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New firms and regional economic activity in Turkey

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Abstract

New firms are important for local development as they create jobs and stimulate local demand. Meanwhile, firms' location decisions are also affected by local demand and supply conditions. These potential links between firms' location decisions and local economic conditions are theoretically discussed. However, strength of these channels over each other is less examined. We use monthly data (i.e., 2009-2021) to investigate the bi-directional relationships between new firms and regional economic activity in Turkey. Results from Panel VAR analyses confirm that new firms have strong effects on regional development which we measure by electricity consumption and employment. Moreover, our spatial extension shows that impact of new firms exceeds the administrative borders of regions. Contrariwise, the reverse case is less likely as economic activities' impact on new firms is relatively weak. Our results validate that agglomeration of new firms have permanent positive effect on the level of economic activity in a region.

JEL Codes: R11, R12

Keywords: electricity consumption, employment, new firms

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Türkiye’de yeni firmalar ve bölgesel iktisadi aktivite

Öz

Yeni firmaların oluşumu yerel kalkınmanın anahtarı olarak görülmektedir. Literatürdeki çoğu çalışma, yeni firmaların istihdam yaratarak işgücü piyasalarını doğrudan etkilediğini vurgulamaktadır. Diğer taraftan, firmaların yer seçim kararları da yerel talep ve arz koşullarından etkilenmektedir. Firmaların yer seçimi kararları ile yerel ekonomik koşullar arasındaki potansiyel çift yönlü bağlantılar teorik olarak tartışılsa da mevcut veri kısıtları dolayısıyla ampirik olarak literatürde fazla yer bulamamıştır. Bu çalışmada, Türkiye'de yeni firmaların bölgesel dağılımı ve bölgesel ekonomik faaliyetler arasındaki çift yönlü ilişkileri araştırmak için aylık verileri (2009-2021) kullanılmaktadır. Panel VAR analizlerinden elde ettiğimiz sonuçlar, yeni firmaların bölgesel elektrik tüketimi ve istihdam ile ölçtüğümüz bölgesel kalkınma üzerinde kalıcı etkileri olduğunu doğrulamaktadır. Ayrıca, mekânsal analiz çerçevesinde yeni firmaların etkisinin bölgelerin idari sınırlarını aşabileceğini gösterilmektedir. Diğer taraftan, bölgesel ekonomik aktivitenin firma oluşumu üzerindeki etkisi görece sınırlıdır. Sonuçlar bir bölgede yeni firmaların kümelenmesinin bölgesel iktisadi aktivite üzerinde kalıcı pozitif etkiler yarattığını göstermektedir.

JEL Kodları: R11, R12

Anahtar kelimeler: elektrik tüketimi, istihdam, yeni firmalar

1. Introduction

There has been considerable interest for the importance of new firms within the regional science community. An important strand of the literature explores the positive effects of new firms for regional economic development. For instance, Fritsch & Mueller (2004), Van Stel & Suddle (2008), Mueller, Van Stel & Storey, (2008) argue that formation of new firms stimulates job creation at the local level. From a different vein, impact of new firms on knowledge spillovers and economic development have also been central discussions (Acs, Braunerhjelm, Audretsch & Carlsson, 2009a; Acs, Lawrence & Ryan, 2009b; Braunerhjelm, Acs, & Carlsson, 2010). Meanwhile, factors which affect new firms' geographical distribution have also been densely discussed. Regional distribution of income, access to finance and various supply based incentives affect the firms' location decision (Fristsch, 1992; Reynolds, 1994, Kangasharju, 2000; Ghani, Kerr & O'Connell, 2014; Cála, Arauzo-Carod & Manjon-Antolin, 2015).

While these studies explore the roots of the relationship between new firms and local economic conditions they disregard the bi-directional networks among each other. For instance, rising local demand through creation of new jobs or from increasing economic activity of new firms can also stimulate formation of the new firms. In other words, the link between local conditions and new firms' formation process can follow a bi-directional pattern which is shaped by the endogenous networks between characteristics of regions and the economic dynamisms of the newcomers. More importantly both channels are theoretically discussed. However, which one is more dominant is mostly under-investigated. Motivated from this gap in the literature, we aim to explore the bi-directional links between regional distribution of new firms and level of local economic activity in Turkey. Using monthly data on the formation of new firms and local economic activity we implement a set of panel vector autoregressive (P-VAR) analyses which are also augmented by a spatial framework.

