadi faaliyet üzerinde yerel kamu harcamalarının etkisi tahmin edilmektedir. İl düzeyinde ekonomik aktivitedeki değişikliği hesaplamak için gece ışık verilerini kullanılmaktadır: il düzeyinde ekonomik faaliyetin temsili için kullandığımız değişken Amerika Birleşik Devletleri Ulusal Jeofizik Veri Merkezi tarafından sağlanan gece ışıkları verisi üzerinden bu çalışma kapsamında il düzeyinde, 1992-2013 yılları için hesaplanmıştır. Literatürde, gece ışıkları üzerinden hesaplanan değişkenlerin GSYİH için uygun bir vekil olarak kullanılabileceğini gösteren birçok yeni çalışma vardır.¹⁹

Çalışma kapsamında gerçekleştirilen analizde, içsellik (endojenlik) sorununu çözmek için bir Enstrümental Değişken (IV) stratejisi tasarlanmıştır. Bu stratejinin tasarlanmasında (i) politik partilerin kamu harcaması stratejilerindeki farklar, (ii) yerel ve genel seçimlerin zamanlamasındaki dışsallık, ve (iii) seçim sonuçları kullanılmıştır. Kamu harcamaları ve ekonomik büyüme arasındaki bağlantıyı politik partilerin bu bağlantıyı algılayış şekillerine göre değişse de, yerel seçimler sonucunda yerel yönetimin el değiştirdiği durumlarda o bölgede gerçekleştirilen kamu harcamalarının miktarında önemli farklılıklar olabileceği düşünülmüştür. Bu durum, seçim zamanlarının süreç içindeki dışsallığı üzerinden yorumlanarak yereldeki bu yönetim değişikliklerinin yerel ekonomik aktiviteye dışsal olduğu

¹⁹ Gece ışıkları verisini ilgili amaçlar için kullanan literatürden güncel örnekler için – Bleakley and Lin (2012), Henderson, Storeygard, and Weil (2012), Michalopoulos and Papaioannou (2013), Pinkovskiy (2013), Kahn, Li, and Zhao (2015), Hodler and Raschky (2014), Axbard (2016), ve Storeygard (2016) ve Başlıhoş, S. (2016).

olarak yorumlanmıştır.²⁰ Bu doğrultuda gerçekleştirilen ekonometrik analizin sonucunda Enstrümental Değişken tahminlerinin ilk aşaması seçim sonuçları ve ilgili yerel kamu harcaması arasında güçlü bir ilişkiyi ortaya koymuştur.

Mali çarpan tahminleri ise Enstrümental Değişkenler (IV) yöntemi üzerinde gerçekleştirilen farklı spesifikasyonlara göre 2.3 – 2.7 aralığında yer almaktadır. Buna göre yerel kamu harcamalarında gerçekleşen 1 Türk lirası artış, gece ışıkları üzerinden il bazında üretilen GSYİH değişkeni üzerinde 2.3 – 2.7 Türk lirası artış sağlamaktadır. EKK yöntemi ile gerçekleştirilen tahminlerin 0'a yakın olması ve istatistiksel olarak anlamlı olmaması sonucunun ise iki temel açıklaması bulunmaktadır. İlk olarak, potansiyel içsellikler öngörülmeden gerçekleştirilen analiz, tahminler üzerinde bir aşağı yönelim oluşturmaktadır. Bu durum, yerel kamu harcamalarının dengeleyici olduğu, ve/veya yeniden dağıtım politikalarının yürürlükte olduğu olarak yorumlanabilir. İkinci olarak, bu güçlü çarpan etkisi, yerel kamu harcamalarının bölgesel ekonomik kalkınma üzerine son derece etkili olduğu ve Türkiye'de Ricardo etkisinin geçerli olmadığıdır.

Bu çalışmada farklı alanlardaki – sağlık, haberleşme ve ulaştırma, Ar-ge ve eğitim, inşaat vb – yerel kamu harcamalarının yerel ekonomik aktivite üzerine etkisi de ayrı ayrı incelenmiştir. Analiz sonuçları, Ar-ge yatırımlarının diğer kamu harcamalarına göre ekonomik aktivite üzerine en etkili yatırım çeşidi olduğunu göstermiştir. Diğer kamu harcamalarının ise daha küçük ve/veya istatistiksel olarak anlamlı olmayan etkileri ortaya konulmuştur.

²⁰ Benzer bir yaklaşım olarak Poterba (1994) ve Levitt (1997) seçim zamanlaması ve sonuçlarını enstrümental değişken olarak kullanarak analizleri içindeki içsellığı elimine etmiştir.

