The Impact of Enterprise Zones Tax Exemption Policy in Rural Regions of Armenia

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Abstract

This paper examines the impact of enterprise zones in the rural borderline regions of Armenia, which is aimed to promote the development of the targeted areas, by the provision of special tax exemptions. The findings of extensive and intensive margins conclude that the program has a little impact on the creation of new businesses, as the intensive margin accounts for the major portion of the turnover variation. The difference-in-difference quasi experimental design approach was implemented for testing the hypothesis on an unbalanced panel data, consisting of 2,632 border and 22,153 non-border observations.

The method **fails to reject** the hypothesis that the enterprise zones do not affect the total turnover, meaning that the program has not achieved its intended impact. In addition, the fixed effect regression was implemented for comparing the results and examining the year-specific effects.

Introduction

In order to promote the social and economic development in the frontier regions of Armenia, in 2015 the government passed the law about the creation of enterprise zones, which grants tax exemption to the activities in the targeted areas. In particular, enterprises in rural border areas are exempt from turnover, VAT, profit, and license tax, except activities, which include passenger transportation or totalizators. Moreover, the entrepreneurial activities of sole-proprietors who operate in that areas under the turnover tax system, are free from the profit tax as well (before 2018 was a profit tax) (HO-156-N, 2015).

This paper discusses the results of difference-in-difference (DID) regression results for evaluating the hypothesis that the enterprise zones have no impact on the turnover in the targeted regions, along with the implementation of fixed effect (FE) regression, descriptive analytics, and the evaluation of intensive and extensive margins.

The available literature mostly challenges the effectiveness of tax exemption practices. The main suggestion is that they are justified mainly for correcting the market failures (Z. Howel, J. Stotsky and E. Ley, 2002) and that the effect of the program is linked to the policy design and overall tax environment and unique characteristics (S. Lerch, 2004). The specific type of tax

exemption is the creation of enterprise zones, for the targeting of specific geographic areas. Givord, Rathelot, and Sillard (2011) analyzes the enterprise zones program effect in France and conclude the even though the program positively affected the intensive margin in the targeted area, the generated advantages were offset by deteriorations in the neighboring regions. Neumark and Kolko (2010), emphasize the point mentioned by Lerch by illustrating that enterprise zones had a negative effect in California, due to the uniqueness of California's tax system.

In the existing literature, one of the most used methods for policy evaluation is the DID approach, as its regression framework is less biased (Chabé-Ferret, 2010) and enables to control for unobservable biases (H. Zhou, C. Taber, S. Arcona, and Y. Li, 2016). The other favored approach is the FE, which is useful for estimating the group level outcomes on the individual observations (M. Kim, 2018).

This paper discusses the application of the DID method for evaluating the program impact. The major advantage of the research is that it includes the population of interest and thus is free from the sampling or selection errors. The data was provided by the State Revenue Committee of RA for academic research purposes. It is an exhaustive unbalanced panel, from 2013 to 2017, with a total of 24,785 observations. The dataset is divided into border (treated) and not-border (control) groups, based on actual activity realization in the exempted regions. In particular, there is a problem regarding the identification of the actual address of operation, as tax declarations provide only the legal address. However, the declaration has two rows dedicated to the trade and production turnover in the borderline region, which were used as a basis of separation between targeted and control groups. In addition, the data provides the business establishment date, its recent status, number of employees, and ownership type. Therefore, it is possible to measure the policy impact on the number of new businesses by estimating the extensive and intensive margins, as well as by implementing the survival analysis.

The results suggest that intensive margin is higher in the frontier part and is significantly higher than the extensive margin, meaning that a larger proportion of turnover variation is contributed by the intensive margin.

The main conclusion of the research is that it fails to reject the null hypothesis that the enterprise zones have no impact on the turnover, based on the model with a 46.5% R^2, as the positive coefficient of the intercept was not-significant, it has p-value higher than 0.05 threshold. In addition, FE model was applied for comparing the results and analyzing year-specific effects, which can contain helpful insights.

Literature Review

This section aims to define the essential theoretical concepts and academic background behind the research and its methodology. More specifically, the literature review part includes the definition and examination of enterprise zone effects on the changes in business activities, as well as the methodology of policy effect measurement.

Many studies have been conducted for identifying the effect of tax exemptions on businesses and economic development and overall provided contradictory results. Lerch (2004), concludes that taxes have a relatively small impact on business decision and economic activity. Meanwhile, the impact can be strengthened or weakened depending on the policy design and overall tax system. “Design and Assessment of Tax Incentives in Developing Countries” (2018) conducts the cost-benefit analyses of tax incentives against lost tax revenue or economic activity and concludes that based on a pure analytical view, tax incentives are always inferior to nationwide tax reforms, as they do not differentiate between the sectors. Stausholm (2017) evaluates the outcomes of tax holidays and concludes that tax incentives are ineffective and do not contribute to sustainable development. Moreover, they have a negative effect on public finances and negative correlation with the children’s opportunity of school attendance. Howell Stotsky, and Ley (2002) assess the effectiveness of tax incentive usage for policy makers and summarizes that primarily they should be used for correcting market failures and that the main criterion for choosing the specific incentive type should be based on the investment recovery speed. James (2013) infers that incentives should be used as minimal as possible and ideally should be linked to investment growth. Moreover, according to him, the incentives have a greater possibility of being successful if the government is effective and more democratic.