An important dimension of our paper is the difficulty to obtain economic activity data at the monthly basis. We are able to collect monthly data for the agglomeration of new firms at the local level. However, macroeconomic indicators are mostly reported on annual basis and we lack in high frequency macroeconomic data at the regional level. In our analyses we refer to the social security records which contains information at the provincial employment figures on monthly basis. While this enables us to consider the changing local labor market conditions it still fails to describe the local demand characteristics. Not surprisingly, local demand and income is not reported at the monthly basis. In order to deal with this shortfall, we use the regional electricity consumption which can be gathered at the monthly basis at the provincial level. We believe constructing a provincial database with high frequency (monthly in our case) is another important dimension of the paper.

In addition to the data issues, we believe our paper contributes to the literature from a number of additional pillars. First, studies that deal with the geographical distribution

of new firms mostly deal with the unidirectional links either for the direct impact of new firms or the potential impact of local conditions. However, the possible bi-directional links are mostly neglected. Second, vast majority of the literature examine the new firms' impact by examining the economic activity within the administrative borders of a region. Yet, spatial externalities which can be an outcome of local networks are most of the time neglected. In our augmented spatial P-VAR setup we incorporate the spatial externalities. Finally, prior discussion show that Turkey has been suffering from persistent policy neutral regional imbalances for decades (Filiztekin, 2018[1999]; Doğruel & Doğruel, 2003; Rey & Janikas, 2005; Karahasan, 2020). Therefore, investigating Turkey is crucial for constructing territorial policies to sustain cohesion in developing countries.

The paper will review the related literature in section 2. In section 3 we introduce the data and the research methodology. Section 4 will introduce the empirical results and the paper will end with a conclusion (Section 5).

2. Prior literature

New firm formation plays a vital role for local economic activity and therefore is perceived as an important element for local development. Formation of new firms brings several benefits to the local economic activity. Firstly, these firms can introduce new products and services to the market, which can increase competition (Fritsch, 1997; Mata & Portugal, 1994). Secondly, new firms create and foster employment opportunities for the local community, thereby reducing unemployment and increasing income in the area (Fritsch, 1997). Lastly, new firms contribute to the overall diversity of an economy by introducing new ideas and ways to stimulate innovation and drive economic growth (Wong, Ho & Autio, 2005; Koster & Karlsson, 2009).

Inevitably, new firms may have an impact on regional development through different channels (Fritsch & Mueller, 2004; Van Stel & Suddle, 2008; Mueller et al., 2008). At this point, the most prominent impact has been through the employment created by new firms. For different country samples, Davidson, Lindmark & Olofsso (1994), Fristch (1997), Van Stel & Storey (2004), Koster & Van Stel (2014) point out that new firm formation processes positively affect employment. Therefore, national and regional policies that support new firm formation processes will contribute to regional development through employment growth.

In addition to the employment effect new firm formation will also have indirect effects to the local economy. One of the most important of these effects is the innovation and technological breakthrough contribution of new firms. Therefore, new firms can also be evaluated in terms of regional development within the framework of modern growth models (Acs et al., 2009a, 2009b; Braunerhjelm et al., 2010). Prusa & Schmitz (1991) examined the computer software industry and emphasized that new firm formation processes have an important role in innovation. More recently, empirical

analyses for Italy (Pellegrino, Piva & Vivarelli, 2012) and Spain (Segarra & Teruel, 2014) show that new firms significantly contribute to the innovation performance of the regions. These discussions guide us to understand that the benefits of new firm formation processes are beyond their ability to create employment and that new firms actually have an impact on technology, innovation and productivity (Acs & Varga, 2005; Audretsch, 2007).

From a different vein, recent literature emphasizes the endogenous nature of firms' location choice processes. Krugman (1991) pointed out that the balance between the centripetal and centrifugal forces of regions as the main driver determining the concentration of economic activity in a region. At this point, the debate on increasing returns especially contributes to the findings of modern growth theories on the rigidity of regional inequalities (Romer, 1990). In fact, Krugman (1991) defines the concentration of production in a region as a form of agglomeration economies which stimulates increasing returns and externalities. This pattern is useful to explain why economic activity tends to cluster in certain locations. Similarly, Fujita, Krugman & Venables (1999) and Fujita & Thisse (2002) emphasize the concept of agglomeration economy and point out that regional externalities directly affect the location decisions of economic activity. These ongoing debates necessitate a comprehensive analysis of firms' location choice behavior in terms of regional economy and inequalities.