2. Tartışma ve Literatür Araştırması

Kamu harcamalarının GSYİH ve diğer refah değişkenleri üzerindeki etkisini inceleyen literatürü gerçekleştirilen analizin ölçeği itibariyle ikiye ayırmak mümkündür. İlgili literatürün ilk ayağı toplam veri üzerinden ulusal ölçekte kamu harcamalarının ekonomik aktivite üzerine etkisi incelerken literatürün ikinci ayağı kesit veri kullanarak yerel/bölgesel kamu harcamalarının yerel ekonomik kalkınma üzerine etkisini incelemektedir. Analizin ölçeği itibariyle ikiye ayrılan literatürü, temel ekonometrik yaklaşıma göre üçe ayırarak incelemek daha faydalı olacaktır: (i) yapısal vektör oto-regresyon (sVAR) yöntemi ile ulusal veri analizi gerçekleştiren çalışmalar, (ii) ABD'deki büyük askeri harcama dönemleri üzerinden dışsal harcama şoklarını izole ederek ABD için ulusal analiz gerçekleştirilen Ramey-Shapiro yaklaşımı kullanılan çalışmalar, ve (iii) kesit yerel/bölgesel veri ile Enstrümental Değişken yaklaşımının uygulandığı çalışmalar.

2.1. Yapısal Vektör Oto-Regresyon (sVAR) Yöntemi

Yapısal vektör oto-regresyon (sVAR) yöntemi, kamu harcamalarındaki şokların belirlenmesi, ulusal kamu harcamaları ve vergi sistemindeki değişikliklerin ulusal ekonomi üzerindeki etkisini analiz etmek; mali çarpan tahmin etmek amacıyla literatürde sıkça kullanılmış, standart yaklaşım olmuştur. Blanchard ve Perotti'nin (2002) kamu harcamalarının ulusal ekonomik büyüme üzerine etkisini analiz etmekte kullandıkları sVAR modeli ve bu model kapsamında geliştirdikleri varsayımlar bu literatürün temelini oluşturmuştur: mali şokları belirlemek için, öncelikle vergi, transfer ve hükümet harcamalarına ilişkin parametreler belirlenir, sVAR modeli kurularak ilgili tahmin yapılır. Bu model kullanılarak içsel değişkenlerin tahmin edilebilir tepkileri elimine edilerek kamu harcaması ve ulusal

ekonomik aktivite arasında kalan korelasyonun kamu harcamalarının ekonomik aktivite üzerine etkisi, mali çarpan, olduğu varsayılmaktadır.

Bu yaklaşım kapsamında gerçekleşen çalışmalar çoğunlukla II. Dünya Savaşı sonrası çeyreklik ABD verisi kullanılarak gerçekleştirilmiştir. Blanchard ve Perotti (2002) savaş sonrası çeyreklik ABD verisi kullanarak yaptığı analizde ABD’de için 1’e yakın bir mali çarpan tahmin etmiştir. Romer (2009) 2008 krizi sonrası ABD’nin ekonomik canlandırma paketinin ekonomik aktivite üzerine etkisini incelediği çalışmasında ABD için mali çarpanı 1.6 olarak tahmin etmiştir. ABD için sVAR kullanılarak gerçekleştirilen tahminler -1 ile 1.6 arasında geniş bir aralıkta seyretse de çoğu tahmin 1 civarında olmuştur.

ABD dışındaki ülkeler için sVAR yöntemi kullanılarak gerçekleştirilen çalışmalarda da benzer değerlerle karşılaşmaktadır. Perotti (2004a, 2007) beş OECD ülkesinin çeyreklik verisini kullanarak gerçekleştirdiği analizde ülkelerin ekonomik ve toplumsal dinamiklerindeki farklılıklara göre mali çarpanı -2.3 – 3.7 gibi geniş bir aralıkta tahmin etmiştir. Benzer şekilde Kraay (2012) gelişmekte olan 102 ülkenin çeyreklik verisini kullanarak yaklaşık olarak 0.4 değerinde bir mali çarpan tahmin etmiş, bu değer in ülkelerin ekonomik karakteristiklerine göre önemli farklılıklar gösterdiğini not etmiştir. Bunun dışında Perotti (2005), Beetsma, Giuliadori, Klaasen (2008), Guajardo, Leigh ve Pescatori (2010), Ilzetski, Mendoza, ve Végh (2010), Beetsma ve Giuliadori (2011) yaptıkları analizlerde ABD için gerçekleştirilen tahminlere paralel sonuçlar getirmiştir.