Glaser (2001) states that place-based tax incentives will improve the efficiency of firms' location decisions and will maximize total social surplus, in all cases except the cases when these incentives are driven by corruption or other influence types. Neumark and Simpson (2015) conclude that some forms of place-based incentives can be effective, if designed in a more discretionary manner and contribute to the provision of public goods, such as infrastructure or knowledge. Lockwood and Shawn (2015) state that enterprise zones become attractive to households and the reduction in poverty can be because of high-income households' migration into the area, thus the program's purpose of aiding the most in need group of residents has a little impact.

Nevertheless, governments continue to promote the development of economic activities through tax exemptions. In order to improve the business environment and investment appeal and to promote the development of rural regions, the government of Armenia passed the special bill about the establishment of the enterprise zones; geographical area, where special tax grants or regulatory exemptions are provided in order to promote the specific region's economic development. The HO-156-N bill was legally put into force on January 2015 and included overall 30 regions, which were granted special tax exemptions.

The practice of providing a solution to the deteriorating territories, through the geographically targeted regions is a well-known approach. French Zones Franches Urbaines (ZFU) and Zones de Revitalisation Urbaine (ZRU), was implemented in France, with the distinctive three periods, 1997, 2004, and 2006. The companies in the ZFU are free from business and corporate taxes, as well as social security contributions. Exemptions were much higher in ZFU, as it encompasses the most underprivileged regions. Givord, Rathelot, and Sillard (2011) examine the effect of the second wave of the policy, where 41 firms were transferred from the ZRU to the ZFU region. Their findings suggest that at the intensive margin, the impact of the ZFU program is positive, that is the program helped improve efficiency, by reducing the number of pre-existing firms. At the extensive margin, the program could have boosted the creation or relocation of new firms in the treated regions. The results indicate that the surviving rate of pre-existing firms was non-significant, while the inflow rate of new business into the enterprise zones was highly significant. Moreover, the program influenced the total employment as well, both in terms of

the worked hours and number of jobs. Nevertheless, the positive effects of the policy were remarkably offset by the negative effects in the immediate surrounding regions of the ZFU, due to the decline in the growth rate of the new and relocated establishments.

Neumark and Kolko (2010), evaluate the Enterprise Zone policy of California, which offers a notable incentive for hiring “disadvantaged” employees. The results are based on heavily-saturated regression and sensitivity analyzes and suggest a robust result of negative employment effect. The writers attribute this surprising result to the uniqueness of the Californian tax system, where firms can claim credits retroactively for up to 4 years. Indeed, the substantial share of enterprise zone tax credits was claimed retroactively according to the California Budget Project 2006. In addition, the results showcase significant sources of variation based on the industry; the policy favors regions, with a low share of manufacturing employment, that is outside the manufacturing sector, which is counterintuitive as some of the incentives, such as tax credit for machinery, favors manufacturing firms.

Mayneris and PY (2013) argue that while the majority of research paper regarding the efficiency of enterprise zones assumes that policies are homogeneous for all types of sectors, in reality, there is some heterogeneity as well. More specifically, the initial characteristics of the targeted zone, such as the number of pre-existing firms, the role of the industrial sector, such as the skill match of enterprises and available human resources, and the policy design specification can have a significant influence on the effectiveness of the policy design. Therefore, it is essential to carefully analyze the source of potential heterogeneity of the region, in order to tailor the policy specifications for maximizing its intended objective.

DID quasi-experimental research design is one of the tools used for evaluating the policy impact, by comparing the changes in outcomes between a treatment and a control group over a specific period by differencing out confounding factors and eliminating biases. In order to ensure that the model reasonably finds the mean causal effect, several key assumptions must be true; stable unit treatment value assumption (SUTVA), strict exogeneity, no effect of treatment on the pre-treatment population (NEPT), common/parallel trend, and bias stability. Within the terms of the regression framework, the model needs to have dummy variables for the group membership, time period, and the interaction of those two, which indicates the

casual effect of the event. Moreover, Chabé-Ferret (2010) claims that the regression framework is less biased than the matching approach in several credible cases. More specifically, he states that the popular idea that more controlled variables will lead to a better result, in reality, will lead to higher level of bias. Therefore, in the case of panel data, when the pre-treatment results are available, DID matching performs better.

