Journal of Research in Economics • Volume: 9 / Issue 1 • March 2025 pp. 31-46
ISSN: 2636-8307 • DOI: http://dx.doi.org/10.29228/JORE.41

RESEARCH ARTICLE

THE IMPACT OF REGIONAL TAX INCENTIVES ON HOUSEHOLD INCOMES IN TÜRKİYE

Raziye SELİM[*]
Suat KUCUKCİFCİ[**]

Abstract

This study analyzes the effects of regional tax incentives on household incomes in Türkiye by using difference-in-differences regression methodology. In Türkiye, a comprehensive regional tax incentive law was introduced in 2009 and it was reorganized in 2012. This new tax incentive law includes additional incentives for investments to be made in the Southeastern Anatolia region. This paper analyzes the effects of these tax incentives on household incomes mainly in the Southeastern Anatolia region of Türkiye. The households of the Southeastern Anatolia region were considered as the treatment group, whereas the households of the neighboring regions were considered as the control group. We estimated household incomes in the regions using the Income and Living Conditions Surveys conducted by Turkstat from 2006 to 2018. In conclusion, it is estimated that incomes of households especially living in Southeastern Anatolia region have increased significantly higher than the household incomes of neighboring regions after 2012. When the analysis is repeated for households whose main income source is entrepreneurial incomes there is no significant effect of the tax incentives on entrepreneurial incomes.

Keywords: Household Income, Tax Incentives, Region
JEL Codes: H31, I38, R11

1. Introduction

Developing countries implement various incentive policies in order to increase employment in underdeveloped regions, reduce regional development differences within the country, attract foreign capital investments and facilitate the adoption of new technologies (Schalk & Gerhard, 2000; Tung & Cho, 2001; Karakurt, 2010; Akdeve & Karagöl, 2013). These incentive policies aim to increase employment by attracting domestic and foreign investments to underdeveloped regions through tools such as regional tax rate incentives, import duty exemptions and tax

* Corresponding Author, Istanbul Technical University, Faculty of Management, Maslak, İstanbul, E:mail: selimraziy@itu.edu.tr, Orcid: 0000-0002-0277-1752
This research has been supported by Scientific and Technological Research Coincil of Turkey (TUBITAK). This paper is presented at the 20th International Conference of MEEA, 13-14 September 2024, İstanbul.
** Istanbul Technical University, Faculty of Management, Maslak, İstanbul, E-mail: suat@itu.edu.tr, Orcid: 0000-0002-0436-1140

Submission Date: 17.01.2025
Revision Date: 02.02.2025
Acceptance Date: 18.02.2025

holidays (Bondonio & Greenbaum, 2006; Klemm & Van Parys, 2012; Simay-Karaalp, 2014). There are many studies in the literature that examine whether tax incentives are successful in attracting foreign capital investments to the host country (Tung & Cho, 2001; Klemm & Van Parys, 2012; Lodhi, 2017; Munongo & Ribinson, 2017).

Tax incentives act as a motivational tool for manufacturing companies to direct their production facilities to rural areas. Holland & Vann (1998) argue that regional development is a common objective for the use of tax incentives. Porsse et al. (2007) evaluate the success of the regional tax incentive schemes implemented in Brazil in the second half of the 1990s in attracting investments using a generalized equilibrium model. The implementation of such incentive schemes has positive effects on employment and household welfare. However, due to the specialized nature of regional production, the impact on real GDP does not follow the same path (Porsse et al., 2007). Lodhi (2017) underlines that tax incentives need to be considered holistically as a component of the overall economic policy in order to achieve overall economic development in the country. This effect is empirically analyzed for Ghana using time series data and it is found that tax incentives have a positive significant effect on regional economic growth (Amankwaah et al., 2022).

This research attempts to find out the impact of regional tax incentives on household welfare in Türkiye using household level data. Various tax incentive regulations have been implemented in Türkiye, varying in scope, types, and regions of application. The most prominent of these policy instruments are the incentives introduced by the 2009 Incentive Law and expanded by the 2012 Incentive Law, targeting general, regional, large-scale, and strategic investments in the production of products with high import dependency. This research examines whether the tax incentives introduced by the 2012 Incentive Law, which predominantly benefit the Northeastern, Middle-Eastern Anatolia, and Southeastern Anatolia regions, have led to an increase in household incomes in these regions compared to other regions. The data for the study were obtained from microdata of annual surveys that is called as Income Conditions and Living Survey from 2006 to 2018 conducted by Turkstat. We apply the difference-in-differences methodology to measure the impact of the 2012 Incentive Law on household incomes. The difference-in-differences econometric methodology is commonly used in the literature to measure the effects of policy changes (Angrist & Pischke, 2008; Bondonio & Greenbaum, 2006).

In 2009, a nationwide law divided Türkiye into four investment regions, adjusting the level of incentives based on the development status of each region. The aim of these investment incentives is to direct savings towards high value-added investments and to reduce regional development disparities by increasing production and employment in economically underdeveloped regions. In 2012, a new incentive law was enacted that grouped Türkiye's provinces into six investment regions based on their development levels. This law also introduced two additional preferential incentive measures specifically for investments directed to the Southeastern Anatolia Region. Since these incentives include legal regulations prioritizing and promoting investments in underdeveloped regions, there are expectations that investments will concentrate in these areas, positively impact household incomes through their job creation potential, and help reduce

income disparities among regions. To assess the effectiveness of the currently implemented regional incentive instruments becomes important in order to reduce regional inequality and to provide policy recommendations. For this reason, we test the effect of the incentive law that started to be implemented in 2012.