2.2. Ramey-Shapiro Yaklaşımı

Ramey ve Shapiro (1998), Ramey (2011), ve Leeper, Walker ve Yang (2011) yukarıda açıklanan sVAR yaklaşımını eleştirmiş, kamu harcamalarında ve vergi sistemindeki değişikliklerin toplum tarafından politika öncesinde öngörülebileceği, dışsal olmadığı, bu nedenle sVAR modeli çıkarımlarının geçersiz olduğunu savunmuştur. Onlara göre sVAR yaklaşımının doğru sonuçlar verebilmesi için kamu harcama şoklarının dışsal olması şarttır ve bu dışsallık sadece savaş odaklı savunma harcamaları için uygun olmaktadır. İlgili literatür, kamu harcamalarında varyasyon kaynağı olarak ABD'deki savaş odaklı savunma harcamalarını kullanarak standart sVAR literatüründen ayrılmıştır.

Ramey ve Shapiro (1998) ABD'de kamu harcamalarının büyük askeri/savunma odaklı harcamalar nedeniyle büyük ölçüde arttığı dönemleri (i) Kore Savaşı, (ii) Vietnam Savaşı, ve (iii) Carter-Reagen Dönemi olarak ayırmış ve bu dönemlerde gerçekleşen askeri kamu harcamalarını, toplam kamu harcamaları içindeki dışsal bir şok olarak izlemiştir. Ramey-Shapiro (1998), Edelberg, Eichenbaum, ve Fisher (1999), Eichenbaum ve Fisher (2005),ve Cavallo (2005) bu yaklaşımı benimsedikleri çalışmalarında 0,6 – 1,8 aralığında mali çarpan tahminlerinde bulunmuşlardır.

2.3. Kesit Veri (Yerel/Bölgesel Veri) ile Enstrümental Değişken Yaklaşımı

Angrist ve Pishke (2010) deneysel ekonomi üzerine gerçekleştirdikleri tartışmada, ampirik yöntem ve standartlardan övgü ile bahsetmiş, uygulamalı mikroekonominin katettiği gelişme üzerinde durmuştur, mikroekonomik tasarım tabanlı yeni yöntemlerin, politika yapıcılara ve makroekonomik çalışmalara sağladığı yeni

anlayış ve bakış açılarını övmüştür. Ramey (2014), yerel kamu harcamalarının ekonomik aktivite üzerine etkisini kesit veri ve Enstrümental Değişkenler (IV) yaklaşımı ile analiz eden bu yeni literatürü, Angrist ve Pishke'ye bir cevap olarak yorumlamaktadır.

Literatürün bu üçüncü ayağı, yerel kamu harcamalarının yerel ekonomik aktivite üzerine etkisini farklı deneysel yöntemlerle, kesit veri kullanarak analiz etmekte, ulusal ekonomik etkileri sabit tutarak mali çarpan tahmin etmektedir. Bu çalışmalar temel olarak “seçilmiş bir bölgeye, diğer bölgelere göre fazladan yapılan \$1 kamu harcamasının o bölgenin ekonomik aktivitesi üzerine etkisi nedir?” sorusunun cevabını aramaktadır. Yerel kamu yatırımının yerel ekonomik aktiviteye olan etkisinin kesit veri ile tahmini, yerel kamu harcamalarındaki dışsal etkilerin tespiti ve içselliklerin elimine edilmesinde büyük imkanlar sağlamaktadır. Bu kesitsel yaklaşım aynı zamanda örnekleme genişleterek tahminlerin keskinliğini arttırmaktadır.

Yerel kamu harcamalarının ekonomik aktivite üzerine etkisini kesit veri ve Enstrümental Değişken (IV) yaklaşımı gibi yaratıcı mikroekonomik deney tasarımlarıyla analiz eden literatür son yıllarda genişlemiş ve çeşitlenmiştir. Serrato ve Wingender (2010), Wilson (2011), Chodorow-Reich, Feiveson, Liscow ve Woolston (2011) ABD ekonomisinin kurumsal karakteristiği üzerinden geliştirdikleri Enstrümental Değişken (IV) metodolojileriyle eyalet düzeyinde gerçekleşen federal harcamaların farklı refah değişkenleri, çoğunlukla da istihdam ve GSYİH üzerine etkisini analiz etmiş, eyalet düzeyinde mali çarpan tahmin etmiştir.

Serrato ve Wingender (2015) yerel kamu harcamalarının ilçe düzeyinde istihdam ve ekonomik büyüme etkilerini 1970 – 2009 dönemi ABD için analiz etmiş, mali çarpan tahminlerinde federal hükümetin ilçe düzeyinde yaptığı nüfus tahminleri ve gerçek nüfus arasındaki farkı kullanarak bir Enstrümental Değişken üretmiştir.

Federal kamu yatırımlarının ilçelere nüfus tahmini üzerinden yapıldığı Amerikan sisteminde yerel ekonomik aktivite ve kamu harcaması arasındaki içselliği bu yöntem ile elimine eden çalışma, mali çarpanı 1.57 olarak tahmin etmiştir.