Zhou, Taber, Arcona, and Li (2016) support the idea that DID allows a researcher to account for unobserved biases and thus offers a robust approach for comparing different groups.

Li, Yi, and Zhang (2011) constructed a DID estimator for Chinses population 1990 census data and found that strict enforcement of law increases the sex ration approximately by 94% throughout the 1980s. Moreover, they test the result with several robustness checks and do not find any confounded changes.

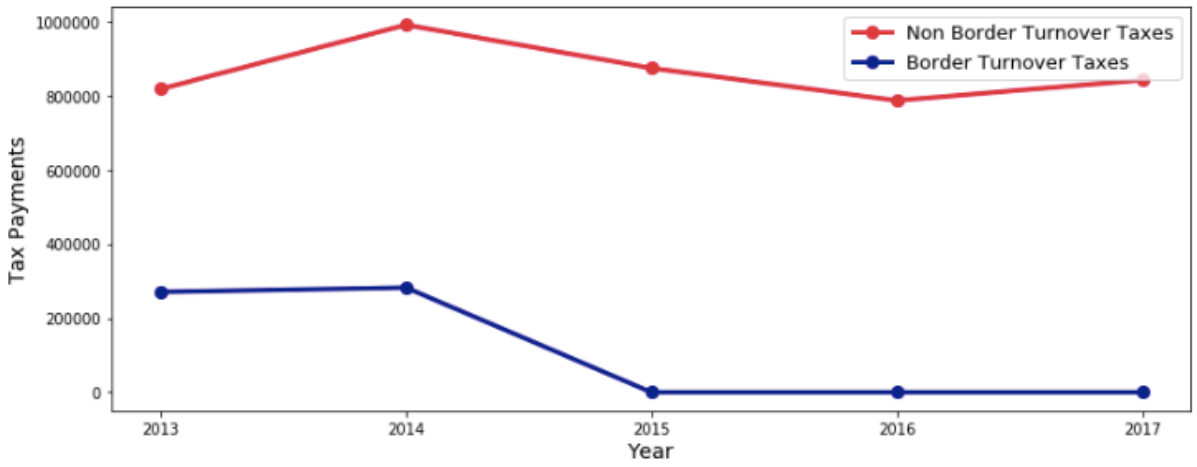
The other general method used for policy evaluation based on the panel data is FE model. Kim (2018) supports the idea that the panel model helps examine the group-level policy effects on individual outcomes. Moreover, he states that the problem of not meeting the assumption that group heterogeneity is time-invariant can be solved by introducing interactive FE model in the panel setting. Buddelmeyer, Jensen, Oguzoglu, and Webster (2008) implemented several Monte Carlo simulations on various estimators in order to identify the possible biases of the FE model on panel data. Based on the results, they argue that it is possible to extract information from the model parameters, which later can be used in microeconomic applications. Moreover, they develop a guide for assisting the researchers with the choice of the panel estimator, given the panel dimension. Nevertheless, Kranz, Lechner, and Planas (2015) claim that while the OLS and FE approaches work identical for the balanced data, the OLS is preferable for the unbalanced panel data, because of asymmetric selective attrition pre-versus post-policy effect.

Intervention Design

In order to improve the overall business environment and investment appeal and to promote the development of rural regions, the government of Armenia passed the special bill about the establishment of enterprise zones; geographical areas, where special tax grants and regulatory exemptions are provided for promoting the specific region's economic development. The bill

was legally put into force on January 2015 and included overall 30 regions. In more details, the enterprises, which engage in trade activities in those zones are exempt from turnover and the sole-proprietors operating under the turnover tax system are free from the profit tax. The production companies are exempt from VAT, turnover and profit tax, regardless of the location of final product sell. Activities which are legally bounded to operate under the patent law are free from the patent tax, except the ones which include passenger transportation and totalizators. Meanwhile, the enterprises in the borderline region are required to act as tax agents of their workforce and thus to account and pay the income tax and social fees of employees established by the legislation. As a result, the tax payments associated with the turnover, which were 3.5% of trade and production activities from 2013-2018 (HO-236-N), should be 0 for the borderline region companies starting from 2015. It is important to note that only activities in the frontier regions are authorized for tax exemption, that is the enterprise is required to keep separate accounting for taxable and non-taxable operations if possible and to implement the method of proportional weights for tax accounting otherwise (HO-156-N, 2015). The enterprise zones effect from 2013 to 2017 is illustrated in Figure 1.

Figure 1: The Enterprise Zones Effect



Methodology

Extensive and Intensive Margin

In order to understand the dynamics and trends of the region, this paper examines whether the positive change in the turnover is attributed to the rise of the number of new businesses in the

region (extensive margin) or the improved operations of existing businesses (intensive margin). In the majority of the cases, the change is attributed to the interaction effects of the two factors and it is essential to measure magnitude and influence of each margin on the observed output.

Implementing the same framework as Fernandes, Klenow, Meleshchuk, Pierola, and Rodríguez-Clare (2018), the variation in overall turnover across regions is estimated by intensive margin elasticity (IME). IME is the slope of the regression line and is determined by an OLS regression of ln(xi) on ln(Xi) with the origin and destination FE, for a given year.

The paper discusses group wise analyzes for each year and each region and then compares results. More specifically, the average number of companies is calculated for each community in both groups per year, which was merged with the original data of individual companies.

Equation 1:

$$Lnx_{ij}=\alpha*lnX_{ij}+\varepsilon_{IJ}$$

Xi is the total turnover for each year per region i, Ni is the total number of businesses, xi= Xi/Ni is the average turnover per year for region i, ln(xi) and ln(Ni) are intensive and extensive margins respectively. Extensive margin elasticity (EME) is the opposite of intensive margin and satisfies the following equation; $EME=1\text{-}IME.$

Unlike the equation implemented by as Fernandes, Klenow, Meleshchuk, Pierola, and Rodríguez-Clare (2018), the paper does not examine the pairwise connections and the community specific and time effects are already included in the average turnover.

Difference-in-difference

The above-introduced intervention design enables to implement DID quasi experimental method for evaluating the impact of intervention policy and to test the hypothesis that tax exemptions do not increase the turnover in the borderline region.

Following the procedure described by Lechner (2010), the treatment and time variables (border and time) were created for indicating the treated and not-treated groups, as well as pre-treatment and post-treatment periods. The observed outcome is denoted by Y, which is equal to the total turnover per business for each year. The notation de facto creates four district

groups, where only one is exposed to the treatment. In addition, the data is free from selection bias and other possible selection errors, as it includes the population of businesses in the Tavush regions over the specified time period. The issue of vague and unclear geographic boundaries, which was present in the case of Kolko and Neumark (2009), who resolved that problem by using GIS software for geographic mapping, is not appropriate in this particular case, as the data itself allows for clear differentiation between the controlled and treated enterprises.

Table 1: DID Design

	Border	Non-Border
Before 2015	$E(Y_t^0 \mid D=1)$	$E(Y_t^0 \mid D=0)$
After 2015	$E(Y_t^1 \mid D=1)$	$E(Y_t^1 \mid D=0)$

For the accurate examination of the causal effect, it is essential to ensure that the common trend assumption is true, which can be done through visual inspection ("Difference-in-Difference Estimation", 2013). From Figure 1 introduced above, it is observable that during the pre-treatment period the total turnover curves for the two groups have more or less similar pattern. Therefore, it is possible to conclude that in the absence of the treatment, the two groups would follow a similar trend, conditioned on the same X covariates. Moreover, by implementing the approach with the panel data, the individual differences existing in the data will remove all influences of the time constant confounding variables through the differencing. The other assumption is the exogeneity condition, which requires that components of X are not influenced by the treatment. The X variables, which are available in the data and can be included in the regression estimation are the sector of operation, border, time, business' years of operation, number of employees, and the type of the ownership. All these variables, except the employment, can be considered exogeneous by their nature, as they cannot change with the time; the law does not differentiate either between sectors or the ownership type.
The regression equation of DID framework is as follows;

Equation 2:

$$Ln(Y)=B_0+B_1*Border+B_2*Time+B_3*Interaction+B_4*Years\_operation+B_5*Number\_of\_Employee+B_6*Sole\_proprietorship+Bn*Xn+\varepsilon ij$$

X is a vector of businesses sector of operation and includes 11 dummy variables, chosen based on the most 12 frequent sectors of the Tavush region. The 12th variable, which includes the rest of the sectors and is used as a reference category. Lastly, based on the DID technique, the interaction term, the product of time and border variables, is created for capturing and evaluating the overall policy effect.

The exemption policy does not affect the income and social tax of employees, yet it is possible that tax savings were directed towards the workers and thus there was an indirect effect on employment. However, findings discussed in the descriptive analytics section suggest that the policy does not affect the employment.

The dependent variable is set to be the total turnover of the companies, however, the examination of the distribution plot of turnover values revealed that the distribution is right-skewed. In order to make the distribution of dependent variable more similar to the normal or bell curve distribution, the logarithm of those numbers was taken as the other dependent variable, after increasing the values by 1 unit, as some of the values of the not-transformed dependent variable were equal to 0.

Fixed Effects Regression

Implementing FE regression assumes that there are some individual and time-invariant characteristics, known as individual heterogeneity, which potentially can influence the behavior of the dependent variable. FE aims to remove and to evaluate the net effect of the independent variables on the outcome by accounting for individual heterogeneity, which in theory is included in the intercept and assumes that individual characteristics are unique and are not correlated with each other.