Scholarly literature discusses why economic activity chooses certain locations and examines the relationship between location decision and economic growth (Hoover, 1948; Isard, 1954). In the 1990s, recent advances in the New Economic Geography (NEG) literature expand our knowledge on the interaction between location decisions and economic conditions. In particular, importance of certain regional factors is examined in order to understand the location decision of firms. Among potential candidates; local demand, public policies, education, labor market structure, access to finance, financial development and sectoral effects are discussed to influence the new firm formation (see Fritsch, 1992; Davidson et al, 1994; Reynolds 1994; Guesnier 1994; Reynolds, 1994; Lee, Florida & Acs, 2004; Sutaria & Hicks 2004; Cheng & Li,2011 among many others).

While early studies focus mainly on developed country groups, there is a growing interest for understanding the firm formation process in developing countries (Ghani et al., 2014; Cála et al., 2015; Cála, Manjon-Antolin & Arauzo-Carod, 2016). Similarly, the discussions in Turkey also draw attention to the fact that new firm formation processes may be related to sectoral and regional factors (Kaya & Üçdoğruk, 2002; Gaygısız & Köksal, 2003; Günalp & Cilesun, 2006). Karahasan (2015; 2018), on the other hand, is one of the most recent studies that discuss what kind of factors at the regional and spatial level will affect the location preferences of new firms. Moreover, Karahasan (2022) examines the spillovers between new firms and local innovation

providing information on the importance of new firms' agglomeration for local economy.

The idea of a possible endogenous relation between a firm's location decision and the local economic activity has been widely discussed in theoretical literature. However, due to the data limitations empirical studies are very limited. That is to say that, empirical studies prefer to rely on one side of the causal channels by keeping one of the dimensions (new firms and local development) as exogenous. Exceptions are Baptista & Preto (2011), Konstantinos & Karkalakos (2015) and Skopelitis (2017). For instance, Baptista & Preto (2011) on Portugal suggest that there is strong impact running from the firm start-up rate to regional employment growth. The study of Konstantinos & Karkalakos (2015) examined the bi-directional links between entrepreneurship and unemployment in 30 countries with Panel VAR setup and their findings indicates that past new firm formation rates reduces unemployment over the OECD countries. In a similar manner, the study of Skopelitis (2017) implies that entrepreneurship has a significant influence on employment growth in EU-15 countries. While these studies provide some insight on the importance of examining the two sides of the relation they do not control for the potential regional networks. However, we argue that spatiality can be a central dimension of the interconnection between distribution of firms and the extent of local economic activity.

Based on these developments in the literature we form a two-stage setup in our analyses. First, we will examine the bi-directional links between new firms and regional economic activity. Our main aim is to see whether a demand side (impact of economic activity on new firms) or a supply side (impact of new firms on economic activity) view dominates the other. Next, we will add a spatial dimension and observe whether our main results are robust to the inclusion of spatial externalities. Our objective is to test if agglomeration is bounded by the administrative borders of regions.