Chodorow-Reich, Feiveson, Liscow ve Woolston (2011) ve Wilson (2011) global kriz sonrası dönemde gerçekleşen Amerikan İyileştirme ve Yeniden Yapılandırma Hareketi (ARRA) kapsamında gerçekleştirilen kamu yatırımlarının eyalet düzeyinde büyüme ve iş/istihdam yaratma üzerine etkisini analiz etmiştir. 2008 öncesi eyalet düzeyinde gerçekleşen sağlık yatırımlarının enstrümental değişken olarak kurgulanarak içselliğin elimine edildiği çalışmalarda mali çarpan 2 civarında tahmin edilmiştir.

Shoag (2011), Clemens and Miran (2010), Cohen, Covall ve Malloy (2010) ve Fishback ve Kachanovskaya (2010) gibi diğer çalışmalarda da yerel mali çarpan, yaratıcı enstrümental değişkenler kullanılarak tahmin edilmiş; kesit veri ve Enstrümental Değişken (IV) kullanımının analizlerdeki içselliği elimine ederek sağlıklı tahminler elde etmekte başarılı olduğunu kanıtlamıştır. Literatürün bu ayağındaki tahminler, yerel mali çarpanın tahmininde genel olarak 0.5 – 2.2 arasında yer almakta, bazı çalışmalarda mali çarpan 2.2 – 3 aralığında tahmin edilebilmektedir.²¹

²¹ Shoag (2010), Serrato and Wingender (2011), Nakamura ve Steinsson (2011) mali çarpan tahminleri 2.2. – 3 aralığındadır.

3. Veri

Bu çalışmada, 2002 –2013 dönemi için il düzeyinde kesit veri kullanılarak Türkiye'de il düzeyinde gerçekleşen kamu harcamalarının yerel ekonomik faaliyet üzerindeki etkisi tahmin edilmektedir. Çalışma kapsamında Türkiye'nin 81 ili için 2002 – 2013 yıllarını kapsayacak şekilde kesitsel veri seti oluşturulmuş; il düzeyinde gerçekleşen türlerine göre yıllık kamu harcamaları, gerçekleşen yerel ve genel seçimlerde il düzeyinde gerçekleşen belediye değişimi ve siyasi partilerin aldıkları oy bilgisi, gece ışıkları verisinden, GSYİH'yı temsilen oluşturulan değişken ve toplam uluslararası ticaret hacmi, vergi, imalat sanayi istihdamı gibi refah endeksleri veri setine dahil edilmiştir.

3.1. Gece Işıkları Verisinden İl Düzeyinde GSYİH Oluşturma

Amerikan Meteorolojik Savunma Uydu Programı'nın Operasyonel Tarama Sistemi tarafından 1992 – 2013 yılları için üretilen gece uydu görüntüleri (DMSP-EKK) ekonomistler tarafından kullanılmaya, ve farklı ölçeklerdeki coğrafyaların ekonomik aktivitesinin tespitinde önemli bir kaynak olarak görülmeye başlanmıştır²². Bu çalışmada karşılaşılan en büyük veri sınırlaması Türkiye illeri için 2001 yılı itibariyle il düzeyinde GSYİH verisinin yayınlanmaması olmuştur. Amerikan Meteorolojik Savunma Uydu Programı'nın Operasyonel Tarama Sistemi tarafından 1992 – 2013 yılları için üretilen gece uydu görüntüleri bu dönemde Türkiye için il bazında GSYİH'yı temsil edecek bir değişken oluşturulmasına imkan sağlamıştır.

²² Bleakley ve Lin 2012, Henderson ve diğerleri 2012, Michalopoulos ve Papaioannou, 2013, Storeygard 2012, Nordhaus ve Chen 2014, ve Pinkovskiy, 2013.

ArcMap 13 isimli coğrafi bilgi sistemleri uygulaması kullanılarak 1992 – 2013 yılları için yayımlanan gece ışıkları görselleri sayısallaştırılmış ve Türkiye illeri özelinde sınıflandırılarak her il için yıllık değişkenler oluşturulmuştur.

Şekil 4 üzerinden görülebileceği gibi Türkiye için hesaplanan gece ışıkları endeksi ve ulusal GYSİH rakamları arasında ciddi bir benzerlik bulunmakta; GSYİH'nın ilgili dönem içinde kaşlaştığı şoklara gece ışıkları son derece keskin ve seri bir şekilde cevap vermektedir. Tablo 1'de gece il bazında gece ışıkları verisi ile ekonomik aktivite arasındaki ilişki daha detaylı ele alınmış ve 1992 – 2001 dönemi için TÜİK tarafından açıklanan resmi il düzeyinde GSYİH ile gece ışıkları verisi üzerinden bu çalışma kapsamında hesaplanan endeks arasındaki korelasyon EKK yöntemi ile 0.91 olarak tespit edilmiştir. Buna göre gece ışıkları üzerinden il bazında hesaplanan GSYİH değişkeni üzerindeki 1 Türk liralık artış, TÜİK tarafından yayınlanan resmi GSYİH üzerinde 0.91 Türk liralık bir etki yaratmaktadır.

