RESEARCH ARTICLE

https://doi.org/10.17059/ekon.reg.2023-3-22
UDC: 330.3, 332.1, 332.05
JEL classification: H25, O38, R00, H71

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An Empirical Analysis of the Impacts of Investment Incentives on Provincial Economic Growth in Turkey[1]

Abstract. There are significant differences between governments in the context of the objectives of incentive policies. However, they are generally focused on macroeconomic purposes such as eliminating regional inequalities and increasing investment level, employment, industrialisation and therefore raising economic growth. In Turkey, The New Investment Incentive System, which has been implemented since 2012, essentially aimed to mitigate interregional inequalities. This study investigates the impact of investment incentives on provincial per capita growth of 81 provinces for the years 2004-2017. Our data are also available for capital types and sectoral levels. The dynamic panel data estimates show that while the impact of the number of incentive certificates on provincial growth is significantly positive, there is no effect of fixed investment and employment on provincial growth. Moreover, given the significantly positive estimated coefficients on all three measures of investment incentives for the energy and manufacturing sectors, we conclude that incentives raise provincial growth for these two sectors. However, investment incentives in services, mining and agriculture sectors have no impact on regional growth. Results of the analysis of investment incentives by investor type imply that while investment incentives provided to domestic firms have no effect on growth, incentives for firms owned by foreigners have positive effects. Our study thus makes important contributions to the literature by considering both province-level incentive measures and five main sectors, namely energy, manufacturing, services, mining and agriculture in the sectoral analysis.[2]

Keywords: investment incentives, growth, regional growth, panel data analysis, system GMM, sectoral analysis, Turkey

For citation: Yanıkkaya, H. & Altay, K. (2023). An Empirical Analysis of the Impacts of Investment Incentives on Provincial Economic Growth in Turkey. *Ekonomika regiona / Economy of regions, 19(3)*, 909-918. https://doi.org/10.17059/ekon.reg.2023-3-22

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[2] This paper is a part of the master's thesis written by Kübra Altay submitted in partial fulfillment of the requirements for the degree of Master of Science in Economics in the Gebze Technical University, 2020.

ИССЛЕДОВАТЕЛЬСКАЯ СТАТЬЯ

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Эмпирический анализ влияния инвестиционных стимулов на экономический рост в провинциях Турции

Аннотация. Несмотря на существенные различия в политике стимулирования, правительства стран мира, как правило, стремятся к достижению макроэкономических целей, таких как устранение регионального неравенства, увеличение объема инвестиций, занятости, темпов индустриализации и, следовательно, ускорение экономического роста. Новая система стимулирования инвестиций, внедренная Турцией в 2012 г., в основном направлена на снижение межрегионального неравенства. В статье исследуется влияние инвестиционных стимулов на рост на душу населения в 81 провинции Турции в 2004-2017 гг. Данные были проанализированы с учетом различных типов капитала по секторам экономики. Согласно оценке динамических панельных данных, выпуск сертификатов инвестиционного стимулирования положительно влияет на экономический рост провинций, а инвестиции в основной капитал и занятость не оказывают подобного воздействия. Более того, значимые положительные коэффициенты всех трех показателей стимулирования инвестиций в энергетический и производственный секторы означают рост этих двух секторов на уровне провинций. Однако взаимосвязь между региональным экономическим развитием и введением стимулов в сфере услуг, горнодобывающей промышленности и сельском хозяйстве не была обнаружена. Результаты анализа инвестиционных стимулов по типам инвесторов показали, что предоставление инвестиционных льгот отечественным фирмам не влияет на региональный рост, в то время как стимулирование компаний с иностранным капиталом имеет положительный эффект. Проведенное исследование вносит важный вклад в литературу, поскольку меры инвестиционного стимулирования были проанализированы как на уровне провинций, так и на отраслевом уровне, включающем в себя пять основных секторов: энергетика, производство, сфера услуг, горнодобывающая промышленность и сельское хозяйство.