This paper has the following sections. The following section summarizes the literature review. The section 3 explains detail the tax incentives implemented in Türkiye. The data and methodology of the paper is seen at section 4. Section 5 presents results of the regression analysis. The final section concludes the paper.

2. Literature Review

In the literature, the effects of incentives on the economy are mostly examined empirically through their capacity to create employment (Schalk & Gerhard 2000; Gabe & Kraybill 2002; Hoyt et al., 2008; Bondonio & Greenbaum, 2007). According to some studies, regional investment incentives have positive effects on investment demand and employment targets (Schalk & Gerhard, 2000). The business incentives in the structural fund "target 2", a specific one of the European regional development funds have shown positive employment growth effects in targeted areas in northern and central Italy (Bondonio & Greenbaum, 2006). Bondonio & Greenbaum (2007) analyze the effects of geographically targeted tax incentives on local economic growth in entrepreneurial regions in the U.S. and find that these incentives positively affect employment, sales, and capital expenditures. On the other hand, a study examining how manufacturing and other businesses in the state of Ohio are affected by government economic development incentives finds that the effect on actual employment is weak or even negative, while the impact on projected employment is significant. This finding suggests that businesses may have misrepresented their hiring plans to secure larger incentives from the government (Gabe & Kraybill, 2002). Similarly, according to an analysis by Hoyt et al. (2008) on regions in the state of Kentucky, educational incentives have a strong and positive impact on economic activity, while tax incentives have a comparatively lower positive effect. Porsse et al. (2007) find that implementing regional tax incentive programs in Brazil has positive effects on employment and household welfare for consumers. In research searching the relationship between tax incentives and firm performance in Nigeria using the survey responses finds a significant relationship between tax incentives and firm performance (Oyerogba et al., 2024).

One of the studies that empirically analyzed the effects of public incentives in Türkiye, Karaçay-Çakmak & Erden (2004), examine the impact of three major public support policies "grouped as public investments, loans, and incentives" on private sector industrial investments across regions. They find that public investments negatively affect private sector investments in developed regions, while positively influencing them in less developed regions. Akan & Arslan (2008) conclude that there is a linear relationship between incentive investments and employment in the Eastern Anatolia region of Türkiye during the 1980-2006 period, and that these investments

create new job opportunities. Yavuz (2010) find that the number of incentive certificates, fixed investment and machinery and equipment investment variables have a positive effect on the employment variable. Selim et al. (2014) conclude that the number of investment incentive certificates and fixed investment amounts issued in 81 provinces between 2001 and 2012 have an effect on employment.

Regional tax incentives aim to increase the welfare level of households in underdeveloped regions by supporting investments in these regions. Şahin & Uysal (2011) state that the share of total incentives received by underdeveloped regions in Türkiye between 2002 and 2009 is insufficient, both in terms of investment amount and job creation. Ulusoy & Akarsu (2012) emphasize SMEs and observe that employment increases as the number of investment incentive certificates and the amount of credit increase. Aydıner (2015) finds that an increase in investment with incentive certificates leads to higher employment covering the provinces of Aydın, Denizli, and Muğla for the period 2002-2014. He also adds that it generates more employment in labor-intensive sectors. Whereas Hosono et al. (2023) find that the tax incentive does not on average increase the capital investment but it improves labor productivity of Japanese SMEs using firm-level panel data.

There are studies in the literature that test the claim that public incentives lead to economic growth by increasing regional investments and income using data from Türkiye. Ay (2005) concludes that, during the period 1980-2003, investment incentives, national income, and imports positively affect fixed capital investments, while treasury bonds and interest rates have negative impact. In another study, Yavan (2011) finds that the number of investment incentives in provinces increases GDP by using the cross-sectional data of 81 provinces for the year 2000. Simay-Karaalp (2014) examines the impact of various variables on private sector employment in 81 provinces during the 2002-2011 period. The study concludes that the amount of public infrastructure investment and public education investment positively affects employment. In the study by Recepoğlu & Değer (2016), the relationship between investment incentives and economic growth is analyzed for Nuts-2 regions during the period 2004-2011. The study finds a long-term positive and significant relationship between investment incentives and regional value added; and concludes that the growth effect of incentives in less developed regions is weak in the short run.

3. Tax Incentives Implemented in Türkiye

The most commonly used tool for regional development in Türkiye is a differentiated incentive system based on sectors and regions. This system has historically been applied at varying rates depending on the development levels of the provinces. The aim of the incentive systems implemented in 2004 and 2006 was to increase investments and employment opportunities by providing tax and social security premium incentives in some provinces, offering energy support, and supplying free land and real estate for investments (Arslan, 2005; Acar & Çağlar, 2012). The first comprehensive national incentive program in Türkiye was implemented with

the incentive law of 2009. The 2009 incentive law includes seven items: VAT exemption, customs duty exemption, interest support, employer social security premium support, tax reduction, investment location allocation, and relocation support. Karakurt (2010) notes that the sectoral-regional and large project-based new incentive system is essentially a three-pillar structure that employs a wide range of incentive tools. With the tax incentives arrangement in this incentive system, a new concept not previously included in the tax legislation, "investment contribution rate or amount," has been introduced and implemented.

A significant development in the incentive system after 2009 was the incentive law that came into effect in 2012. The law covers VAT exemption, tax refunds, tax reductions, interest support, allocation of investment locations, employer social security premium support, social security premium support, and income tax withholding practices. Ersungur & Takım (2018) criticize the fragmented nature of the 2012 incentive system's institutional structure, arguing that this fragmentation weakens the effectiveness of the incentive system. Akdeve & Karagöl (2013) state that the new incentive system designed in 2012, considering the needs and demands of investors, includes four main investment incentives: general incentive applications, regional incentive applications, large-scale investment incentives, and strategic investment incentives. They note that due to its many features, this incentive law is the most extensive and comprehensive incentive system ever implemented to date. According to Akdeve & Karagöl (2013), as in the old incentive system, the support provided in the new incentive system varies depending on the region where the investments are located and the scale of the investment. The new incentive system includes measures aimed at reducing regional development disparities at the provincial level as well as reflecting technological transformation in the production structure.

In the 2009 law covering Türkiye as a whole, the country was divided into four investment regions, with adjustments in the level of incentives made according to the development level of each region. In the new incentive law introduced in 2012, Türkiye's provinces were grouped into six investment regions based on their level of development. The aim of these investment incentives is to redirect savings towards high value-added investments and to reduce regional development disparities by increasing production and employment in economically underdeveloped regions. Today, investment incentives have been expanded to include the promotion of international direct investments and to enhance international competitiveness, with a focus on high research and development content, regional and large-scale investments, as well as strategic investments. Accordingly, in 2017 and 2018, small adjustments were made to the sectoral scope and financial support amounts outlined in the incentive law enacted in 2012.

Public incentives are applied at different rates to selected sectors, strategic investments in research and development, and the six distinct regional groups specified in the law according to their development levels (see Appendix, Figure A.1). Among these types of support are "customs duty exemption," "VAT exemption," "employer social security premium support," "allocation of investment locations," and "interest support" (for investments in the 3rd, 4th, 5th, and 6th regions). The 2012 incentive law includes two specific provisions for the 6th Region, which is

covered by comprehensive incentives, that differ from the other five regions grouped in the law. These are "social security premium support covering the employee's share" (whereas the support for the employer's share of social security premiums is applicable to other regions as well) and "income tax withholding discount." This situation provides an opportunity to measure the policy impact on investments in the 6th Region. The "employee's share of social security premium support" involves covering the portion of the social security premium payable by the employer, equivalent to the minimum wage, from the Ministry's Budget for ten years for large-scale and strategic investments in the 6th Region. The "income tax withholding discount" involves deducting the income tax calculated on the portion of employees' wages equivalent to the minimum wage, provided for additional employment created by investments in the 6th Region, from the tax assessed on the tax return over a period of ten years.

4. Data and Methodology

The data used in this research comes from household survey microdata called as the Surveys of Income and Living Conditions (SILC) conducted by TURKSTAT. These surveys were first conducted in 2006 and provide detailed data on a wide range of variables at the household and individual level, including demographic variables, income, living conditions, employment status, working conditions, material deprivation indicators, and indebtedness. In this study, "SILC data" produced for each year from 2006 as the starting year to 2018 as the final year. Since the income-related variables in these surveys refer to the previous year's income, the research period is set as 2005-2017. The sufficiently large sample size of these surveys allows for estimations at the NUTS1 division (12 regions) (see Appendix, Figure A.2).

In examining the impact of regional incentives on household incomes, the data from the SILC cross-sectional individual, and/or household datasets were aggregated to create variables for household income, wage income, and entrepreneurial income. These household incomes were converted to real incomes using the Consumer Price Index (CPI).

The positive effects of the 2012 Incentive Law through investments in the relevant regions are expected to create economic externalities in those areas. This situation is expected to increase the incomes of households living in the regions. In this study, the difference-in-differences analysis methodology (Angrist & Pischke, 2008) is used to test whether the tax incentives have an effect on regional household incomes. In the literature, the difference-in-differences method has been used to examine the employment effects of business incentives using firm-level data from Northern and Central Italy (Bondonio & Greenbaum, 2006).

In the 2012 Incentive Law, Region 6 is the region that benefits from the incentive policy at the highest rate since it includes two separate regulations different from the incentives applied to other regions. The regional definitions in the 2012 incentive law differ from those in the SILC, which defines 12 regions, as the law includes six regions grouped according to their level of development. Therefore, the regional boundaries in the SILC do not overlap with the regional

boundaries defined in the law. The highest degree of overlap is observed for the provinces in the Southeastern Anatolia Region. The provinces in the 6th Region defined by the law (a total of 15 provinces) cover 62.5% of the provinces in Nuts1 regions 10, 11, and 12 (a total of 24 provinces) (see Appendix, Figure A.1 and Figure A.2).

In this study, the "treatment group" consists of the provinces in the 6th Region of the incentive law, which are the provinces in Nuts1 regions 10, 11, and 12, namely the North Eastern Anatolia, Middle Eastern Anatolia, and Southeastern Anatolia regions. Initially, provinces outside these regions were selected as the "control group" for the analysis. However, the presence of provinces with significant income variability within this set poses issues for the homogeneity of the control group in the difference-in-differences analysis. Therefore, for the difference-in-differences analysis methodology, the first six Nuts1 regions (Istanbul, Western Marmara, Aegean, Eastern Marmara, Western Anatolia, Mediterranean) were not included in the control group. Instead, households living in the provinces of regions 7, 8, and 9, which are close neighboring regions to the "treatment group" in Nuts1, are selected as the "control" group.

In this study, data covering the years 2005-2017 were aggregated to form a pool data, and the following model is estimated. This model analyzes whether the two tax incentive tools applied to the 6th Region create a significant difference in the household incomes in the 6th Region.

$$Y_{ijt} = \beta_1 + \beta_2 D_j + \beta_3 TI_t + \beta_4 (D_j * TI_t) + \beta' \boldsymbol{X} + \varepsilon_{ijt} \quad (1)$$

In this regression model (equation 1), *Y* represents household disposable income. *D* is a dummy variable that takes a value of 1 for households in the treatment group (households in the 6th Region, which includes the North Eastern Anatolia, Central Eastern Aanatolia, and Southeastern Anatolia regions) and 0 for households in other regions geographically neighborhood to the treatment group (households in Nuts1 regions 7, 8, and 9). *TI* is a dummy variable that takes a value of 1 for years after 2012, when tax incentives were introduced under the 2012 incentive law, and 0 for the years 2012 and prior. *D*TI* is the "difference-in-differences" variable, which takes a value of 1 when both the treatment region and the incentive period are 1, and 0 otherwise. The group of variables represented by ***X*** includes variables that affect household income, such as the age, education, gender, sector, occupation, and employment status of the household head, as well as household size.

The coefficient β_1 represents the disposable income per household in the regions 7,8 and 9 for the years 2012 and prior; $\beta_1 + \beta_2$ represents the disposable income per household in the regions 10,11 and 12 for the years 2012 and prior; $\beta_1 + \beta_3$ represents the disposable income per household in the regions 7, 8 and 9 for the years after 2012 and finally $\beta_1 + \beta_2 + \beta_3 + \beta_4$ represents the disposable income per household in the regions 10, 11 and 12 for the years after 2012 (Table 1).

Table 1. Regression Coefficients of Difference-in-Differences Methodology

	Control Group (7.,8.,9. Region)	*Treatment Group (10.,11.,12. Region)*	*Difference*
2012 and prior	β_1	$\beta_1 + \beta_2$	β_2
After 2012	$\beta_1 + \beta_3$	$\beta_1 + \beta_2 + \beta_3 + \beta_4$	$\beta_2 + \beta_4$
Difference	β_3	$\beta_3 + \beta_4$	β_4

The difference in differences (DID) methodology involves some assumptions that need to be evaluated for the model we estimate (Angrist & Pischke, 2008; Murray & Bardaka, 2022). The first one of them is that the methodology needs to observe parallel trends in the outcome variable between the treated and control groups before the program's implementation (Tonetto et al., 2023; Kim et al., 2023). In our model disposable household income trends would be the same in both regions (5th region and 6th region defined by the law) in the absence of treatment. Figure 1 is prepared to look at the validity of this assumption. It plots the trend in average disposable household incomes of the control group households (in Nuts 1 regions 7, 8 and 9) and the treatment group households (in Nuts 1 regions 10, 11 and 12). The outcome variable namely household disposable income follows parallel trends between the control and the treated regions before the tax incentive law implementation.

The second assumption of the methodology is about that treatment assignment independency from the potential outcomes (Murray & Bardaka, 2022). To provide this assumption we have made the following corrections. We add a number of control variables such as sector, occupation, and employment status of the household head. Households living in regions 7, 8, and 9, which are neighboring areas to the treatment group regions and share similar economic potential and socioeconomic characteristics with the treatment groups, have been carefully selected as the control group.

The third assumption of the DID methodology is the Stable Unit Treatment Value Assumption (SUTVA), which is usually made in casual inference (Murray & Bardaka, 2022). According to this assumption one unit's treatment status does not have any effect on the outcomes of another unit. In our model, this assumption remains valid since treatment and control group units are located in geographically different regions and certain tax incentives are explicitly provided by law to Region 6.

5. Results

To analyze the impact of incentive laws on household incomes, first, household incomes for the Nuts1 regions of Türkiye are calculated from the SILC surveys and converted in 2005 constant prices using the CPI. To observe the effects of the incentive laws, the time series plots of the

averages of real household incomes for the "control" and "treatment" group regions for the period 2005-2017 are presented in Figure 1.

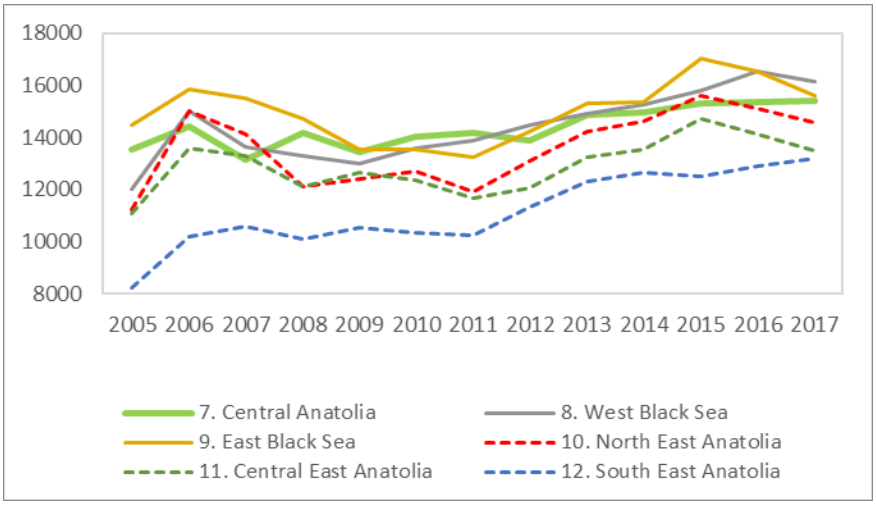

Figure 1. The Regional Disposable Income per Household (2005 Constant Prices, TL)

Among these six regions, the Southeastern Anatolia Region has the lowest average household disposable income. However, after 2011, we observe that the real household incomes in the Southeastern Anatolia Region increase more rapidly compared to the control group regions, as well as the treatment regions of the North Eastern Anatolia and Middle Eastern Anatolia regions. This increase in real household disposable income averages continued until 2015, after which real incomes declined in regions other than Southeastern Anatolia during the 2015-2017 period.

Since the primary components of household income are earnings income and entrepreneurial income, Figures 2 and 3 are prepared to also show the development of these income types over the same period. Households that reported receiving earnings income are selected from the survey data, and the total earnings income for each of these households is calculated. This income is then converted to 2005 constant prices using the CPI price index. Figure 2 presents the development over time of the average household earnings income for each region. Among these regions, the Southeastern Anatolia Region has the lowest average earnings income. Real wage income averages generally show an upward trend from 2009 to 2015. After 2009, average earnings income increased in the Middle Anatolia and Western Black Sea regions. In the Eastern Black Sea, North Eastern Anatolia, Middle Eastern Anatolia, and Southeastern Anatolia regions, an increasing trend in wage income is observed starting from 2012.

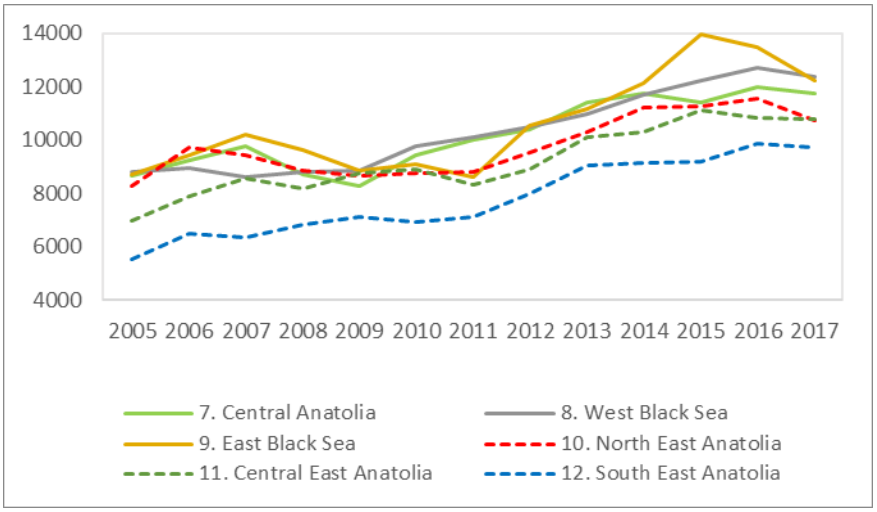

Figure 2. The Regional Earnings Income per Household (2005 Constant Prices, TL)

When investigating the source of the increase in household earning income during this period, one might first examine the developments in the minimum wage. How did the minimum wage change during the period when real increases in household earnings income were observed? During the period when the incentive law was implemented, the nominal minimum wage increased by 4.5% in 2013, 15.3% in 2014, and 22.2% in 2015. The highest increase in minimum wage occurred in 2016, at 30%, followed by an 8% increase in 2017. During this period, the annual inflation rates were 7.40% in 2013, and subsequently 8.17%, 8.81%, 8.53%, and 11.92% in the following years. Adjusted for inflation, the average annual real growth rate of the minimum wage over these five years was 6.13%.

Another factor that could contribute to the increase in household earnings income is the addition of new wage earners who have completed their education and started working, or the rise of the added worker effect due to economic difficulties within the household. To investigate this, the average number of wage earners per household in the SILC microdata was calculated for each year. The number of wage earners per household shows an increasing trend in both the treatment and control group regions up to 2015; however, no such increase is observed after 2015. The similarity of this trend with that shown in Figure 2 indicates that the development in wages per household is influenced by changes in the number of wage earners.

Another source of income affected by the incentive law is entrepreneurial income. Household data with entrepreneurial income were selected from the survey, and these incomes were converted into real terms using the Consumer Price Index (CPI). Figure 3 shows that entrepreneurial real incomes exhibit fluctuating movements over the period. Between 2006 and 2009, there is a downward trend in the average entrepreneurial incomes of households in both the control and

treatment regions. Although there was some improvement after 2009, some regions exhibited movements contrary to the overall trend in subsequent periods.

The tax incentives analyzed in the study, such as social security premium support covering the employee's share, primarily target large-scale and strategic investments in Region 6. Therefore, their impact on entrepreneurial incomes is expected to be weaker and more indirect compared to their effect on earnings incomes.

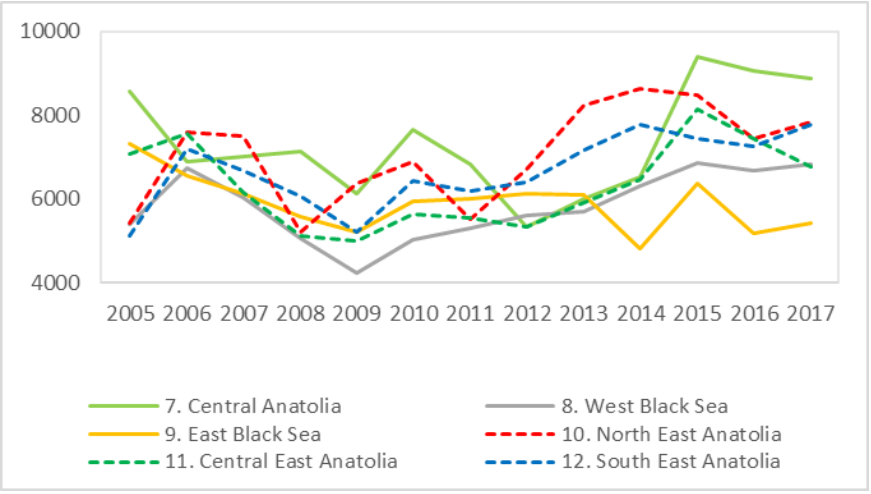

Figure 3. The Regional Entrepreneurial Income per Household (2005 Constant Prices, TL)

To measure whether the benefits of the incentive law implemented in 2012 have been reflected in the incomes of the 6th Region, the difference-in-differences regression equation estimated from the pooled data presented in Table 2 has been used. In the equation, the dependent variable is the natural logarithm of household income, as household income is log-normally distributed. The variable Dum_D represents a dummy variable that takes the value of 0 for Regions 7, 8, and 9, and 1 for Regions 10, 11, and 12. The variable Dum_2013 is a dummy variable that takes the value of 0 for the year 2012 and earlier, and 1 for the year 2013 and later. The variable Dum_D*Dum_2013 is the interaction term of these two dummy variables and its coefficient is estimated as the difference-in-differences coefficient. Several control variables affecting household income have been included in the equation. The first is the household size variable, where an increase in household size is expected to lead to an increase in disposable income. Since the primary source of household income is the household head, demographic characteristics of the household head, such as age, gender, and education level, have been included as dummy variables in the model. Additionally, dummy variables representing the employment status, occupation, and sector of the household head have been included as other control variables in the model.

According to the regression results, the average income of the treatment group regions is 17.10% lower than the average income of the control group regions. The average incomes in 2013 and

later, following the year when the incentive law started to be implemented, are 13.61 per cent higher than the average incomes before 2013. Household incomes in the treatment region grew 2.22 per cent faster than in the control region for the period after 2013. Since the difference-in-differences coefficient is statistically significant at the 1% significance level, it indicates that the household incomes in the treatment group differed significantly from those in the control group during the period when the policy change was implemented.

Table 2. The Regression Equation of Difference-in Differences for Household Disposable Incomes

Dependent Variable: The natural logarithm of household disposable income	Coefficients	Probability	Interpretations of Coefficients (%)
Dum_D	-0.1870***	0.000	-17.10
Dum_2013	0.1276***	0.000	13.61
Dum_D*Dum_2013	0.0220***	0.010	2.22
Household size	0.0518***	0.000	
Gender	-0.0257**	0.028	
Age Groups	Yes		
Education Levels	Yes		
Employment Status	Yes		
Occupation	Yes		
Sector	Yes		
Constant	8.6620***	0.000	
R^2	0.4044	0.000	
N	54481		

Note: (***) and (**) denote 0.01 and 0.05 significance levels, successively. D represents the treatment region. Dummy variable coefficient is interpreted by taking the inverse logarithm of the estimated dummy variable coefficient (according to base e) and subtracting it from 1.

To examine the impact of the tax incentive law on the regression equation, sensitivity analyses were performed by creating separate dummy variables for the years before and after the period 2013 and onward (2009-2015) instead of using a single dummy variable for the period 2013 and later. The model estimation was then repeated. Table 3 presents the results of these regression equation estimates, showing only the difference-in-differences coefficient (β_4).

The difference-in-differences coefficient for the model estimated for the period from 2009 onward is not statistically significant. Similarly, the difference-in-differences coefficients in the models tested for 2010, 2011, and 2012 are also not significant at the 5% level. However, this coefficient is found to be significant in the regression models tested for the period from 2013 onward. This finding indicates that, in the post-2013 period, household incomes in the treatment group significantly differed from those in the control group.

Table 3. Sensitivity Analysis: The Regression Coefficient of Difference-in Differences

Difference-in Difference Variable	Regression Coefficients	Probability	Interpretations of Coefficients (%)
Dum_D*Dum2009	-0.0129	0.281	-
Dum_D*Dum2010	-0.0201*	0.058	-
Dum_D*Dum2011	-0.0165*	0.085	-
Dum_D*Dum2012	0.0076	0.394	-
Dum_D*Dum2013	0.0220***	0.010	2.22
Dum_D*Dum2014	0.0301***	0.001	3.06
Dum_D*Dum2015	0.0254***	0.006	2.57

Note: (***), (**) and (*) denote 0.01, 0.05 and 0.10 significance levels, successively. D represents the treatment region.

6. Conclusion

In this project, the tax incentives by the 2012 Incentive Law have been examined, and the effects of these incentives on regional incomes have been evaluated. The analysis of the impact of public investment incentives on household disposable incomes contributes to the literature by testing the statistical significance of the difference in household incomes between regions that received more intensive incentives and those that received fewer incentives.

According to the 2012 Incentive Law, the four provinces in the Northeast Anatolia Region (Ağrı, Kars, Iğdır, and Ardahan), the five provinces in the Eastern Anatolia Region (Bingöl, Van, Muş, Bitlis, and Hakkari), and the six provinces in the Southeastern Anatolia Region (Şanlıurfa, Diyarbakır, Mardin, Batman, Şırnak, and Siirt) are designated as the sixth region. The extra preferential incentives provided to these provinces include "social insurance premium support including the employee's share" and "income tax withholding discount" for investments in these areas. It is expected that the implementation of these incentives will benefit the increase in investments and the improvement in regional development levels. Our research examines whether this policy implementation has impacted household incomes in the sixth region. The study seeks to answer whether there is a significant difference between the sixth region, which benefits from the incentives, and the fifth region, which benefits less and does not have the aforementioned two incentives. Estimates obtained using the difference-in-differences regression analysis methodology reveal that, following the implementation of the law, household incomes in the sixth region grew significantly faster compared to those in the fifth region. The research results indicate that the incentive law and the associated policy change created a significant difference up to 2015, after 2012. The success of the incentive applications demonstrates that such policy measures are effective in reducing regional income disparities. Additionally, it is necessary to empirically investigate the impact of incentive laws on employment levels in different sectors.

References

Acar, O. & Çağlar, E. (2012). Yeni Teşvik Paketi Üzerine Bir Değerlendirme, *TEPAV Yayını*, 201221, 1-11.

Akan, Y. & Arslan, İ. (2008). Türkiye'de Sektörel Yatırım Teşvik Belgeleri İle İstihdam Analizi: Doğu Anadolu Bölgesi Üzerine Bir Uygulama (1980-2006), *Çalışma ve Toplum*, 1(16), 107-119.

Akdeve, E. & Karagöl, E. T. (2013). Geçmişten Günümüze Türkiye'de Teşvikler Ve Ülke Uygulamaları, *Dumlupınar Üniversitesi Sosyal Bilimler Dergisi*, (37).

Altuntas, F., Altuntas, S., & Dereli, T. (2022). Social network analysis of tourism data: A case study of quarantine decisions in COVID-19 pandemic. *International Journal of Information Management Data Insights*, *2*(2), 100108.

Amankwaah, E., Mensah, N. & Okyir Baidoo, N. (2022). The Impact of Location Tax Incentives on the Growth of Rural Economy: Evidence from Ghana, *Future Business Journal*, 8(1), 54.

Angrist, J. D. & Pischke, J. S. (2008). Mostly Harmless Econometrics: An Empiricist's Companion. Princeton University Press.

Arslan, İ. K. (2005). Bölgesel Kalkınma Farklılıklarının Giderilmesinde Etkin Bir Araç: Bölgesel Planlama Ve Bölgesel Kalkınma Ajansları, *İstanbul Ticaret Üniversitesi Sosyal Bilimler Dergisi*, Yıl:4 Sayı:7 Bahar 2005/1 s.275-294.

Ay, H. M. (2005). Yatırım Teşviklerinin Sabit Sermaye Yatırımları Üzerindeki Etkisi, *Selçuk Üniversitesi Karaman İktisadi ve İdari Bilimler Dergisi*, 5(2), 176-184.

Aydıner, M. (2015). Teşvik Sistemi Kapsamındaki Yatırımların İhracata ve İstihdama Etkisi: TR32 Bölgesi Üzerine Bir Değerlendirme, *Global Journal of Economics and Business Studies*, 4(8), 74-87.

Bondonio, D. & Greenbaum, R. T. (2006). *Do Business Investment Incentives Promote Employment in Declining Areas? Evidence from EU Objective-2 Regions*, European Urban and Regional Studies, 13(3), 225–244.

Bondonio, D. & Greenbaum, R. T. (2007). Do Local Tax Incentives Affect Economic Growth? What Mean Impacts Miss in The Analysis of Enterprise Zone Policies, *Regional Science and Urban Economics*, 37(1), 121–136.

Ersungur, Ş. M. & Takım, A. (2018). Türkiye'de Teşvik Sisteminin Yapısı, Sorunları ve Etkinliği Üzerine Bir Politika Önerisi: Tek Bir Uygulamacı Kuruluş Sorunları Çözer mi? *Atatürk Üniversitesi İktisadi ve İdari Bilimler Dergisi*, 32(3), 725-744.

Gabe, T. M. & Kraybill, D. S. (2002). The Effect of State Economic Development Incentives on Employment Growth of Establishment", *Journal of Regional Science*, 42(4), 703–730.

Holland, D. & Vann, R. J. (1998). Income Tax Incentives for Investment, *Tax Law Design and Drafting* (volume 2; International Monetary Fund; Victor Thuronyi, ed.), 1-32.

Hosono, K., Hotei, M. & Miyakawa, D. (2023). Causal effects of a tax incentive on SME capital investment, *Small Business Economics*, 61:539-557.

Hoyt, W., Jepsen, C. & Troske, K. (2008). Business Incentives and Employment: What Incentives Work and Where? *Working Papers 2009-02*, University of Kentucky, Institute for Federalism and Intergovernmental Relations.

Karaçay-Çakmak, H. K. & Erden, L. (2004). Yeni Bölgesel Kalkınma Yaklaşımları ve Kamu Destekleme Politikaları: Türkiye'den Bölgesel Panel Veri Setiyle Ampirik Bir Analiz, *Gazi Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 6(3), 77-96.

Karakurt, A. (2010). Küresel Kriz Ortamında Yatırım Teşvikleri, *Ankara Üniversitesi SBF Dergisi*, 65(02), 143-163.

Kim, J., Park, S., Subramanian, S.V. & Kim, T. (2023). The Psychological Costs of the COVID-19 Pandemic and Heterogeneous Effects in South Korea: Evidence from a Difference-in-Differences Analysis. *Journal of Happiness Studies*, 24:455–476. https://doi.org/10.1007/s10902.022.00605-31-3

Klemm, A., & Van Parys, S. (2012). Empirical Evidence on The Effects of Tax İncentives, *International Tax and Public Finance*, 19(3), 393–423.

Lodhi, K.M. (2017). Tax Incentives and Impact on Investment in Pakistan, *Abasyn Journal of Social Sciences*, 10 (1), 192-211.

Munongo, S., Akanbi, O.A. & Robinson, Z. (2017). Do Tax Incentives Attract Foreign Direct Investment? The Case of the Southern African Development Community, *Journal of Accounting and Management*, 7(3), 35-59.

Murray, J. & Bardaka, E. (2022). Evaluating the spatial and temporal distribution of beltway effects on housing prices using difference-in-differences methods. *Transportation,* 49:1963–1998. https://doi.org/10.1007/s11116.021.10233-0

Oyerogba, E.O., Alamu, J.A. & Omojola, S.O. (2024). Tax Incentives and Firm Performance: Evidence from Listed Manufacturing Firms in Nigeria, *African Journal of Business and Economic Research*, 19(3), 239-257.

Porsse, A., Haddad, E. & Ribeiro, E. P. (2007). Economic Effects of Regional Tax Incentives: A General Equilibrium Approach, *Latin American Business Review*, 7(3-4), 195–216.

Recepoğlu, M. & Değer, M. K. (2016). Türkiye'de Bölgesel Yatırım Teşviklerinin Bölgesel Ekonomik Büyüme Üzerine Etkisi: Düzey 2 Bölgeleri Üzerine Panel Veri Analizleri (2004-2011), *Kastamonu Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 14(4), 6-21.

Schalk, H. J. & Untiedt, G. (2000). Regional Investment Incentives in Germany: Impacts on Factor Demand and Growth, *The Annals of Regional Science*, 34(2), 173–195.

Selim, S., Koçtürk, O. M. & Eryiğit, P. (2014). Türkiye'de Yatırım Teşvikleri ve Sabit Yatırımların İstihdam Üzerine Etkisi: Panel Veri Analizi, *Ege Academic Review*, 14(4).

Simay-Karaalp, H. (2014). The Effect of Public Investment and Firm-Based Investment Incentives on Employment: A Panel Data Analysis for Turkey, *Journal of Economic and Social Development*, 1(1), 74-85.

Şahin, M. & Uysal, Ö. (2011). Bölgesel Kalkınma Çerçevesinde Yatırım Teşviklerinin Shift-Share Analizi, *Maliye Dergisi*, 160, 111-138.

Tonetto, J. L., Fochezatto, A. & Padilha da Silva, G. (2023). Refund of Consumption Tax to Low-Income People: Impact Assessment Using Difference-in – Differences. *Economies,* 11: 153. https://doi.org/10.3390/economies 11060153

Tung, S. & Cho, S. (2001). Determinants of Regional Investment Decisions in China: An Econometric Model of Tax Incentive Policy, *Review of Quantitative Finance and Accounting*, 17(2), 167–185.

Ulusoy, R. & Akarsu, R. (2012). Türkiye'de KOBİ'lere Yapılan Destekler Ve İstihdam Üzerindeki Etkileri, *Kocaeli Üniversitesi Sosyal Bilimler Dergisi*, (23), 105-126.

Yavan, N. (2011). Teşviklerin Bölgesel Ekonomik Büyüme Üzerindeki Etkisi-Ampirik Bir Analiz, *Ekonomik Yaklaşım*, 22(81), 65-104.

Yavuz, A. (2010). Bir Maliye Politikası Aracı Olarak Yatırım Teşviklerinin Rekabet Koşulları Altında Özel Kesim Yatırımları ve İstihdam Üzerine Etkisi: Ekonometrik Bir Analiz, *Süleyman Demirel Üniversitesi İktisadi ve İdari Bilimler Fakültesi Dergisi*, 15(1), 83-101.

Appendix

Figure A.1: Tax Incentive Law Provinces Grouped According to Development Level

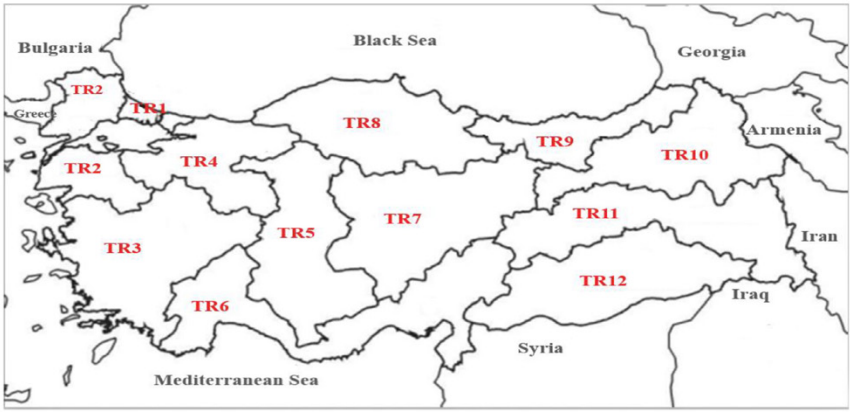

Figure A.2: Regions according to Nomenclature of Territorial Units for Statistics (NUTS) 1 Classification in Türkiye (Altuntas, et al., 2022).