3.2. Kamu Harcaması ve Diğer Refah Verisinin Tanımlanması

T.C. Kalkınma Bakanlığı, Proje Yatırımları Değerlendirme ve Analizi Dairesi, 1999-2015 yılları için il düzeyinde yıllık kamu yatırım bilgisini yayınlamaktadır. Yayınlanan veri kapsamında il düzeyinde tarım, imalat sanayi, enerji, ulaştırma ve haberleşme, turizm, eğitim ve Ar-ge, ve sağlık yatırımlarına yönelik kamu harcamaları bulunmaktadır.

İl düzeyinde gelir vergisi, kurumsal vergi, özel tüketim vergisi, katma değer vergisi bilgileri T.C. Maliye Bakanlığı Muhasebat Genel Müdürlüğü tarafından 2004 – 2014 yılları için mevcuttur. İl düzeyinde banka depoziti verisi Türkiye Bankalar

Birliđi; il düzeyinde ithalat ve ihracat verileri ise TÜİK üzerinden 2002-2014 yılları için sađlanmıřtır.

3.3. Seçim Verisinin Tanımlanması

Enstrümental Deđişken (IV) yönteminin tasarlanmasında 2002 – 2013 yılları arasında gerçekleşen yerel ve genel seçim sonuçları kullanılmıřtır. Türkiye Büyük Millet Meclisi'nin (TBMM) seçim arřivlerinden 2002, 2007 ve 2011 yılı genel seçimleri; 2004, 2009 ve 2014 yılı yerel seçim sonuçları kullanılarak, birbirini takip eden seçimler arasında il düzeyinde iktidar parti ve en yakın rakibi arasındaki oy farkı ve yerel yönetimin iktidar partisi ve başka bir siyasi parti arasında el deđiřtirip deđiřtirmedięi il düzeyinde kodlanmıřtır.

4. Enstrümental Değişken (IV) Stratejisi

Bu çalışmada amaç yerel kamu yatırımlarının ekonomik aktivite üzerine etkisini ölçen katsayıyı tahmin etmektir. Bu katsayıyı kamu harcamasının ekonomik büyümeyi sağlamak kapasitesi olarak yorumlamak mümkündür. Bu bölümde bu katsayının tahmininde karşılaşılan ampirik problem ve belirlenen enstrümental değişken tanımlanmaktadır.

4.1. Ampirik Problem

Mali çarpanın tahmin edilmesinde standart yaklaşım kamu yatırımının ile ekonomik aktivite arasındaki ilişkiyi seçilmiş uygun kontrol değişkenleri ile birlikte EKK yöntemiyle ölçmektir. Ancak, basit bir regresyon modelinde mali çarpan olan katsayıya nedensel anlamlar atfetmek doğru sonuçlar vermeyecektir. Burada asıl sorun, ekonomik büyüme ve kamu harcaması arasında gözlemlenmeyen; ekonomik büyüme ve gerçekleşen kamu yatırımı ile korele bir değişkenin bulunması ihtimalidir. Böyle bir korelasyonun varlığı, nedensel etkilerin ekonometrik tespitini maskeleyecektir.

Bu içsellik problemini işaret etmek ve elimine etmek amacıyla bir Enstrümental Değişken (IV) stratejisi kurgulanmıştır. Uygun enstrümental değişken yerel kamu harcaması ile ilişkili/korele; yerel ekonomik aktiveyle ise ilişkisiz olmalıdır. Böyle bir enstrümental değişkenin oluşturulmasında (i) politik partilerin kamu harcaması stratejilerindeki farklar, (ii) yerel ve genel seçimlerin zamanlamasındaki dışsallık, ve (iii) seçim sonuçları kullanılmıştır. Kamu harcamaları ve ekonomik büyüme arasındaki bağlantıyı politik partilerin bu bağlantıyı algılayış şekillerine göre değişse de, yerel seçimler sonucunda yerel yönetimin el değiştirdiği durumlarda o

bölgede gerçekleştirilen kamu harcamalarının miktarında önemli farklılıklar olabileceği düşünülmüştür. Böyle bir enstrümental değişken mantıklı ve geçerli bir analiz yöntemi sunacaktır. Biçimsel olarak başlangıç regresyon model aşağıdaki gibidir:

$$\ln(y_{c,t}) = \beta_0 + \beta_1 \ln(g_{c,t}) + \beta'_2 X_{c,t} + f_c + f_t + \varepsilon_{c,t} \quad (4.1)$$