Ключевые слова: инвестиционные стимулы, рост, региональный рост, анализ панельных данных, системный обобщенный метод моментов, отраслевой анализ, Турция

Для цитирования: Яниккая Х., Алтай К. (2023). Эмпирический анализ влияния инвестиционных стимулов на экономический рост в провинциях Турции. *Экономика региона, 19(3)*, 909-918. https://doi.org/10.17059/ekon.reg.2023-3-22

1. Introduction

As a result of substantial regional development differences in most countries, the attention given to regional growth and development policies in many economies has been increasing. An employment of investment incentives scheme is a policy tool widely used all over the world. Although there are considerable differences in the aims of incentives policies, they are generally designed for macroeconomic purposes such as eliminating regional inequalities and increasing investment level, employment, industrialisation and therefore raising economic growth. The New Investment Incentive System in Turkey, which was put into practice in 2012, principally aimed to raise investments in relatively underdeveloped regions and thus mitigate interregional inequalities in Turkey. According to NUTS-3 (Nomenclature of Territorial Units for Statistics) definition, there are 81 provinces in Turkey, which are very different from each other in terms of development. These provinces are also divided into 26 regions in terms of NUTS-2, largely based on the geographical proximity. Moreover, in the new incentive system, provinces are divided into six groups solely depending on their levels of development. The provinces that are close to each other socio-economically are grouped. Although provinces in Region 5 and Region 6, which are comparatively lagging behind according to these index values, have the greatest advantages to investments, provinces in these two regions have not been successful in attracting investment with the incentives provided. The success of the New Investment Incentive System is thus open to discussion at this point.

The New Investment Incentive System consists of four main regimes: general, regional, large-scale and strategic investment incentives. These regimes and the elements of support scheme they outline are shown in Table 1.

This study contributes to the literature in three ways. Firstly, given the limited consensus on the growth effects of investment incentives, our study contributes to the literature by examining the effect of incentives on provincial economic growth. Secondly, since there is a lack of provincial data,

Table 1

Support elements in the New Investment Incentive Policy

Incentive Tools	General	Regional	Strategic	Large-Scale
Customs Duty Exemption	+	+	+	+
Value Added Tax (VAT) Exemption	+	+	+	+
Tax Reduction	–	+	+	+
Investment Place Allocation	–	+	+	+
Interest Support**	–	+	+	–
VAT Refund***	–	–	+	–
Insurance Premium Support*	–	+	+	+
Income Tax Stoppage Support*	+	+	+	+
Insurance Premium Employer Share Support	–	+	+	+

Source: Turkey Legal Gazette, 2012, 28328.

* For Region 6.

** Except for Region 1 and Region 2.

*** It is valid for the construction expenditures of strategic investments with a minimum fixed investment amount of 500 million TL (Turkish Lira).

existing research is generally based on NUTS-2 regions in Turkey. The present paper mainly examines the impacts of investment incentives on regional economic growth on NUTS-3 (81 provinces). To the best of our knowledge, this is the first study to investigate the effect of investment incentives on provincial growth. Thirdly, there is no empirical study analysing the sectoral effectiveness of investment incentives for Turkey yet. Thus, this article makes an important contribution to the literature by considering five main sectors, namely energy, manufacturing, services, mining and agriculture in the sectoral analysis.

The dynamic panel data estimations imply that while incentives proxied by the number of certificates are positively associated with the growth of the provinces, incentives proxied by the level of new investments made with incentives programmes and the level of new employment undertaken through incentives programmes seem to have no effect on the provincial growth. Furthermore, in our sectoral analysis, while the effects of investment incentives in the energy and manufacturing sectors on the provincial growth are significantly positive, no significant impact of investment incentives on the services, mining and agriculture sectors are found. Regarding the types of investors, unlike local investors, investment incentives provided to foreign investors seem to have a significantly positive effect on provincial growth.