FE regression can be estimated either with the least square dummy variable or with the fixed effect estimators, which provide similar estimations, yet significantly differ computationally. In order to implement the least square dummy variable approach, it is needed to add an intercept dummy variable for each observation unit, that is for each company in the dataset. However,

the SRC data includes a large number of companies and creating separate dummy variables for each would take a lot of time and computational effort. Therefore, the second approach with the FE estimator was chosen, as it gets the same variables by averaging the data across time and subtracting the mean from each variable and thus diverges the values from their means. As a result, the FE estimator defined coefficients explain the variation of the dependent and explanatory variables for each individual.

In order to explore the relationship between the independent and outcome variables over time FE regression was implemented, after executing some software specific adjustments. More precisely, the year variable was transformed into the categorical type and the year and business ID variables were set as the multi-indexes of the data set. The changes were implemented for making the data comprehensible for the python's linearmodels.panel package

The FE regression framework is described by the following equation;

Equation 3:

$$\begin{aligned}\text{Ln}(Y) = {} & B_0 + B_1*\text{Border} + B_2*\text{Year\_2014} + B_3*\text{Year\_2015} + B_4*\text{Year\_2016} + B_5*\text{Year\_2017} + \\ & B_6*\text{Years\_operation} + B_7*\text{Employee} + B_8*\text{Sole\_proprietorship} + B_n*\text{Xn} + \varepsilon ij\end{aligned}$$

Similar to the DID approach, the dependent variable is set to be the logarithmic value of the turnover amount added by 1 unit. The independent variables included in the model are the sector of operation, the business establishment year, number of employees, and the type of the ownership. Following the procedure described in the documentation of linearmodels.panel package, the entity effects parameter of the formula is set to False, as Panel OLS does not create the separate variables for each entity, but rather produces group wise dummies, which in this case is equivalent to including the border variable, after changing its type to categorical data. Similarly, time effects are added by creating a dummy variable of the year feature, which is automatically implemented in the code. As a result, the derived model of the FE regression explains the net-effect of the relationship between the independent variables and logarithm of the turnover within a company, by accounting for company specific characteristics.

Data Description

The data set is an unbalanced, short and wide panel data, which includes all existing businesses in Tavush Region (24,785 observations), from years 2013 to 2017. The complete dataset was provided by the State Revenue Committee of RA (SRC), based on the formal request of academic research purposes. Business specific information is kept anonymous for ensuring that the tax secret of enterprises is kept, that is to avoid any leakage of personal information, as well as possible ethical issues.

The data is derived from the tax reports, which are filled in by the taxpayers. The report includes two separate rows for non-taxable borderline trade and production turnover, which help separate privileged businesses. In addition, the report includes the company's place of registration, which is its legal address and potentially can be different from its actual place of operation. However, SRC assured that in most of the cases the two addresses correspond to each other. Therefore, the crucial assumption, based on the expert opinion, is that the legal address and actual place of operation is the same.

The variables which were provided are the business establishment date, region, sector, paid taxed and other fees, the taxable amount of VAT and total circulation, borderline trade and production turnover, the total number of employees, and salary budget.

The variables which were created are;

- *Border* (dummy variable)- 1 if operates in a tax-exempt border region
- *Time* (dummy variable)- 1 after the law commencement (2015, 2016, and 2017)
- *Business ownership type*- dummy variable, 1 if a sole proprietorship, that is the number of employees was 0 for all the observed period
- *Sector categories*- the top 12 most frequent sectors were separated and the rest was merged into the 'other' sector

It is important to note, that being in the privileged zones does not necessarily ensure that the enterprise is utilizing the tax exemption opportunity. Therefore, the labeling was not done based on the tax-exempted locations, but rather, based on the tax declarations, that is whether the borderline trade or production cell was filled in any year between 2015 and 2017, as it ensures that the enterprise is taking the advantage of the exemption opportunity.

Data contains a significant number of missing values, all of which were imputed with 0 and includes outlier, which was detected and removed. As a result, there is a total of **2,632** border and **22,153** non-border observations. Table 2 presents details about the total number of companies each year:

Table2: Number of Companies per Region

Region	2013	2014	2015	2016	2017
Border	414	461	555	593	609
Non-border	4,015	4,152	4,347	4,656	4,983

Meanwhile, it is assumed that there is a difference whether the firm stop operation in that year or even was not established yet and the fact that the particular values were 0 for the analyzes. Therefore, the data includes only active companies, that is the company with 0 turnover is included in the data only if its status is "*Active*".

Descriptive Statistics

This part of the paper presents the results of descriptive analytics, which was implemented for unfolding the main trends and patterns in the data.

Figure 2 depicts the mean of the total turnover of non-border and border regions and reveals that the non-borderline regions display very similar trends.

Figure 2: Total Turnover Mean

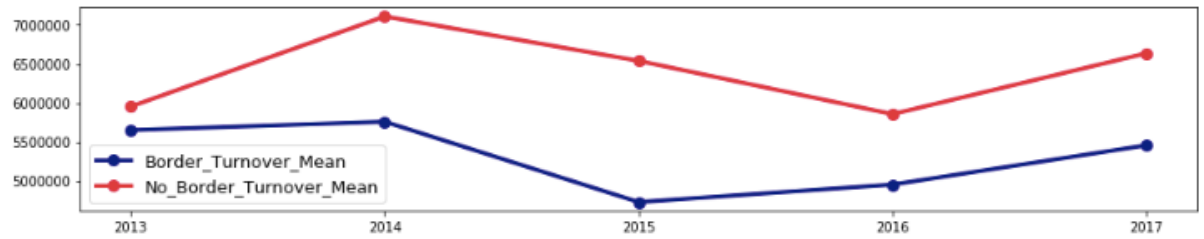


Figure 3 is the graphical representation of the mean payments of taxes and other legal fees and indicates that in 2015 the borderline region had a noticeable decrease, followed by a slight increase. Most probably decline is attributed to the enterprise zones effect, while the followed increase can be the result of the employment growth.

Figure 3: The Mean of Payed Taxes, Rates, and Other Legal Payments

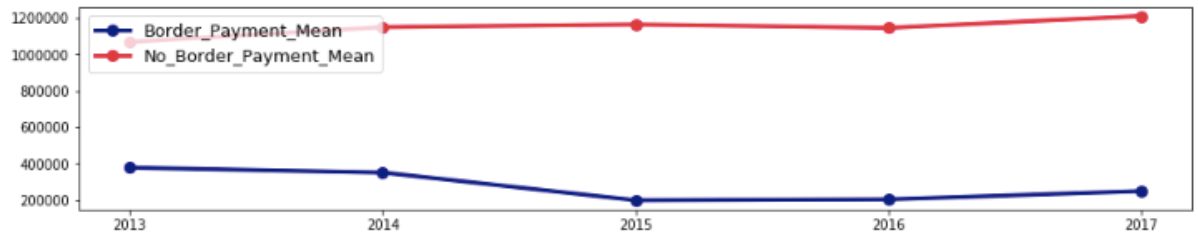


Figure 4 demonstrates that the increased total tax payments in the frontier region were mainly attributed to the increase of the employment mean in 2017, which was expected as the law does not affect the tax payments connected to the workforce.

Figure 4: Borderline Employment Mean and Total Tax Payments

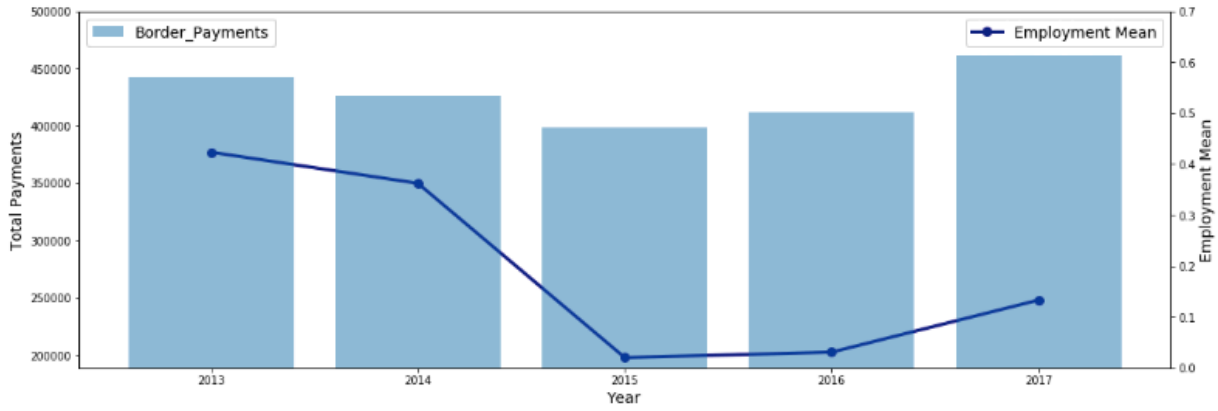
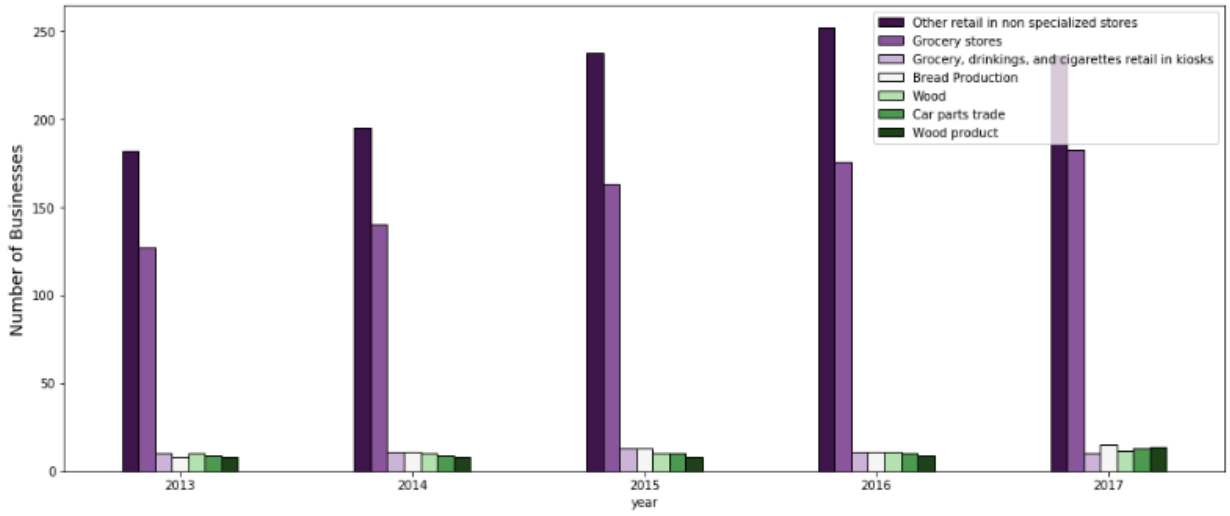


Figure 4 reveals that from 2013-2016, the mean of employment in the borderline mostly was constant and from 2016 it experienced a slight increase. Moreover, t-test inferential statistical technique between the employment means of two groups and between the pre-treatment and post-treatment period was implemented. Expectedly, there is a significant difference between the treated and control groups, as a p-value is smaller than 0.05 threshold. However, the difference between the pre-treatment and post-treatment period for both groups was not significant, they have p-values higher than 0.05 threshold. The findings suggest that the policy has not influenced the employment.

Figure 5 demonstrates the total number of companies in the top 5 occupied sectors. Interestingly only the top 2 most occupied sectors, which are related to the trade experience growth of companies.

Figure 5: Sector Category Breakdown



Survival Analysis

In order to identify the major behavioral patterns in the region, it is essential to consider and evaluate the percentage of surviving firms. The survival rate is defined as the number of companies born in x-year that exist till t-base year, divided by the total number of companies established in x year.

Table 3: Surviving rate for the reference

Border Region				
Reference Year/ t	**2017**	**2016**	**2015**	**2014**
2013	17.39%	18.48%	22.28%	21.74%
2014	22.42%	25.45%	26.67%	
2015	28.32%	34.07%		
2016	48.32%			

Non-Border Region				
Reference Year/ t	**2017**	**2016**	**2015**	**2014**
2013	15.2%	16.4%	18.8%	23.6%
2014	21.0%	22.7%	26.5%	
2015	29.9%	33.9%		
2016	47.9%			

The survival rates estimation indicates that the survival rates in both regions are very similar to each other. On the same time, it is observable that the highest rates are within *t-1* period and as the difference between periods increases, the survival rate decreases accordingly.

Extensive and Intensive Margin

The analysis of intensive and extensive margin results for both groups during the 2013-2017 are presented below;

Table 6: Intensive and Extensive Margin Results

Region	IM	EM
Border	75.2%	24.8%
Non-Border	60.7%	39.3%

The results suggest that IM is higher in the borderline region, indicating that around 75.2% of variation in the total turnover is attributed to the variations in the average turnover per enterprise, while 24.8% to the number of companies.

Results

In this section, the report examines the results of the implemented analysis of DID and FE regressions for evaluating the impact of the enterprise zones policy on the variation of turnover in Tavush region.

Table 4 reports the results of DID and FE regression, defined by Equation 1 and Equation 2 respectively and **fails to reject** the hypothesis that tax exemptions are not increasing turnover.

Table 4: Estimation Results

Estimation Results		
Dependent Variable: Logarithm of the total turnover		
Independent variables	**DID**	**FE**
Constant	14.42*** (0.397)	14.51*** (0.3982)
Border	3.66*** (0.203)	3.73*** (0.1249)
Time	-0.53*** (0.078)	-
Year_2014	-	-0.299** (0.116)
Year_2015	-	-0.561*** (0.115)
Year_2016	-	-0.81*** (0.114)
Year_2017	-	-0.655*** (0.113)
Interaction	0.096 (0.24)	-
Years of operation	-0.15*** (0.005)	-0.15*** (0.005)
Number of Employee	0.0025 (0.003)	0.003 (0.003)
Sole proprietorship	-5.95*** (0.087)	-5.95*** (0.087)
N	24,785	24,785
R^2	0.465	0.4655

***Note**: Standard errors are in parentheses. *p<0.1, **p<0.05, ***p<0.01*

Based on the DID results, the interaction coefficient is the difference in changes over time, that is whether the expected mean change in outcome from before to after was different in the two groups and thus estimates the total policy impact. It is positive, yet not significant, as it has p-value larger than 0.05. The results conclude that enterprise zones have no significant effect and therefore we fail to reject the null hypothesis, that is, the exemption policy does not cause the variation of turnover in the designed enterprise zones.

The border coefficient is the pre-intervention difference between the control and treatment group and represents the baseline differences existed between the groups before the

intervention was applied to the control group. Border coefficient is positive and significant as its p-value is smaller than 1% threshold and highlights the apparent difference between two groups. Time coefficient is the time trend in the control group that is the factor, which will change the dependent variable even without the treatment effect, which is negative and significant as has a p-value smaller than the 1% threshold. The majority of sector coefficients are significant, yet they have varying signs and magnitude of coefficients. However, there are a few promising sectors with high positive coefficients all related to retailing.

The enterprises' years of operation has a negative and significant effect in both models. The negative sign suggests that as companies' years of operation increases, their performance decreases, that is the newly opened companies operate in a better way. The major difference between DID and FE regression is that it enables to examine the yearly effect of the policy and not just the pre-treatment and post-treatment periods. As can be seen from the results, the 2013 year is chosen as a reference category and indicates that compared to 2013 there was a significant decrease in the turnover, which started to recover in 2017.

Discussion

This paper fails to reject that the enterprise zones affect the total turnover, meanwhile the model results reveal several important trends, which need further analyses. As mentioned above, the FE model reports that there was a negative time trend compared to 2013. This time trend can be attributed to the migration and variation in remittances from the Russia, due to the 2014-2015 crisis in Russia, when the ruble has fallen to as low as 80 to the dollar due to the sharp decrease in the global oil and energy prices and the sanctions because of the Ukraine conflict. The ruble rates fell almost as quickly as they had risen, stabilizing to the expected 50-60 per dollar range by the end of December.

The table below illustrates the comparison of yearly GDP growth of Russia and Armenia based on the World Bank data (GDP growth, n.d.):

Table 7: Russia & Armenia GDP growth rate (%)

Year	GDP Growth (%) Russia	GDP Growth (%) Armenia
2013	1.8 %	3.3 %
2014	0.7 %	3.6 %
2015	-2.3 %	3.2 %
2016	0.3 %	0.2 %
2017	1.6 %	7.5 %
2018	2.3 %	5.2 %

From the table, it is noticeable that after 2015 the GDP growth started to increase. Moreover, by taking into account that growth rate and the overall global recovery of oil prices, it seems that the economic outlook for Russia is more or less optimistic. However, according to the "Economic and Financial Crisis in Russia" paper, published by OSW on February 2015, "In the last months of 2014, ordinary people in Russia started to feel the deteriorating economic situation, especially in the form of rising inflation (in the agricultural and food sector in particular) and a decrease in real wages", which indicates that the migrant population was heavily influenced. Moreover, the migrant population converted their Russian wages in to US dollars and then sent them to their relatives. As a result, devaluated ruble had a massive effect on the dollar-denominated remittances sent home by Armenian migrant workers from Russia, which in 2015 alone declined by 35.8%. The table below summarizes the yearly inflow of money transfers to Armenia from Russia through the Armenian banks and is based on the official statistics from the Central Banks of Armenia.

Table 8: Remittances Transfer from Russia to Armenia

Year	Transfers to ARM from RUS (1,000 $)	Transfers to ARM from RUS (%)
2013	1,727,946	5.11 %
2014	1,554,852	-10.02 $
2015	1,008,635	-35.13%

2016	896,916	-11.08 %
2017	1,064,984	18.74 %

In addition, many of the migrants return home in December 2014 and bring with them rubles instead of the dollars, as they were not able to convert the earnings in Russia and thus they tried to exchange them in Armenia. However, the Central Bank of Armenia did not anticipate the magnitude of those activities, which later resulted in high inflation of AMD. Meanwhile, the transfer change rate started to recovered in 2017 and it seems that the FE model captured this change, as the negative coefficient in 2017 is smaller than in 2016 (GRÖNE & HETT, 2015).
The other important component, which needs examination is a community level actual earnings of Tavush region.

Table 9: Community level Actual Earnings

	2013	2014	2015	2016	2017
Border	1,036,913	1,267,959	1,555,041	1,428,526	1,508,908
Border (%)	-	22.3%	22.6%	-8.1%	5.6%
Non-border	1,369,886	1,596,988	1,947,324	1,809,908	1,940,574
Non-border (%)	-	16.6%	21.9%	-7.1%	7.2%

The actual earnings do not show a significant growth for the borderline region in 2015, despite the enterprise zone policy inclusion. Afterwards, the earnings decrease in 2016 for both regions and then increased in 2017 approximately to the same level as in 2017. The parallel trend in both groups further emphasize the point that the policy has no affect.

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