Yukarıdaki modelde c, ili; t yılı göstermek üzere; y, il düzeyinde gece ışıkları üzerinden hesaplanan GSYİH; g, il düzeyinde gerçekleşen kamu harcaması, X ilin nüfusu ve bağımlı değişkenin bir sene önceki değeri olarak tanımlanmış matris; fc ve ft şehir ve yıl sabit etkiler ve ε, hata terimi olarak tanımlanmıştır. β1, bu çalışmanın temel amacı bu değişkeni tahmin edebilmektir, kamu harcamasında gerçekleşen değişikliğin ekonomik aktivite üzerine etkisini ölçmektedir. Buradaki temel potansiyel sorun, y ve g'nin öngörülemeyen bir değişken üzerinden birbirleriyle ilişkili/korele olması durumudur:

$$E[\varepsilon_{c,t} | \ln(g_{c,t})] \neq 0 \quad (4.2)$$

Bu nedenle 4.1 numaralı regresyon modelinde β1 için yapılan tahminler 0'a yönelecektir. Enstrümental Değişken (IV) stratejisi aşağıdaki gibi tanımlanan model ise bu sorunu çözmeye yöneliktir. Modelin birinci ve ikinci aşamaları aşağıdaki gibi yazılabilir:

$$\ln(g_{c,t}) = \gamma_0 + \gamma_1 E_{c,t} + \gamma'_2 X_{c,t} + f_c + f_t + \eta_{c,t} \quad (4.3)$$

$$\ln(y_{c,t}) = \beta_0 + \beta_1 \ln(g_{c,t}) + \beta'_2 X_{c,t} + f_c + f_t + \varepsilon_{c,t} \quad (4.4)$$

Yukarıdaki deęişkenlerin η ;t dışındakilerin tamamı 4.1 numaralı denklemde tanımlanan deęişkenlerdir. η ;t ise modelin birinci aşamasında elde edilen hata terimidir.

Bu stratejiye göre il düzeyindeki seçim sonuçları üzerinden tasarlanan E deęişkeni yerel ekonomik kalkınma, y deęişkeni, ile yalnızca yerel kamu yatırımı, g, deęişkeni üzerinden bağlantılıdır. Başka bir deęişle E, g ile ilişkili; y deęişkeni ile ilişkisizdir.

4.2. Enstrümental Deęişkenin Tanımlanması

2002 sonrası dönemde iktidar partisi, kamu harcamaları ekonomik büyüme için önemli bir katalizör olduęu görüşüne dayalı ekonomik politikalar uygulamış; karayolları, köprüler, enerji santralleri, havaalanları, limanlar, demiryolları, kentsel dönüşüm projeleri, yeraltı ulaşım altyapısı gibi büyük kamu projelerini planlamış ve desteklemiştir.

Şekil 5'te 2002 – 2016 yılları arasında gerçekleşen üç yerel seçimde, 2004, 2009 ve 2014, başka bir siyasi partiden iktidar partisine geçen yerel yönetimlere ve böyle bir geçişin yaşanmadığı illere gerçekleştirilen kamu harcamaları resmedilmiştir. Görüldüğü gibi yerel seçimler sonucunda yerel yönetimin iktidar partisinin lehine el deęiştirdiğı durumlarda o bölgede gerçekleştirilen kamu harcamalarının miktarında önemli farklılıklar olduęu görülmüştür. Gerçekten de Tablo 4 – 13 üzerinden görülen birinci aşama regresyon sonuçları, bu mantık ile tasarlanan beş enstrümental deęişken (iktidar partisinin genel seçimlerde aldığı oy oranı yüzdesi, iktidar partisinin ilgili ilden çıkardığı milletvekili sayısı, iktidar partisinin yerel seçimlerde aldığı oy oranı yüzdesi; iktidar partisinin yerel seçimlerde kazanıp kazanmadığına ilişkin kukla deęişken (0-1) ve iktidar partisinin yerel seçimlerde

en yakın rakibi arasındaki oy farklı yüzdesi) için de istatistiksel olarak anlamlı ve güçlü bir ilişkiyi ortaya koymaktadır.

5. Sonuçlar ve Tartışma

Bu çalışmada yerel kamu harcamalarının ekonomik büyüme üzerine etkisi üç adımda incelenmektedir. İlk adım mali çarpanın doğrudan tahmini; ikinci adım kamu yatırımlarının alt kategorilerine göre tahminler gerçekleştirilerek her birinin ekonomik büyüme üzerindeki potansiyel rolleri değerlendirilmesi; üçüncü adım ise yerel kamu harcamaları ile yerel ekonomik aktiviteyi temsil edebilecek diğer refah değişkenler –imalat sanayi istihdamı, banka mevduatı, gelir vergisi ve uluslararası ticaret hacmi– arasındaki ilişkinin test edilip değerlendirilmesi.