This paper is organised as follows. Section 2 reviews the literature on the effects of regional investment incentives. Section 3 presents the method of this study, the features of the data used in the analysis and the econometric model. In Section 4, regression results are reported and discussed. Finally, the section 5 concludes the study.

2. Literature Review

Given the large regional development inequalities observed in most countries, there is a substantial literature studying the impact of investment incentives on the regional growth and development policies. Empirical studies generally focus on the effects of incentives at the national or regional level. The closest study to our research is that Yavan (2011) employs NUTS-3 regional (81 provinces) and investment incentives data for a single year, 2001. He reports that there is a positive relationship between investment incentives and provincial growth. Due to the lack of data on the provincial basis in Turkey, the empirical studies at the regional level are generally based on NUTS-2 (26 sub-regions) or 7 geographical regions. For instance, based on NUTS-2 sub-regional data, Recepoğlu and Değer (2016) conclude that investment incentives affect regional growth positively only in the long run. Sevinç et al. (2016) report that Turkey fails to utilise the regional incentives policies effectively because it seems that investment incentives are distributed very evenly across different regions classified based on their development levels. Similarly, Özkök (2009) states that investment incentives in the context of regional development are not effective in Turkey. Şahin and Uysal (2011) conclude that the amounts of incentives given in relatively less developed regions are insufficient for regional development, both in terms of investment and employment.

Zheng and Warner (2010) find that the use of incentives has a negative effect on economic growth in the USA for 1994, 1999 and 2004 by using survey data. Bunker (2013) reports that tax incentives provided by the 2005 Gulf Opportunity Zone Act in the USA do not have a significant negative economic impact on the surrounding cities

without incentives. Jensen (2017) concludes that incentive programmes implemented in Maryland and Virginia states have no effect on creating new employment areas.

Studies in the literature generally examine the effect of investment incentives on specific macroeconomic variables such as employment, fixed investments or foreign direct investments rather than their effects on regional growth. Using data set for the 1978–1989 period, Schalk and Untiedt (2000) state that investment incentives have a positive effect on investment and employment for the manufacturing industry in the West Germany. Yanıkkaya and Karaboğa (2017) report that investment incentives do not affect employment significantly, but negatively affect capital stock per working hour, growth rate of value added per working hour and total factor productivity growth for 1981 and 2009 periods in Turkey. Öz and Buyrukoğlu (2017) show that the relationship between investment incentives and employment is positive, and the relationship between foreign direct investments is neutral in Turkey. Similarly, Adamek and Rybkova (2015) find that incentives have a positive effect on regional employment in the Czech Republic. Bondonio and Greenbaum (2006) conclude that investment incentives have a positive effect on regional employment in Italy and some European Union countries for the period 1995–1998 even though they were more costly than in the past.

Yavuz (2010) argues that the impact of incentives in the energy sector for employment creation is weaker compared to the manufacturing sector and also finds a statistically significant and positive relationship between the incentives and employment for Turkey. While emphasising the interregional development differences in Turkey, Akan and Arslan (2008) claim that there is a positive relation between investment incentives and employment for the 1980–2006 period. Using the survey data for the period 1993–1995, Gabe and Kraybill (2002) find a positive effect of investment incentives on employment for 366 companies in Ohio, USA.

Some studies discuss the effect of incentives on attracting private sector investments and foreign direct investments. For example, Tung and Cho (2001) find that regional tax incentives have a positive and significant impact in attracting foreign direct investments in China. According to the results of the analysis by Parys and James (2010), tax holidays for 12 Sub-Saharan African countries in West and Central Africa do not have a strong effect on attracting foreign direct investment and fixed capital. However, improving investment area variables such as reducing the complexity of tax incentive policies and increasing the number of legal guarantees has an important effect on attracting foreign direct investment to the region. Fowowe (2013) argues that fiscal incentives have a considerable negative impact on private sector investments and foreign direct investments in Nigeria, where a very complex incentives system exists.

3. Data and Methodology

This study employs the standard neoclassical growth model. Solow (1957) provides a framework for the aggregate production function with the assumption of constant returns to scale. The following function, written in the Cobb-Douglas form, presents that output is a function of technology, capital, and labour. According to the neoclassical production function, Y is gross total output, A is technology level, K is capital accumulation and L is labour. The α and β parameters are the output shares of capital and labour. With this measurement method, referred to as 'growth accounting', the growth rate of each of the component in the formulation can further be calculated.

$$Y_{i,t} = A_{i,t} K_{i,t}^{\alpha} L_{i,t}^{\beta}, \quad (1)$$

In this study, we actually utilise the dynamic panel model, which exploits the lagged values of the dependent variables. Dynamics models are usually represented as follows:

$$y_{it} = \gamma y_{i,t-1} + \beta_1 X_{i,t} + \eta_i + \lambda_t + \varepsilon_{i,t}, \quad i = 1, \ldots, N \text{ and } t = 1, \ldots, T, \quad (2)$$

where $y_{i,t-1}$: the lagged value of dependent variable, y; β_1: $Kx1$ dimensional matrix of coefficients; $X_{i,t}$: independent variables vector of dimension $Kx1$; η_i: unobservable individual effects; λ_t: unobservable time-specific effects; $\varepsilon_{i,t}$: error term.

Our econometric model based on the basic Solow (1957) growth model is then as follows:

$$growth_{i,t} = \alpha_0 + \beta_1 growth_{i,t-1} + \beta_2 publicinv_{i,t} + \beta_3 trade_{i,t} + + \beta_4 population_{i,t} + \beta_5 patent_{i,t} + \beta_6 credit_{i,t} + \beta_7 incentives_{i,t} + \beta_8 T_{i,t} + \varepsilon_{i,t}, \quad (3)$$

where i denotes provinces and t denotes time. The dependent variable (growth) is the growth rates of gross domestic product (GDP) per capita at the provincial level.

A number of control variables are also used in the analysis. Public investment variable (publicinv) measures the amount of public investment undertaken by the central government in a province. Data on public investment are taken from the Ministry of Development. Trade (trade) and popu-

Table 2

Summary statistics

VARIABLE	Obs.	Mean	Standard Error	Min	Max
GDP per capita growth rate (%)	1,053	4.428	5.147	-12.932	27.659
Public Investment/GDP (%)	1,134	2.665	2.935	0.288	43.488
Trade/GDP (%)	1,134	13.06	17.057	0	87.585
Credit/GDP (%)	1,134	26.840	14.694	2.595	93.662
Population (in thousand)	1,134	916.288	1616.087	74.412	15029.23
Patents (per thousand people)	1,134	0.021	0.039	0	0.853
Investment with Incentives (million TL)	1,134	497.033	1651.5	0	42155. 4
Number of Certificates	1,134	46.282	71.028	0	782
Employment with Incentives	1,134	1684.586	2943.826	0	30262
Energy Investments	1,134	132679	1271424	0	41606870
Services Investments	1,134	147976.3	698945.4	0	16704673
Manufacturing Investments	1,134	171393.5	482730.6	0	12049035
Mining Investments	1,134	17661.54	127755	0	2935703
Agriculture Investments	1,134	5641.271	14487.77	0	145619.3
Number of Energy Certificates	1,134	5.599	15.576	0	140
Number of Services Certificates	1,134	13.630	26.054	0	341
Number of Manufacturing Certificates	1,134	23.747	43.220	0	448
Number of Mining Certificates	1,134	1.898	2.737	0	22
Number of Agriculture Certificates	1,134	1.400	3.360	0	47
Energy Employment	1,134	34.495	114.007	0	2823
Services Employment	1,134	672.181	1889.906	0	17461
Manufacturing Employment	1,134	884.057	1454.758	0	14324
Mining Employment	1,134	85.779	945.551	0	30000
Agriculture Employment	1,134	48.137	320.572	0	10000

Source: Turkish Statistical Institute (TUİK), The Ministry of Development, The Ministry of Treasury and Finance, Turkish Patent and Trademark Office, The Banks Association of Turkey, The Ministry of Industry.

lation (population) variables indicate the amount of provincial foreign trade and population, respectively. Total provincial foreign trade share is calculated as the sum of import and export values divided by provincial GDP (Gross Domestic Product). The last two measures are taken from the Turkish Statistical Institute (TUİK). Patent measures (patent), taken from Turkish Patent and Trademark Office, show the number of patents for a provincial level. Provincial credits amounts provided by the banks as a percentage of provincial GDP (credit) indicate the financial strength of provinces and data are taken from The Banks Association of Turkey.

Our main variable of interest, investment incentives (incentives), is proxied by three different measures, namely the number of incentive certificates, the levels of fixed investment and employment supposed to be undertaken within the scope of the incentives scheme. Data on investment incentives are annual data taken from the Ministry of Industry. The amounts of fixed investment and employment are expected quantities or planned to be in the future, not realised. Each of our incentives data are available for both domestic and foreign capital types. Incentives data are also available for five main sectors: energy, services, manufacturing, mining and agriculture.

All data are obtained on the basis of NUTS-3 (81 provinces) and annually for the period 2004–2017. To deflate our data in current prices, we employ a 2009 based deflator obtained from the Ministry of Treasury and Finance. Table 2 presents the summary statistics for all variables. Comparison of means and standard errors of the variables shows that there are major differences between provinces. These differences are even more intense for sectoral variables.

While the average value of the investments with incentives is 497 million TL, the minimum value belongs to various provinces such as Kars, Bingöl, Bartın and Kilis with no investment, and the maximum value belongs to the province of Mersin with 42 billion TL for 2017. The average value of the number of incentive certificates variable belongs to the provinces of Karabük, Bartın, Ardahan and Bayburt with the smallest value of 0, and the maximum value of 782 belongs to the province of Istanbul for 2004. While the minimum value of the employment with incentive variable is 0, it belongs to Region 6 provinces such as Ağrı, Ardahan, Bitlis and Muş for various years, while

the maximum value belongs to the province of Istanbul with 30 262 for 2004.

The System Generalised Method of Moments (GMM) and Difference GMM, two different applications of GMM Estimation Method, were first presented by Hansen (1982). Although the Difference GMM is one of the methods frequently used in estimators based on GMM, the System GMM was developed over time by Blundell and Bond (1998). As a result, it has been proven that its predictive power is higher than the Difference GMM. Accordingly, the System GMM is widely used in the empirical literature. Due to the correlation between the lagged value of dependent variable ($y_{i,\,t-1}$) and error term ($\varepsilon_{i,\,t}$), the results of OLS estimators in dynamic models are biased and inconsistent. Our study also employs the System GMM estimation, which is an effective method when the error terms contain autocorrelation and there are constant and changing variances. Baum et al. (2003) state that the first problem that will arise during empirical analysis is heteroskedasticity and the use of GMM is an effective method for solve this problem. In addition, Arellano-Bond (1991) suggested that the endogeneity problem arises because of not using all possible tool variables and using all valid lagged values as tool variables will be effective in overcoming this problem. In all of our predictions, AR (1) test results are significant as expected. As expectedly, AR (2) tests are found to be insignificant. Similarly, the validity of instruments is tested with the Hansen test. Baum et al. (2007) argue that the Hansen J is used to test overidentifying restrictions, which makes the researcher more confident about the appropriateness of the instrument set. The number of groups (provinces in our case) should be more than or equal to the number of instruments, and we test the validity of instruments with the Hansen test. High (insignificant) p values in our estimations show that our group of instruments is exogenous and our instruments are strong enough.

4. Empirical Results

Our study investigates the economic growth impacts of provincial investment incentives in Turkey both for the full sample and for several sectors. The System GMM is applied to annual panel data for the years between 2004–2017. Note that while patent and credit variables are included in the model as exogenous variables, the rest of the right-hand side variables are all considered as endogenous. In our analysis, the Ordinary Least Squares (OLS) and fixed effects analysis are also estimated. Investment with incentive and employment with incentive variables, which are found to have positive effects in the OLS analysis, are not found to have any effects on growth in the GMM analysis. This may indicate that the OLS results are not reliable enough. In addition, the results of the fixed effects analysis are very similar to the OLS results. Thus, we chose not to present the OLS and fixed effects estimations in the main text, which are available upon the request. For the reasons listed above, we find the results of the System GMM analysis to be more reliable than the results of the OLS analysis.

Table 3 reports the System GMM results for all three incentives variables. The GMM estimations show that the number of incentive certificates issued has a statistically significant and positive effect on growth. The amounts of investment or employment have no significant effects on provincial growth.

Looking at the control variables in Table 3, the statistically significant and negative estimated coefficients on lagged growth rates imply that there exists a partial adjustment for the provincial growth. It is a significant result that the amount of credits we use to proxy financial development and public investments, which are public support tools, have no effect on growth. There is no effect of public investments, foreign trade and credits on growth in all models. Thus, our findings fail to support the argument that higher public investments, foreign trade and credits strengthen provinces financially and infrastructurally. The population variable is found to be highly significantly negative and in line with our expectations, which means that provinces with larger populations experience lower growth rates. The significantly positive coefficients on the patent variable indicate that provinces with higher innovative capability seem to have higher growth.

We then estimate the same regressions by using incentives data at the sectoral level. Sectors employed in the analysis consist of five main sectors, including energy, services, manufacturing, mining and agriculture for each province. Note that the one limitation of our study is that the control variables are not on a sectoral basis due to lack of data.

Table 4 reports the System GMM estimates for the five sectors. At the first panel, the estimates for energy and manufacturing sectors indicate that the effects of total fixed capital investment made using investment incentives programmes in these sectors on provincial growth are positive and statistically significant. Total fixed capital investments made in the services, mining and agriculture sectors do not have any significant effect on growth.

Table 3

The growth impacts investment incentives: the System GMM estimates

Independent Variables	Coefficients and Standard Errors		
	I	II	III
Growtht-1	–0.121** (–2.289)	–0.123** (–2.422)	–0.127** (–2.465)
Growtht-2	–0.106*** (–3.069)	–0.112*** (–3.061)	–0.100*** (–3.044)
Public Investments/GDP	–2.718 (–0.304)	–8.856 (–0.835)	–5.202 (–0.494)
Trade/GDP	–4.702 (–1.019)	–8.008 (–1.463)	–5.314 (–1.019)
log Population	–5.401** (–2.491)	–6.583*** (–2.666)	–5.673*** (–2.996)
log Patent	1.724* (1.931)	1.642* (1.753)	1.785** (2.138)
Credit/GDP	8.662 (1.397)	7.836 (1.147)	7.938 (1.165)
log Investment	0.173 (1.496)		
log Number of Certificates		1.647** (2.457)	
log Employment			0.325 (1.394)
Number of Observations	891	891	891
Number of Instruments	82	82	82
Number of Provinces	81	81	81
AR (2)	0.410	0.502	0.415
Hansen Test	0.160	0.185	0.279

Source: Authors' calculation.
Notes: 1, 5 and 10 percent levels of significance are denoted as ***, **, and * respectively. Standard errors are provided in the parentheses. All estimates include the individual year dummies.

Table 4

Sectoral GMM estimates for three incentives measures

	Incentives Measures					
	Panel I		Panel II		Panel III	
Sectors	Fixed Investment	AR(2) — Hansen tests	Certificates	AR(2) — Hansen tests	Employment	AR(2) — Hansen tests
Energy	0.094** (2.062)	0.167 0.142	0.623* (1.765)	0.177 0.103	0.241** (2.132)	0.182 0.174
Services	–0.034 (–0.281)	0.256 0.231	0.592 (1.038)	0.386 0.119	0.001 (0.004)	0.289 0.204
Manufacturing	0.114* (1.750)	0.293 0.161	1.867*** (3.655)	0.648 0.283	0.437*** (2.973)	0.530 0.224
Mining	0.057 (1.261)	0.285 0.223	0.503 (1.460)	0.127 0.329	0.090 (1.054)	0.189 0.278
Agriculture	–0.006 (–0.131)	0.304 0.146	0.173 (0.455)	0.299 0.183	–0.098 (–0.821)	0.285 0.267

Source: Authors' calculation.
Notes: All estimates (not reported here) employ exactly the same control variables as in Table 3. Number of observations, instruments, and provinces are also the same as in Table 3. See also notes to Table 3.

At the Panel II of Table 4, the statistically significant and positive estimates on incentive certificates issued in the energy and manufacturing sectors again indicate that the higher the investment certificates in these sectors, the higher provincial growth rates are. Similarly, estimates in the Panel III of Table 4 also show that the impact of employment undertaken using investment incentives programmes in the energy and manufacturing sectors on provincial growth are positive and statistically significant. However, employment undertaken in the services, mining and agriculture sectors does not have an impact on provincial growth. Insignificantly estimated Hansen test statistics in all cases in the analysis imply that our instruments in the models are valid.

For all three measures of incentives, we have very consistent results across sectors. While incentives provided by the government in the energy and manufacturing sectors have the positive and statistically significant impact on growth, for the other three sectors, we have insignificant results. Since the majority of incentives are allocated (58 % for energy sector and 23 % for manufacturing sector on average in 2017) in manufacturing and energy sectors in Turkey, our results have important implications.

There is no study in the literature analysing investment incentives for domestic and foreign investments separately. Our incentives data used in this study enable us to differentiate between domestic and foreign investors. During the period from 2004 to 2016, the share of domestic investors has always been higher in investment incentives. However, the share of foreign investors in investment incentives was higher than that of domestic

Table 5

The growth impacts investment incentives by investor type

Independent Variables	Coefficients and Standard Errors					
	1	2	3	4	5	6
Growtht−1	0.515*** (8.048)	0.525*** (8.125)	0.529*** (7.732)			
Public Investments/ GDP	39.162* (1.985)	39.478* (1.787)	41.360* (1.813)	42.030 (0.611)	14.703 (0.184)	37.367 (0.479)
Trade/GDP	1.929 (0.569)	1.283 (0.448)	2.413 (0.790)	–0.612 (–0.096)	1.090 (0.223)	–0.095 (–0.015)
log Population	0.434*** (4.372)	0.432*** (4.877)	0.455*** (4.477)	0.219 (0.756)	0.319 (1.185)	0.199 (0.598)
log Patent	0.674* (–1.890)	–0.543 (–1.549)	–0.675* (–1.953)	0.582 (0.621)	0.024 (0.026)	0.459 (0.452)
Credit/GDP	–1.236 (–0.465)	–1.186 (–0.493)	–0.819 (–0.285)	–3.119 (–0.559)	–3.507 (–0.597)	–3.042 (–0.535)
log Domestic Investment	0.000 (0.098)					
log Number of Domestic Certificates		–0.331 (–0.821)				
log Domestic Employment			–0.211 (–1.452)			
log Foreign Investment				–0.000*** (–4.318)		
log Number of Foreign Certificates					1.261* (2.111)	
log Foreign Employment						0.214 (1.326)
Number of Observations	1,045	1,045	1,045	568	568	568
Number of Instruments	84	84	84	72	72	72
Number of Provinces	81	81	81	76	76	76
AR (2)	0.105	0.097	0.104	0.807	0.906	0.743
Hansen Test	0.168	0.207	0.218	0.507	0.350	0.518

Source: Others on calculation.
Notes: See notes to Table 2.

investors in 2017. The share of domestic investors was 71 % and the share of foreign investors was 29 % for fixed capital investments made using incentive programmes in 2004; however, the share of domestic investors has decreased to 49 %, the share of foreign investors has increased to 51 % in 2017.

Table 5 reports the GMM results for each type of investor. Fixed investment with incentives, number of incentive certificates and employment with incentives are included in the model separately as in Table 3. The System GMM estimates at the first three columns show that none of the incentives measures has any significant effect on provincial growth for domestic investors. For the last three columns for foreign investors, while the estimated coefficient (albeit extremely small) on fixed investments is significantly negative, the estimated coefficient on the number of certificates is significantly positive. Since the magnitude of estimated coefficient on fixed investments is essentially zero, this effect is negligible. The latter result implies that incentives proxied by the number of certificates raise provincial growth for only foreign capital. The significantly positive growth impact of the incentives scheme for foreign firms is important because approximately half of the incentive certificates in the analysis period belong to foreign firms. These results also imply that the type of investor matters for the provincial growth. Significantly positive impact for foreign firms can be explained by a newer and better technology or by the technology transfer for foreign investors.

5. Conclusion

This study investigates the relationship between the investment incentives scheme and provincial growth in Turkey by using the dynamic panel data method for the period between 2004 and 2017. Our estimation results indicate that

among the three measures of investment incentives, the number of incentive certificates has a positive association with provincial growth. We then extend our estimations by focusing on main sectors. Estimates for five main sectors imply that all three measures of incentives (the amounts of fixed investment and employment, and the number of incentive certificates) have a significantly positive effect on provincial growth both in the energy and manufacturing sectors. None of the investment incentives in the services, mining and agriculture sectors has any impact on provincial growth. In addition, each of our incentive measures used in this study provide information on the origin of firms. Estimates on fixed investment incentives for the types of investor show that incentives measures have no significant effects on growth for national investors. On the contrary, provincial growth seems to increase with the number of incentive certificates provided to foreign investors.

The investment incentives scheme implemented by the government and the incentives tools used in this direction are assumed to play an important role in investment preferences. However, incentives alone are not enough for investors to invest in less developed regions. The willingness of both national and foreign firms to invest can possibly be reduced by the regional instability, lack of qualified personnel, unfavourable geographical and climate conditions. Accordingly, the available data clearly show that relatively more developed regions still obtain much higher shares from the incentives. Considering the data used in the estimates, we observe that the investments with incentives in Region 1, consisting of the most developed provinces, has accounted for 58 % of total investments in Turkey in 2004 and this ratio decreased to 23 % in 2007. However, investments in Region 6, which are the least developed provinces, were less than 5 % between 2004 and 2017. Therefore, there is a need for probably even more incentives provided to relatively less developed provinces.

There could be many factors reducing the effectiveness of incentives in Turkey. For example, the minimum fixed investment amount is supported within the framework is very high for investors in relatively poor provinces except for general incentives to benefit in the New Incentive System in Turkey. There are also very few instruments in general incentives and these instruments are not adequate to attract investors. The number of sectors eligible to benefit from larger scale incentives is also very limited. Given the actual distribution of incentives across the identified six regions, we can argue that the new system fails to bring expected benefits in terms of both mitigating distribution and income gap across regions. Thus, the effectiveness of the New Incentive System in Turkey ought to be improved by considering all the shortcomings and conditions of Turkey. The revision of the incentives scheme in Turkey on a district basis in 2020 is an encouraging development.

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Дата поступления рукописи: 25.06.2021.
Прошла рецензирование: 12.04.2022.
Принято решение о публикации: 15.06.2023.

Received: 25 Jun 2021.
Reviewed: 12 Apr 2022.
Accepted: 15 Jun 2023.