3. Data and Methodology

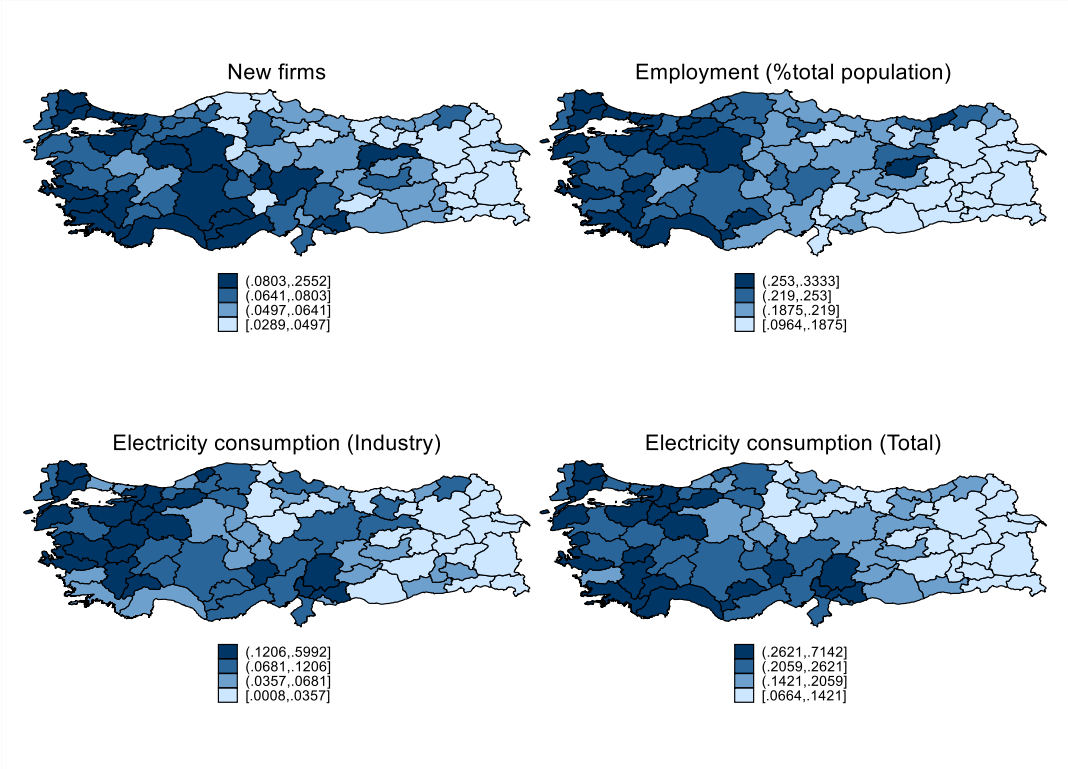
3.1 Data

In our empirical analyses we construct our sample at the monthly basis for the 2009-2021 period at the NUTS-3 level. New firm formation data is provided by The Union of Chambers and Commodity Exchanges of Turkey (TUCCET, 2021). Since no sectoral data is provided, we use the total new firm formation data. Most of the existing studies use the Labor Force Survey to control for regional differences in employment figures. This data set enables researchers to examine employment figures at the NUTS-2 level. In this study we utilized administrative employment figures collected from the Social Security Institute (SII, 2021) which has NUTS-3 representation. Finally, electricity consumption data is provided by the Energy Market Regulator Authority (EMRA, 2021). We acknowledge that electricity consumption can be upward biased in more industrialized areas. However, there is growing interest in the international literature for

the use of electricity consumption as an indicator of economic activity (Arora & Lieskovsky, 2016; Blonz & Williams 2020). Motivated by this development, we use the monthly electricity consumption as a measure of regional income. We have to remark that use of electricity consumption enables us to work with high frequency data (monthly basis). It should be kept in mind that the most commonly used per capita income data can only be obtained in annual terms. Note that, we use two separate indicators for electricity consumption (i) industrial electricity consumption, (ii) total electricity consumption. Additionally, potential seasonality in the data is corrected by applying the methodology of the United States Census Bureau (X-13 ARIMA-SEATS method).

Spatial distribution of new firms' location decision (per population) and local economic activity are plotted in Figure 1. All figures clearly indicate the spatial polarization of economic life in Turkey. While, western regions host more new firms and realize higher levels of economic activity (measured by employment and electricity consumption) eastern topography of Turkey is less developed in terms of the same indicators. This pattern mimics the already known regional disparities in Turkey.

Figure 1: Spatial Distribution of New Firms and Local Economic Activity (sample average)



Source: TUCCET (2021), SSI (2021), EMRA (2021)

3.2 Methodology

In order to explore the dynamic inter-relationship between new firm formation, employment and local economic activity, we employ a panel vector autoregression (P-VAR) model. Within this context our baseline model with p lags as follows,

$$y_{it} = \sum_{q=1}^{p} A_q y_{it-q} + \mu_{it} \quad [1]$$

$$y_{it}: \begin{pmatrix} F_{it} \\ X_{it} \end{pmatrix} \quad [2]$$

where y_{it} represents the vector of variables including, new firm formation (F) in region i at time t and X_{it} which stands for economic activity that we control with two separate variables: (i) electricity consumption, (ii) employment. Finally, μ_{it} is a vector of orthogonalized shocks and have the following characteristics: $E(\mu_{it}) = 0, E(\mu'_{it}\mu_{it}) = \Sigma$ and $E(\mu'_{it}\mu_{is})$ for all $t > s$.

Note that, in the standard P-VAR setting we do not allow for spillover between regions. However, an important dimension of regional analyses is the potential spatial externalities. While spatial econometric analyses receive huge interest within the regional science community spatio-temporal patterns also start to receive interest recently. Therefore, we carry-out additional exercises to incorporate spatiality into the standard P-VAR model. The main idea behind spatial externalities stems from the existence of spatial auto-correlation. We measure the spatial auto-correlation by using the Moran's I statistics as follows:

$$I_i = \frac{n}{s} \frac{\sum_i \sum_j w_{ij}(x_i - \bar{x})(x_j - \bar{x})}{\sum (x_i - \bar{x})^2} \quad [3]$$

where *n* and *s* represent number of regions and the summation of all elements of the weight matrix (*w*). Among different weight matrices we use the contiguity weight matrix which assigns a value of 1 if two regions share the same administrative border and 0 otherwise.

Based on the potential role of spatial externalities we perform the second set of P-VAR analyses. The main objective is to assess whether spatial proximity plays any role in understanding the bi-directional links between new firms and regional economic activity. To assess the impact of spatiality we concentrate on the spatial dimension of agglomeration economics and compute the spatial lag of new firms' formation (WF_{it}). Similar to the earlier analyses, X_{it} represent the economic activity (employment and electricity consumption). The spatially augmented P-VAR models transforms into:

$$y_{it} = \sum_{q=1}^{p} A_q y_{it-q} + \mu_{it} \quad [4]$$

where

$$y_{it}: \begin{pmatrix} WF_{it} \\ X_{it} \end{pmatrix} \quad [5]$$

4. Empirical Results

Prior to the estimation of P-VAR we first determine the integration order of the variables of interest. Table 1 supplies the unit root test results. For panel unit root tests, Levin, Lin & Chu (LLC) assumes common unit root process and Im, Pesaran & Shin (IPS) assumes individual unit root process, and for both tests null hypothesis asserts variables contain unit root. Results indicate that new firm formation and electricity consumption variables are stationary, while the employment variable is trend stationary.[1]

Table 1: Unit Root Test Results

	Levin, Lin & Chu (LLC)				Im, Pesaran & Shin (IPS)			
	Intercept		Intercept + Trend		Intercept		Intercept + Trend	
	Stat.	p-value	Stat.	p-value	Stat.	p-value	Stat.	p-value
New Firm Form.	-50.358	0.000	-73.773	0.000	-47.046	0.000	-57.413	0.000
Employment	1.086	0.861	-3.221	0.001	4.994	1.000	-10.659	0.000
Electricity Cons. (total)	-19.556	0.000	-36.531	0.000	-23.252	0.000	-33.516	0.000
Electricity Cons. (industrial)	-12.231	0.000	-23.739	0.000	-15.712	0.000	-21.435	0.000
New Firm Form. - Spatial Lag	-56.420	0.000	-83.588	0.000	-48.552	0.000	-62.826	0.000

In our analyses we use 6 as the optimal lag length. To our view this allows for controlling for the potential business cycles in the economy. Throughout the P-VAR estimations we focus on the impulse response analyses which basically shows the

[1] In the PVAR estimations we include a trend dummy as an exogenous covariate.

response of a variable to a given shock to the other variable.[2] We must highlight that our objective is not to make causal statements as these kinds of models are not particularly designed to assess causality. Moreover, we are aware of the fact that we are keeping many other factors outside the model. In that sense, our basic exercises in this study should be perceived as descriptive analyses of the potential networks between new firms and local development.

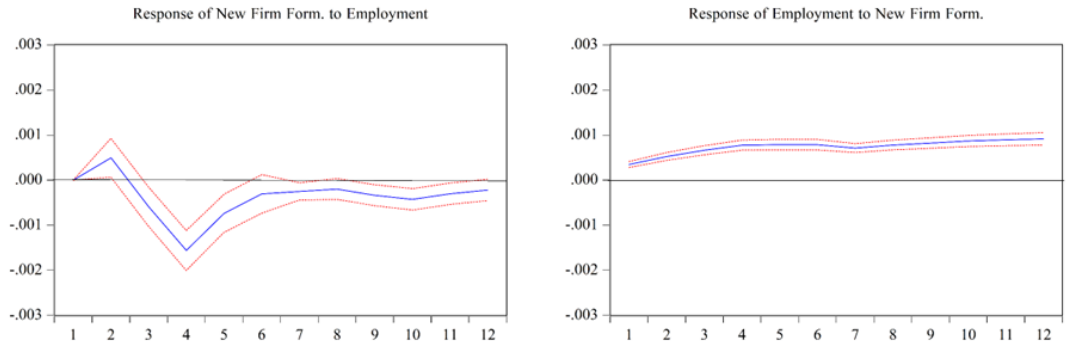
Figure 2 shows impulse response functions obtained from our baseline model. According to the results, one standard deviation shock to new firm formation leads to significant increases in employment. Remarkably, this effect is permanent over periods. Likewise, a one standard deviation shock to new firm formation also increases total electricity consumption by 0.04%. The impact of new firm formation also applies to industrial electricity consumption. Accordingly, a one standard deviation shock increases industrial electricity consumption by 0.03%. In addition, the effect of new firm formation is persistent in both types of electricity consumption.

On the contrary, one standard deviation shock to employment has a positive effect on new firm formation for 1 period after which the effect disappears. On the other hand, the response of new firm formation to a one standard deviation shock of total electricity consumption, which we use to measure economic activity, is statistically insignificant. Similarly, if we look at economic activity in terms of industrial electricity consumption, a one standard deviation shock is also insignificant.

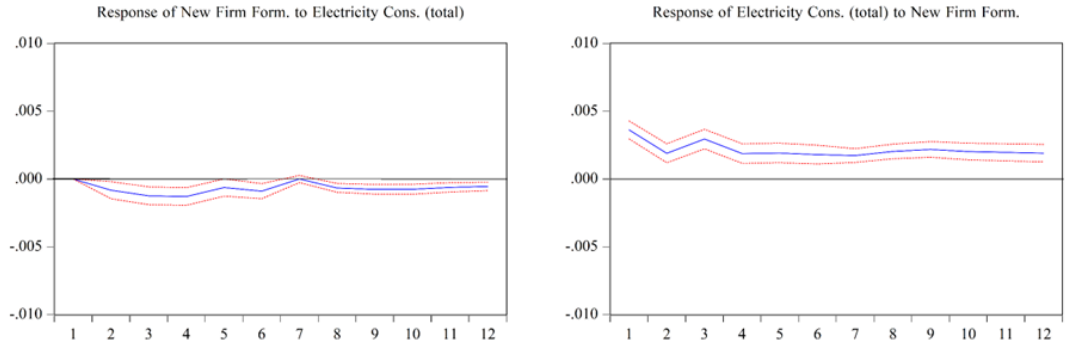
Overall, our results from the baseline P-VAR analyses show that the impact of new firms on local economic activity is stronger compared to a reverse case scenario. As we highlighted before there are other potential local factors which will influence the bi-directional relations. However, controlling these factors with monthly data seems difficult. Therefore, these preliminary results should give us preliminary clues on the potential links between new firms and local economic activity.

[2] Stability condition for the estimated models evaluated through the moduli of each eigenvalue and the results reported in the Appendix (Figure 1A). Our stability analyses confirm that all eigenvalues are inside the unit circle. As a result, the estimated P-VAR specifications satisfy the stability condition. Stability condition implies that the estimated models are invertible and has an infinite-order vector moving average (VMA) representation, providing known interpretation to estimated impulse-response functions (Abrigo & Love, 2016).

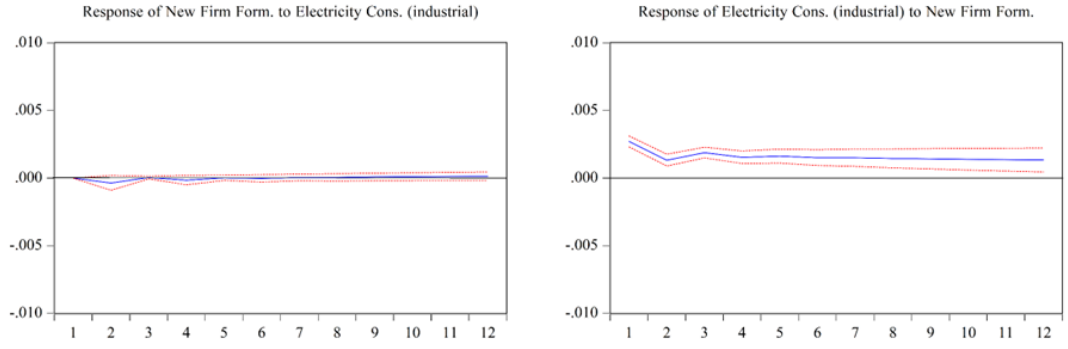
Figure 2: Non-spatial P-VAR Models (IRFs)



Note: Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E. Variables constructed as per capita.



Note: Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E. Variables constructed as per capita.



Note: Response to Cholesky One S.D. (d.f. adjusted) Innovations ± 2 S.E. Variables constructed as per capita.

Source: Authors' own calculations

In line with our prior discussions in the methodology part we would like to check for the potential role of spatial externalities. Table 2 gives the results for the spatial auto-correlation test and shows that our variables of interest are all spatially auto-correlated. This reminds the importance of potential spatial externalities which can influence the responses of the economic variables. While estimating the P-VAR models by fully using

spatial terms is an option we prefer to be selective and focus on the spatial dimension of agglomeration economies. Our reasoning departs from the location decision of the new firms. The main intuition is that firms' location decision represents an agglomeration behavior which is rooted beyond the administrative borders of the regions. Therefore, we compute the spatial lag of the new firms and the apply spatially augmented P-VAR model.

Table 2: Spatial Auto-correlation Tests Results

	Moran's I	Std. dev	Z-score
New Firm Formation	0.369***	0.069	5.567
Employment	0.751***	0.072	10.636
Electricity Consumption (industry)	0.327***	0.068	4.976
Electricity Consumption (total)	0.456***	0.07	6.733

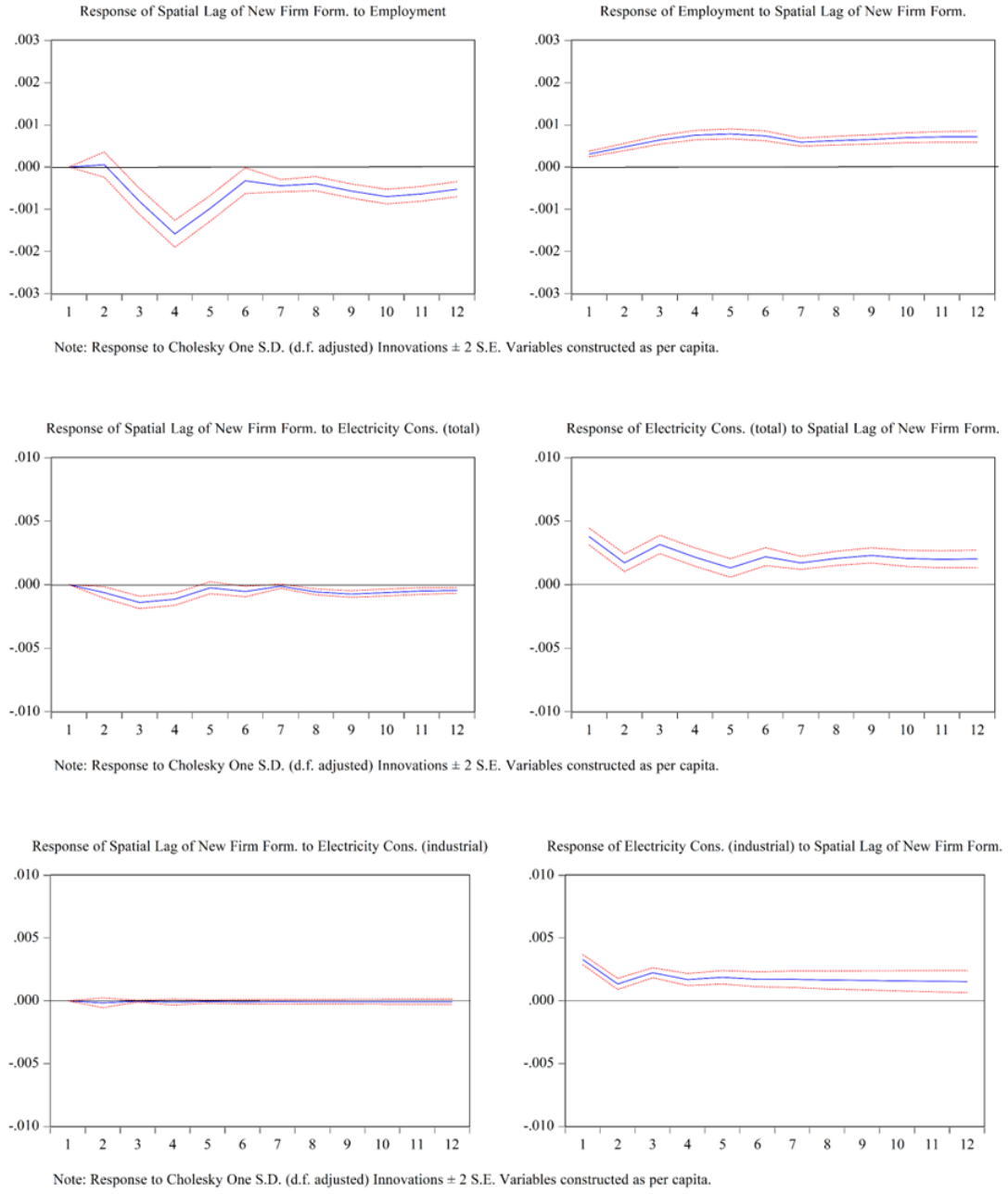
Notes: *** represents significant spatial auto-correlation at 1% level

Results for the spatially augmented P-VAR model are supplied in Figure 3. Our findings indicate that a one standard deviation shock to spatial lag of new firm formation leads to significant increases in employment and this effect is permanent over periods similar to non-spatial findings. Likewise, a one standard deviation shock to spatial lag of new firm formation raises total electricity consumption by 0.004% approximately. Furthermore, if we look at economic activity in terms of industrial electricity consumption, a one standard deviation shock to spatial lag of new firm formation leads to by 0.003% increase in industrial electricity consumption and this effect is also persistent.

However, the response of spatial lag of new formation to one standard deviation shock of employment is statistically insignificant. Similarly, a one standard deviation shock to our other economic activity measure total electricity consumption, is also statistically insignificant on spatial lag of new firm formation. Moreover, this also applies to industrial electricity consumption.

Overall, our results from the spatially augmented P-VAR models indicate that impact of new firms exceed the administrative borders of regions and both demand and supply side effects of region and its neighbor regions are influential in the location choice of new firms. In addition, new firm formation in periphery has a permanent impact on local employment.

Figure 3. Spatial P-VAR Models (IRFs)



Source: Authors' own calculations

5. Conclusion

Importance of new firms has been densely discussed in the literature. Moreover, role of local factors to understand how firms decide the right location for production receives huge interest in the empirical literature. However, which channels dominates the other

is relatively less examined. Motivated from this gap, we compare the strength of these two channels for a developing country example. Our results from a spatially polarized country, Turkey, show that impact of new firms on local economic activity is extremely strong. On the contrary, the reverse channels are either weak or statistically insignificant. Moreover, we also find statistically significant spillovers from the surrounding regions. Our results point-out that firm formation of the spatial proximity is as important as the regions' local economy.

These results imply that agglomeration of new firms in a given region is central for local development and territorial cohesion. Therefore, new firms should be regarded as one of the most vital elements of the territorial policies which targets regional integration. Policies supporting the formation of new firms should be prioritized by the policy makers. Not only, economic incentives to spur new firm formation but also structural reforms and institutional improvements are central for providing the suitable investment climate for the new economic agents.

We believe our results contribute to our knowledge on the place of new firms for local development. First, it is one of the first attempts for Turkey where we use high frequency data in a regional model to assess bi-directional links between agglomeration and local economic conditions. Moreover, we incorporate the role of spatiality in the P-VAR analyses. These to aspects of our study enables a better understanding for the spatio-temporal patterns of new firm formation and evolution of local economic activity.

Finally, a number of points are worth highlighting. Our analyses cover the post 2009 period during which Turkish economy is affected from both internal and external shocks. Lagged impact of the 2008 Global Financial Crises, rising internal instabilities, macroeconomic turmoil after 2018 and the COVID-19 crises are important developments of the period. In this study, we do not investigate the potential role of these exogenous shocks and evaluate our results under the potential impact of these development. At this stage, we have to remind that our analyses do not aim to construct a causal framework. Moreover, in our empirical exercises we do not control for a host of other factors that can also be a part of the bi-directional links between new firms and local development. We are also aware that new firms' impact on local economic activity can be moderated by certain regional factors. Likewise, there can be various mediating channels which define the true impact of the new firms for economic activity. Working on these potential improvements should be perceived as future lines of research that deserves specific attention.

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Appendix

Figure A1: Stability Graphs of P-VAR Models