Tablo 4 mali çarpanın doğrudan tahminini –mali çarpanı– göstermektedir. Burada gece ışıkları verisi, Türkiye'de il düzeyinde GSYİH için bir temsili değişken olarak kullanılmış, bu değişkeni Türk lirası cinsinden bir GSYİH verisine dönüştürmek için TÜİK tarafından yayınlanmış 2001 yılı il düzeyinde resmi GSYİH ölçümü ve ilişkili büyüme oranları kullanılmıştır.

EKK tahminleri, yerel kamu harcamalarının il düzeyindeki ekonomik büyüme üzerinde bir etkisi olmadığını göstermiştir. Ancak önceki bölümlerde tartışıldığı gibi EKK ile yapılan analiz, yerel kamu harcamaları ile il düzeyindeki ekonomik aktivite arasındaki içsellik nedeniyle tahminleri 0'a çekmektedir. Bu durum, Türkiye'de yerel kamu harcamalarının bölgeler arası gelişmişlik farklılıklarını azaltmak amacıyla dengeleyici olduğu, ve/veya yeniden dağıtım politikalarının yürürlükte olduğu olarak yorumlanabilir. Bu durumun sonucu olarak kamu harcamalarının ekonomik aktivite üzerine etkisinin tahmini aşağı yönlü sapmaya maruz kalmaktadır.

Bu potansiyel içsellik sorunu çözmek için, Türkiye'de 2002 sonrası tek parti iktidarı döneminde, genel ve yerel seçimlerin dışsal/eksojen doğası göz önünde bulundurularak seçim sonuçları üzerinden bir Enstrümental Değişken (IV) strateji kurgulanmıştır. 2 Aşamalı EKK (2SLS) sonucunda elde edilen mali çarpan, enstrümental değişkenin kurgusuna göre, 2.3 – 2.7 aralığında tahmin edilmiştir. Bu tahmin, ilgili literatürdeki mali çarpan tahminlerinin üst bandında yer almaktadır. Daha açık ifade edilmesi gerekirse, çalışma kapsamında elde edilen tahminlere göre il düzeyinde gerçekleştirilen kamu harcamasındaki 1 Türk lirası artış, Türkiye'de il düzeyinde GSYİH'de 2.7 Türk lirası artışa neden olmaktadır. Bu durum Türkiye'de maliye politikasının ekonomik büyümeyi tetiklemek için büyük bir potansiyele sahip olduğunu göstererek kamu harcamalarının etkinliği hakkındaki güncel tartışmalara katkıda bulunmaktadır.

İkinci adım olarak mali çarpanın tahmininde yerel kamu harcamalarının alt kategorileri arasında heterojenite olup olmadığı analiz edilmiştir. Kamu harcamalarının alt kategorileri T.C. Kalkınma Bakanlığı'ndan temin edilen veriye göre, eğitim ve Ar-Ge, sağlık, ulaştırma ve haberleşme, tarım ve inşaat olarak tanımlanmıştır (Tablo 5 – 9). Kamu yatırımlarının alt kategorilerine göre gerçekleştirilen bu tahminler, doğrudan bir mali çarpan olarak tanımlanmasa da, kamu yatırımlarının alt bileşenlerinin mali çarpan içindeki potansiyel rollerine ilişkin fikir sağlamaktadır.

Analiz sonuçlarına göre “Eğitim ve Ar-Ge” harcamalarının ekonomik büyümeyi tetiklemekte en etkin alt bileşen olduğu tespit edilmiştir. Sağlık, ulaştırma ve haberleşme, ve tarıma yönelik kamu yatırımları için ise istatistiksel olarak anlamlı sonuçlar elde edilememiştir. Bu sonuç, yüksek katma değer yaratan –eğitim ve Ar-Ge gibi– alanlarda gerçekleştirilen kamu yatırımlarının mali çarpanın büyüklüğü üzerine etkili olduğunu ifade etmektedir. Bu durumun arkasında iki ana neden olabileceği düşünülmüştür: (i) eğitim ve Ar-Ge harcamaları beşeri sermayede sağladığı gelişme üzerinden kamu fonlarının verimliliğini arttırmaktadır, (ii) eğitim

ve Ar-Ge harcamalarında gerçekleşen artış diğer özel ve kamu yatırımlarının verimliliğini arttırmada tamamlayıcı bir rol oynamakta ve sonuç olarak bu alanlarda gerçekleşen kamu harcamaları yüksek bir mali çarpan yaratmaktadır.

Son olarak kamu harcamalarının yerel ekonomik aktiviteyi temsil edebilecek diğer refah değişkenler –imalat sanayi istihdamı, banka mevduatı, gelir vergisi ve uluslararası ticaret hacmi– üzerine etkisi incelenmiştir (Tablo 10 – 13). Bu analizler, mali çarpanın doğrudan tahmin edildiği birinci adımdaki sonuçlarımızı doğrulamak açısından önemlidir: eğer yerel kamu harcamaları il düzeyindeki GSYİH üzerine etkiliyse, ekonomik aktiviteyi temsil edebilecek diğer refah değişkenleri üzerinde de etkili olmalıdır. Bu analizler kapsamında elde edilen sonuçlar, yerel kamu harcamalarının il düzeyinde imalat sanayi istihdamı, mevduat, gelir vergisi ve uluslararası ticaret hacmi üzerinde pozitif ve istatistiksel olarak anlamlı bir etkisi olduğunu göstermektedir.²³

²³ Analizler kapsamında elde edilen mali çarpan değerlerini bu aşamada ulusal mali çarpan olarak yorumlamamak anlamlıdır. Yerel ve ulusal mali çarpanların hangi şartlar altında benzer şekilde değerlendirilebileceğine ilişkin detaylı bir tartışma için: Serrato ve Wingender (2014).

6. Sonuç

Bu çalışmada 2002 – 2013 döneminde Türkiye’de il düzeyinde gerçekleşen kamu harcamalarının ekonomik büyüme üzerine etkisi incelenmiştir. 2001 yılı itibariyle il düzeyinde GSYİH verisinin yayınlanmaması nedeniyle oluşan veri sınırlaması, Amerika Birleşik Devletleri'nin Ulusal Jeofizik Veri Merkezi tarafından sağlanan yüksek çözünürlüklü gece ışıkları verileri kullanarak elimine edilmiş, 2002-2013 dönemi Türkiye için il düzeyinde GSYİH endeksleri oluşturulmuştur. Türkiye’de yerel seçimlerin yapı ve zamanlamasının eksojen doğası kullanılarak bir Enstrümental Değişken (IV) stratejisi oluşturularak kamu harcaması ve ekonomik akticite arasındaki içsellik problem çözülmüştür. Analiz sonuçları, il düzeyinde kamu harcamasında gerçekleşen 1 Türk lirası artışın il düzeyinde 2.7 Türk lirasına kadar milli gelir ürettiğini göstermiştir.

Çalışmada, farklı alanlardaki – sağlık, haberleşme ve ulaştırma, Ar-ge ve eğitim, inşaat vb – yerel kamu harcamalarının yerel ekonomik aktivite üzerine etkisi de ayrı ayrı incelenmiştir. Analiz sonuçları, Ar-ge yatırımlarının diğer kamu harcamalarına göre ekonomik aktivite üzerine en etkili yatırım çeşidi olduğunu göstermiştir.

Türkiye için tahmin edilmiş olan 2.7 değerindeki mali çarpan, ilgili literatürdeki tahmin aralığının üst bandında yer almaktadır. Bu durum Türkiye için maliye politikasının ekonomik büyümeyi sağlamak ve ivmelendirmek için büyük bir potansiyele sahip olduğunu göstererek kamu harcamalarının etkililiği ve verimliliği hakkındaki güncel tartışmalara katkı sağlamaktadır.

APPENDICES

B. TEZ FOTOKOPİSİ İZİN FORMU

ENSTİTÜ

Fen Bilimleri Enstitüsü	<input type="checkbox"/>
Sosyal Bilimler Enstitüsü	<input checked="" type="checkbox"/>
Uygulamalı Matematik Enstitüsü	<input type="checkbox"/>
Enformatik Enstitüsü	<input type="checkbox"/>
Deniz Bilimleri Enstitüsü	<input type="checkbox"/>

YAZARIN

Soyadı : CEYLAN
Adı : ELİF SEMRA
Bölümü : İKTİSAT

TEZİN ADI (İngilizce) : GROWTH EFFECTS OF LOCAL
GOVERNMENT SPENDING: EVIDENCE FROM OUTER SPACE

TEZİN TÜRÜ : Yüksek Lisans Doktora

1. Tezimin tamamından kaynak gösterilmek şartıyla fotokopi alınabilir.
2. Tezimin içindekiler sayfası, özet, indeks sayfalarından ve/veya bir bölümünden kaynak gösterilmek şartıyla fotokopi alınabilir.
3. Tezimden bir (1) yıl süreyle fotokopi alınmaz.

TEZİN KÜTÜPHANEYE TESLİM TARİHİ: