# INTERBUDGETARY TRANSFERS AND REGIONAL ECONOMIC DEVELOPMENT. CASE OF UKRAINE.

By

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#### ABSTRACT

The aim of this paper was to investigate the usefulness of interbudgetary transfers and, alternatively, public investments as tools of regional convergence between poor and rich regions in Ukraine. For analytical purposes, data was collected for 25 regions and covered 8 years from 2004 till 2011, with carefully selected variables and specifications to best answer the underlying research questions. OLS and pooled OLS methods were used for the econometric estimations. The findings show that neither transfers, nor public investments influence the productivity growth in the poor regions. Therefore, the current design and implementation of fiscal policy does not promote further convergence between the regions.

Keywords: Interbudgetary Transfers, Public Investments, Regional Convergence, Ukraine.

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#### **1. INTRODUCTION**

Disparities in levels of regional economic development represent a problem that is constantly discussed and studied in many countries – from giants (like USA Sedgley and Elmslie (2005), China: Marco (2010), Chen (2010), or Brazil: Amaral et al. (2007)) to relatively small Eastern European states (for example, Hungary: Lengyel et al. (2010)). The subject is a source of never-ending theoretical debate. Researchers investigate factors that affect local economic growth, evaluate dynamics of income imbalances, build models to examine regional convergence, and analyse policies aimed to address regional inequality.

Within the field of regional economics, interbudgetary relations play an important role. The way in which funds are redistributed between national and local budgets affects economic performance of particular regions and the standards of living within them. In recent years this subject has attracted a particular interest in case of Russia – a large country with a transition economy that has a socialistic past of command economy and a relatively young budgetary system. As a consequence, there is an abundance of theoretical works. The implications of imposing central control over subnational budgetary activities were studied by Litwack (2001); Makrushin et al. (2006) analysed seasonality of regional budget expenses; Sulianov et al. (2010) examined the interaction between budgets of different levels during the financial crisis of 2008. The subject was further developed by Mamedov et al. (2012), who provided a comprehensive overview of Russia's interbudgetary relations and discussed possible ways of reforming them.

Since Ukraine has a very similar model of interbudgetary relations and is going through the same transition as Russia, it also attracts a significant interest from this viewpoint. The largest country that is entirely located within Europe, Ukraine is divided into 24 provinces (called "oblasts"), one autonomous republic (Crimea) and two cities with a special status (Kyiv – the capital, and Sevastopol – the sea port and the base of the Russian Black Sea Fleet). All Ukrainian regions differ significantly in terms of access to natural resources, level of industrialisation, production capacity, infrastructure and quality of the labour force. Their economic profile was shaped in the times of the Soviet Union, where Ukraine – then a Soviet republic– was an important link in the production chain of the command economy.

Ukraine inherited a complicated and extensive social welfare system from the Soviet times and thus has to finance numerous programmes (for example, education, healthcare, culture, and the pension system are all financed publicly). Given that these programmes are mandatory throughout all regions, local budgets have comparable expenditure requirements per capita. Yet, regions differ significantly in terms of economic development. As of 2011, the richest oblast in terms of gross regional product (GRP) per capita outperformed the poorest one by a factor of 2.85<sup>1</sup>. Consequently, regions with lower levels of business activity collect lower incomes for their local budgets. This is the fundamental reason why poor oblasts face a constant and inevitable threat of running into deficit. In order to fight these disproportions and finance all social programmes sufficiently Ukraine implemented a highly sophisticated budgetary system in which interbudgetary transfers play a key role.

The relationship between interbudgetary transfers and regional economic development in case of Ukraine has been studied both theoretically and empirically. Thiessen (2002) made a fundamental attempt to examine this link. He found that income redistribution from wealthy to poor regions has been effective in Ukraine and therefore promoted regional economic convergence. In contrast to Thiessen's results, Kizim et al. (2010) argued that high volumes of grants and subsidies transferred from the central to regional budgets are

<sup>&</sup>lt;sup>1</sup> State Statistical Services of Ukraine: <u>http://ukrstat.gov.ua/</u>

ineffective to the extent that they do not stimulate regional growth and do not decrease the productivity gap between the richest and poorest regions.

Given the contradictory results of the previous studies and the fact that Ukraine is trying to overcome the consequences of the financial crisis while running constant deficit of the state budget, it is important to clarify whether interbudgetary transfers foster economic growth in poor regions and promote regional convergence. The aim of this paper is, henceforth, to further analyse the influence of interbudgetary transfers on regional economic development in Ukraine and provide evaluation of respective state policies. The absence of a positive effect would imply that demand for transfers from the side of poor oblasts will only get higher over time. That would, in turn, further undermine the fiscal stability of the country.

With the help of descriptive statistic methods, cross-sectional and panel data analysis applied to the latest available data for the period of 2004-2011, it will be shown that interbudgetary transfers in Ukraine is a good tool to balance standard of living disparities across different oblasts. However, the present system of interbudgetary relations fails to stimulate economic development in poor regions. Therefore, it does not help reduce the gap between regions, which may lead to a negative impact on the budget stability in future.

Public investments in fixed capital is another tool at the government's disposal for implementing economic policies. There are evidence (for example, Kyryushyna (2008)) that such investments positively influence regional growth. It will be tested if such a positive effect exists at the current stage of Ukrainian economic development and whether public investments may be used as an alternative tool to speed up regional convergence.

The aim of the current research is to offer a new overview of the problem of interbudgetary relations and the effect of an alternative policy tool public investment. Firstly, it is based on the latest available data, which means that it captures the evolving fiscal sector in transition towards a more pure market economy, while showing the first visible outcomes

of the crisis. Secondly, it is a first attempt to look at both interbudgetary transfers and public investments, which can have interesting policy implications in case either can meet the expectations embedded in the research hypotheses.

The rest of this paper is organized as follows. Chapter 2 provides theoretical justification of the present paper with the review of existing works and researches. Chapter 3 describes sources of differences between Ukrainian regions; it also gives a brief explanation of the budgetary system of Ukraine and its main principles. Chapter 4 comprises descriptive data analysis, according to which hypotheses are formulated. Model specifications and estimation results are provided in Chapter 5, followed by the interpretation of their data output. In conclusion, Chapter 6 summarises key findings of the research and gives policy recommendations.

#### **2.** THEORETICAL OVERVIEW

Recent researches of the Ukrainian economy include a number of works where investments, as well as interbudgetary relations are studied in the context of regional economic development.

It is a widely acknowledged fact that different types of investments positively affect regional economic growth.

Sheremirov (2008) investigated the potential spatial dependence between the growth of Ukrainian regions. He applied techniques that are mostly used in cross-country studies to reveal specific patterns that influence regional performance. If one growing region positively affects the growth of others – an effect known as spatial spillovers – then regional development is determined by the complicated system of interregional links. The presence of spatial dependence means that development of key regions can stimulate growth throughout the whole country.

In the construction of his spatial model, Sheremirov used such variables as gross regional product, fixed capital investments, the number of small enterprises (all expressed per capita), inflation and unemployment rates, and even the number of students enrolled. Data was collected for the six-year period of 2000-2005. As a next step, the model was applied to analyse the spillover effect of additional investments into specific regions. The results confirmed that investments positively and significantly influence both growth and GRP per capita, but only a marginal spillover effect was detected. Moreover, results of the spatial model were principally the same as those obtained by the simple OLS models.

Kyryushyna (2008) studied the causes for socio-economic disparities between the regions of Ukraine. Political focus was in the centre of her analysis. Collected data covered the period from 1995 to 2005. Such variables as gross regional product, industrial output, economically active population, number of high education institutions, and fixed capital

investments were used, alongside with a dummy variable for the political power of the region. Using the methods of spatial econometrics it was found that political support has small, but significantly positive effect on the economic development of the region. However, such factors as availability of human capital and fixed capital investments play a more significant role in the economic growth of the region. Moreover, the division of the regions was carried out according to geographical principles, as opposed to their business profile and economic development.

Among those works that analyse interbudgetary relations in Ukraine the most notable are the following.

Gorodnichenko (2001) examined the effects of intergovernmental aid on the fiscal behaviour of local governments. The popular theoretical phenomenon of flypaper effect was in the focus of his study. Flypaper effect entails that grants provided to local authorities lead to excessive taxation and expenditure growth. After providing economic justification of interbudgetary grants and describing their possible impact on the fiscal behaviour of local authorities, the author proceeded with the model. Using data for the period of 1995-1999, he tried to emulate the dependence between own revenues of regional governments and budgetary grants received by them. Other variables included industrial and agricultural outputs, average wages and wage arrears, as well as the share of children and retired workers in population. The main result of the research is that flypaper effect is not observed in Ukraine and does not contribute to the growth of the public sector. Other notable findings include, for instance, the negative relationship between agricultural output and regional revenues, meaning that in the observed period agricultural enterprises have been net recipients rather than donors to local governments.

The cornerstone work on interbudgetary relations and regional development in Ukraine was done by Thiessen (2002). He studied the effects of the fiscal stabilisation system

on economic growth and tax revenues. Based on data on gross regional products, transfers and tax rates, and applying the methods of panel data analysis, Thiessen concluded that transfers have a strong growth impact in recipient regions and promote regional convergence, because their expansionary effect dominates any possible adverse incentive effects.

Thiessen's analysis relied heavily on tax considerations and the division of oblasts into net donors and net recipients of interbudgetary transfers. Since the publishing of his work in 2002, the Ukrainian Tax Code has been changed twice. The interbudgetary system has changed too. For instance, there are no more net donors. Each and every region receives funds from the state budget. Furthermore, there is a problem with Thiessen's numerical analysis. The data sample collected by him only covered a short period from 1996 to 1999 – this fact might raise some concerns about practical significance of the obtained results.

Kizim et al. (2010) tried to examine interbudgetary relations in Ukraine for the period of 2000-2008. Contrary to Thissen's results they argued that high transfers stimulate conscious growth of expenditures in poor regions, but do not create incentives to increase productivity through structural reforms. The authors state that the present system under which transfers constitute up to 50% of regional expenditures undermines budget stability. However, their analysis lacks statistical rigor.

Nesteruk (2008) also proved that fiscal decentralisation is inefficient in Post-Soviet countries in terms of regional development. He used panel data analysis and found that an increase in investments or labour force significantly fosters the growth of regional productivity, while the effect of government expenditures is only marginally positive.

There have also been some attempts to examine the subject from quite unexpected viewpoints. For example, Vialykh (2011) analysed whether a region's representation in the Ukrainian parliament influences its development. Specifically, she tested if there is any association between the number of a region's parliament members and the volume of budget

funds allocated to that region from the state budget. Alternatively, gross regional product was also used as an independent variable, while different control variables – such as regional foreign direct investments, capital investments, wages, and agricultural output – were included in the model. Despite the author's expectations, results of the empirical analysis suggested that not only there exists no positive influence of parliament representation on regional development measured by GRP, but a surprising negative effect on the volume of subsidies is evident.

In sum, it should be noted that the vast majority of available works on the subject of regional development in Ukraine cover a relatively short period of time, and only up until 2008, i.e. before the financial crisis in Ukraine. This event was characterized by a 60% devaluation of the national currency, a 12% real GDP decline, a liquidity crisis and a substantial increase in the number of non-performing loans in the banking sector. Therefore, since it is one of the specifics of the research period, it is interesting to analyse it.

#### **3. REGIONAL DISPARITIES AND**

#### THE BUDGETARY SYSTEM OF UKRAINE

The success of policy making is very much dependent on interbudgetary fiscal relations, their level of development and the efficiency of the wealth redistribution mechanism. Transition from the command to the market economy requires the decentralisation of economic decision-making, a painstaking process full of hurdles and obstacles that the Ukrainian interbudgetary fiscal relations had to go through as well. Many changes were made to correct the mistakes and errors of the old system, while finding a new, more adequate model to implement was equally challenging. In reality, the construction of the Ukrainian budget system had never reflected the constitutional aim of equal distribution of public wealth between citizens and among territorial communities. In order to follow these outlined principles, at least in theory, a budget structure with a system of interbudgetary fiscal relations had to be built.

Before the presentation of an overview of fiscal relationships within Ukraine, it is important to understand the source of regional disparities between its regions. It was noted in the introduction that they are different in terms of their geographic location, availability of natural resources, industrialisation, level of urbanisation, quality of infrastructure and other characteristics. Ukraine is divided into 27 administrative units, but, in order to better represent their distinctive qualitative features, they are better to be grouped into larger territories – namely, Eastern, Central, Western, Southern and Northern regions, and the separate Kyiv area.

The Eastern region (represented by Dnipropetrovsk, Donetsk, Zaporizzhya, and Luhansk oblasts) is considered to be the industrial heart of the country. Because of the region's access to large fields of various metal ores and coal, it was heavily industrialised

during Soviet times. All of the largest domestic mines, metallurgical plants, coke and chemical factories are situated in this area. The region has a high urbanisation ratio and is also the country's leading exporter (State Statistical Services of Ukraine n.d.).

The Central region (Vynytsya, Cherkasy, Kirovohrad and other oblasts) is mainly agricultural. Ukraine possesses 30% of the world's "chernozem" (very rich and fertile black soil) and produces all sorts of cereals, fruits and vegetables on it. As of 2012, the country is the world's largest producer and exporter of sunflower oil and the sixth-largest grain exporter<sup>2</sup>.

The Western part of the country (Lviv, Volyn, Zakarpattya and other oblasts) is a mountainous area with a high share of rural population. It borders Poland, Slovakia and Hungary. From an economic perspective, Western Ukraine specialises in the timber industry and food products. It has a significant touristic potential, which is far from being realized. With no access to extracted minerals or fertile soils, Western Ukraine is the least economically developed region of the country.

The Southern region (Odesa, Mykolaiv, Kherson oblasts and the Autonomous Republic of Crimea) is also agricultural in nature, but it has an important distinction from other regions, namely, its access to the Black Sea. Large ports of Odesa, Youzhny and Illichivsk are situated here, as well as some shipyards and dockyards. As a consequence, the economy of the region is based upon sea freight and transportation. Additionally, this region is a popular tourist destination domestically, as well as internationally, especially the Crimea.

The Northern region (Kharkiv, Chernihiv, Sumy oblasts) is a tree-laden territory that borders Russia and Belarus. The region has an industrially based economy that includes engineering, machinery, radio-electronics and food processing. Its economic centre is Kharkiv, the second largest city of the country.

<sup>&</sup>lt;sup>2</sup> Index Mundi: <u>http://www.indexmundi.com/agriculture/?commodity=wheat&graph=exports</u>

Finally, Kyiv is the administrative, economic and business centre of Ukraine. It hosts the headquarters of virtually all large banks, insurance companies, real estate developers, telecoms, oil and gas companies, etc. In 2011 Kyiv attributed 17% of Ukraine' GDP – the same as the twelve poorest oblasts combined (State Statistical Services). The adjacent Kyiv oblast benefits from its location, being the only oblast in Ukraine that has recently enjoyed population growth.

The basic characteristics of each region are summarised in tables below (Table 1. and Table 2.). For the period from 2004 till 2011, the Kyiv area is a clear leader in terms of all main economic indicators (weighed per capita). It produces the largest gross regional product (GRP), attracts more investments, has more registered business entities and rewards its citizens with the highest salaries in the country. Elsewhere, the Eastern region is the wealthiest with high GRP, salaries and investments; the South has the largest number of firms and companies; and the West appears to be the poorest and least developed region. For example, the GRP of the Eastern region is almost twice as high as the GRP of the Western.

Region	Oblasts included	Population, thousands (as of 2011)	Economic specialisation
Eastern	Dnipropetrovsk, Donetsk, Luhansk, Zaporizzhya	11 825	Ore and coal mining, metallurgy, machinery building
Central	Poltava, Cherkasy, Kirovohrad, Vinnytsya, Zhytomyr	6 684	Agriculture, cattle breeding, oil and gas refineries
Western	Lviv, Volyn, Rivne, Zakarpattya, Ternopil, Ivano-Frankivsk, Chernivtsi, Khmelnytsky	10 674	Timber, light industry, food production, tourism
Southern	Odesa, Mykolayiv, Kherson, AR Crimea	6 618	Agriculture, sea freight, tourism
Northern	Kharkiv, Sumy, Chernihiv	4 999	Engineering, machinery building, food production
Kyiv area	Kyiv city and Kyiv oblast	4 525	Banking and other financial services, telecommunications, real estate development, state-owned monopolies

Table 1.	Composit	tion and r	nain featu	res of the	Ukrainian	regions
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Source: State Statistical Services and author's calculations

Region	GRP	Interbudgetary transfers	Investments in fixed capital	Monthly salary	Number of business entities (per thousand of population)
Eastern	17 151	422	2 811	1 397	22.3
Central	10 993	558	2 277	1 084	19.8
Western	9 051	588	2 006	1 068	18.7
Southern	11 445	513	2 782	1 152	27.7
Northern	11 699	510	2 274	1 139	22.0
Kyiv area	31 892	-62	7 791	1 829	57.9
Ukraine	14 331	457	2 951	1 312	25.4

**Table 2.** Average values of regional quantitative characteristics, 2004-2011(in 2007 Ukrainian hryvnias, per capita)

Source: State Statistical Services and author's calculations

According to Oates (1990), subnational governments are better at implementing and administrating some of the social programmes and are better at meeting the consumer's preferences. However, it is complicated to deliver such services timely since local budgets have chronic problems due to the lack of funds, especially in poor regions with low incomes. Therefore, the subnational budgets tend to be less proficient when it comes to taking on this task without being provided with the necessary amount of revenues, for instance in the form of interbudgetary transfers. The efficient design of such transfers can be a good support of a well-formed fiscal policy (Bird 1995).

Since the level of economic development of different Ukrainian regions happens to be quite different due to various factors, as described above, there is a need to use the mechanism of redistribution of incomes and expenditures through the governmental budget. At the same time, a similar process is at work inside the regions themselves. The construction of intergovernmental relations when the budget of a lower level is included in the higher level government's budget is called a budgetary pyramid, or, as it was labelled by Pynzenyk (2000), - "matryoshka". Its main feature, as monetary dependence dictates, is the full dependence of the lower levels on the decisions taken above.





Source: Current Budget legislation of Ukraine (Cabinet of Ministers 2010)

The budgetary system of Ukraine consists of 4 tiers. The highest one is the national level with the State Budget of Ukraine. Oblast budgets are located on the second level. It comprises the consolidated budget of 24 oblasts, and budgets of the Autonomous Republic of Crimea and two cities of "state importance" (Kyiv and Sevastopol). The third tier encompasses individual budgets of oblasts', rayons' (localities) and the cities' of "oblast importance". The lowest level contains cities of rayon significance, as well as settlements' and villages' budgets. The consolidated budget of a higher tier always includes those of the subordinate jurisdictions. Therefore, the first-level Consolidated Budget of Ukraine consists of the State Budget of Ukraine and the Consolidated Local Budgets of Ukraine, the latter of which aggregates lower level sub-national accounts. That is why this model of the budget is called "matryoshka". The scheme of it is shown on Figure 1.

The key organisation in determining interbudgetary relations is the Ministry of Finance. It drafts fiscal and budgetary laws and creates the methodology that is used for the calculation of transfers. These documents are later to be approved by the "Verhovna Rada", the Ukrainian National Parliament.

To implement the planned budgetary programmes at the lower levels of the budgetary system, a certain amount of different interbudgetary transfers is redistributed to the local budgets. According to the State Budget of Ukraine , there are three types of such transfers in Ukraine: levelling grants, subventions, and extra grants.

- A *levelling grant* is an interbudgetary transfer from the State Budget of Ukraine to the budgets of lower levels. Its aim is to align local budget inflows with its expenditures in order to avoid a negative balance. On the other hand, when the revenues of the local budget exceed its factual needs, the levelling grant works the other way around funds are transferred from the city or oblast to the state budget (from inside the "matryoshka"). A levelling grant is given on a non-reciprocal and gratuitous base.
- A *subvention* is an interbudgetary transfer from the State Budget of Ukraine to local budgets that is provided specifically for the implementation of the social security governmental programmes and other similar goals. Such programmes have to be funded solely with the help of the designated subvention and on terms that are stated in law. Typically, the largest subventions have the following goals:
  - assistance to poverty-stricken families;
  - providing privileges for the housing and communal services;
  - social-economic development of the region;
  - repayment of public debt for salaries to scientific and educational workers (i.e.
     employees of schools, universities and other institutions);
  - construction and maintenance of roads of communal property in settlements.

• *Extra grants* are used to finance the payment of salaries for the employees of publicly financed institutions or to provide financial support to the most vulnerable layers of the society (State Budget of Ukraine).

The purposes of the transfers tend to change every year, depending on what are the main goals and programmes of the government, but for the purpose of the present research, distinctions between different types of transfers are not essential. The research is made based on the aggregated total transfers since the target variable is the interbudgetary transfers and their influence on regional product, rather than the purpose of the expenditure itself. Therefore throughout the work they are jointly referred to as interbudgetary transfers.

The distribution of these transfers is not at all a transparent and trivial process. The formula used to calculate the size of interbudgetary transfers has changed several times since the establishment of the Budgetary Code of Ukraine. Moreover, the government reconsiders the funding of social programmes annually. Finally, in Ukraine, democracy has yet to evolve to a state where corruption and political bargaining are negligible in terms of their effect on fiscal decision-making. All these aspects have a substantial influence on the budgeting process, making it obscure and non-transparent, as well as potentially sub-optimal, which can be one of the possible reasons for the transfers to be less effective when it comes to the success of the social programmes provided by the authorities.

Figure 2. shows the country average of real interbudgetary transfers to oblast budgets per capita (in 2007 prices). Over the years the size of these transfers has changed significantly. One reason for such fluctuations is a tendency for frequent government changes in Ukraine. Some cabinets opt to leave more funds in the local budgets, while others prefer to collect almost everything to the central budget and then redistribute incomes in the form of the transfers.



Figure 2. Dynamics of interbudgetary transfers per capita

Another reason is that transfers size is dictated by contemporary macroeconomic circumstance. By this token, the economy was at the height of its expansion in 2007; hence, the budget could afford a higher level of transfers as additional stimuli. On the contrary, 2008 and especially 2009 were the crisis years, thus the volume of transfers had to be cut. Since 2011, the gradual recovery of the domestic economy has started, triggering a fiscal expansion as well.

As one can note, the described transfers usually do not have a stimulating character and are not aimed at productivity growth. They mostly help the local budgets to finance and implement different social programmes that were planned by the national budget for each year. However, they represent an inflow of funds into the region, so it is reasonable to expect at least an indirect influence on economic growth. The next two sections will present analysis targeted at revealing whether or not such a relationship exists.

#### 4. DATA DESCRIPTION AND PRELIMINARY ANALYSIS

#### 4.1. Data description

In order to conduct econometric analysis, information should be collected, organised and examined prudentially. Henceforth, this chapter is dedicated to the presentation and discussion of underlying data, as well as the analysis of tendencies and possible relations present in the dataset.

Data collection and analysis in present and following chapters of this paper were performed under the following considerations and assumptions.

#### 1 Statistical information was collected from multiple resources

The overwhelming majority of variables were taken from the State Statistical Services of Ukraine (SSSU). SSSU collects data on an annual basis for the 25 Ukrainian regions (24 oblasts plus the city of Kyiv). Further, it is entitled and required to publish the Statistical Yearbook of Ukraine and the Statistical Yearbook of Regions of Ukraine (updated in 2010 and 2011, respectively). The Statistical Yearbook of Regions of Ukraine is in general more detailed and data-rich, but in cases when some figures were not available from this source, the Statistical Yearbook of Ukraine was used. An additional source of data used in this research is the state budget of the corresponding years.

2.

#### Data was collected for the period of 8 years, from 2004 to 2011

#### 3.

CEU eTD Collection

#### The City of Kyiv and Sevastopol were left out of consideration

Kyiv is a clear outlier based on all main indicators; therefore, its inclusion into a) analysis would have added skewedness and bias to the data features, making the interpretation more difficult and less precise. Moreover, in addition to being different in terms of scale in economic and social indicators, the city of Kyiv is quite different from all

oblasts in the context of business activity and budget relations (as an example, it is the only administrative unit that had negative interbudgetary transfers for the period of 2004-2011). Hence, its exclusion is required out of economic consideration, and all country averages were calculated without Kyiv data.

b) Sevastopol was disregarded since it is small and not that influential, when it comes to such figures as GRP, transfers and many others. Additionally, since the main interest was to look at the oblasts level, the two cities of state significance were left out.

c) As a final note, Kyiv oblast was included into analysis as it is comparable with other oblasts both in terms of values of variables and interbudgetary relations.

#### 4. <u>All variables were analysed in real terms</u>

a) Nominal values of all macroeconomic variables such as gross regional product, interbudgetary transfers and different investment types were expressed in constant prices of 2007. Data transformation was carried out with GRP deflators for each oblast, which in turn were computed from the annual volume indexes of GRP provided in regional yearbooks published by the SSSU.

b) Regional values of average monthly salaries were also expressed in constant 2007 prices. In this case, recalculation was made with the help of regional consumer price indexes that are also published in the Statistical Yearbooks.

#### 5. <u>All variables were analysed in per capita terms</u>

Since oblasts have unequal distribution of population, it proves more adequate to analyse data with consideration of this fact and calculating everything expressed in per capita. Furthermore, data in Appendix A indicates that dynamics of population growth (actually, decline for this period) is very similar throughout Ukraine within the period of interest. This implies that per capita values reflect real changes in macroeconomic indicators and do not suffer from biases that can be caused by migration.

### 6. <u>Data was analysed at the level of oblasts, but was grouped into two broad categories</u> of "rich" and "poor" regions

In order to perform the analysis of the specifics of interbudgetary transfers', the whole population of oblasts was used. To simplify the presentation of results, all oblasts were grouped into two categories: "poor" and "rich". The process of this division was the following. Firstly, oblasts were sorted by real average GRP per capita for the period of 2004-2011 (see Appendix B). Nine oblasts that performed better than the country average (or slightly below as in the case of Mykolayiv oblast) were grouped together as the "rich" region; the other set of sixteen oblasts went into the "poor" region. The division of both is shown in Appendix C and on the Figure C1. This distinction will be used in Chapter 5 for the construction and analysis of the econometric models<sup>3</sup>.

#### 7. <u>The following economic indicators were analysed:</u>

Gross regional product (GRP), average monthly salaries, interbudgetary transfers, public investments in fixed capital, banking investments in fixed capital. Detailed information is provided in Appendix D.

#### 4.2. General tendencies in the main regional economic indicators

The following part is dedicated to data analysis starting with descriptive statistics for each described variable and for combinations between them. Based on this analysis, hypotheses will be formulated.

<sup>&</sup>lt;sup>3</sup>Interestingly, the oblasts from the rich region are located in the East and South (except, of course, Kyiv oblast). As it was stated in the description of the regional economies specifics, it does make sense, since these oblasts are either key industrial producers that are located on territory rich in natural resources or have an access to key transport routes in the form of especially Black sea.

#### 4.2.1. Interbudgetary transfers

It is obvious that the poor region receives more transfers per capita than the rich one does. The reason was provided in the previous chapter: the poorer an oblast is, the lower the revenues it collects and the more transfers it thus requires for the financing of social programmes and other planned expenditures. Data for real interbudgetary transfers per capita that are paid to the budget of each oblast from the State Budget throughout 2004-2011 period are presented in Appendix E (Table E.1). The dynamics of the transfers for the poor and rich regions can be found in Appendix F (Figure F.1).

In 2007, the overall volume of transfers increased tremendously. The main cause of this was a decent macroeconomic performance of Ukraine throughout 2006 and 2007. The country's real GDP grew by 8.0% and 8.5% respectively, therefore the fiscal revenues were high and the budget could afford additional transfers (State Statistical Services of Ukraine n.d.). However, the situation changed right after the domestic financial crisis of late 2008, which coincided with the Great Recession. The Ukrainian currency, hryvnia (UAH), was devalued by 60% with respect to the US dollar. This led to a panic in the banking sector and triggered both liquidity and credit crises. At the same time, the situation in the global steel markets worsened and hit the largest exporting sector of Ukraine's economy – metallurgy. As a consequence, the country's real GDP fell by 12.0%, and the deficit of the state budget increased leading to a substantial cut in transfers (State Statistical Services of Ukraine n.d.)<sup>4</sup>.

It is of particular interest to see if the imbalances between regions in terms of received transfer disappear over time. Table E.1.contains values of descriptive statistics such as mean, standard deviation, coefficient of variation and maximum to minimum ratio.

<sup>&</sup>lt;sup>4</sup>Later, the impact of the financial crisis on other variables will be discussed.

Both the coefficient of variation and the maximum to minimum ratio measure the level of dispersion in the dataset. In case of interbudgetary transfers, they both demonstrate mixed dynamics and do not decrease over time in terms of magnitude. This implies that there is no convergence between oblasts in terms of size of transfers received.

The graph below (Figure 3) shows a scatter plot where all oblasts are marked for every year in two dimensions: GRP and transfers<sup>5</sup>. This plot suggests that oblasts with smaller GRP generally receive larger transfers. One can conclude that poorer oblasts get larger grants and subventions from the State Budget; further, such situation is stable over time<sup>6</sup>. The next step is to determine whether poor oblasts benefit from this special treatment.



Figure 3. Dependence between transfers and GRP

Source: State Statistical Services and author's calculations

(State Statistical Services of Ukraine n.d.)

 $<sup>^{5}</sup>$ Both variables were logged. The reason for this decision will be described in the following chapter.

<sup>&</sup>lt;sup>6</sup>The reasons for taking the logs in the graph will be justified in the following chapter.

#### 4.2.2. Monthly salary

For a developing country like Ukraine the main indicator of citizens' well-being is the average value of wages. For the eight years since 2004 the average real monthly salary in Ukraine increased almost twofold – from 778 to 1513 UAH. It is worthwhile to mention that there has been only one period when real monthly salary has actually decreased: this occurred in 2009, the crisis year. More detailed information can be found in Appendix E (Table E.2). The information on growth in poor and rich regions is shown in Appendix F (Figure F.2).

Salaries in rich oblasts are higher than in poor ones, as expected; however, disparities seem to gradually diminish over time. For eight years since 2004 salaries in the rich region have grown by 84.3%, which is lower than the respective growth rate of 109.6% in the poor region. This is additionally confirmed by data presented in Table E.2.: the variation coefficient decreased from 0.17 to 0.11, while the maximum to minimum ratio exhibited the same dynamics. As poor oblasts have less privately owned enterprises (State Statistical Services of Ukraine n.d.), and the majority of active population is employed in the public sector (schools, hospitals, governmental institutions), where salaries are paid from the oblast budget, it seems reasonable to suggest that interbudgetary transfers, over time and on average, indeed push salaries up in these oblasts.

The next section of this chapter confirms that gross regional product is a much more dispersed variable than salaries. This can be seen as another confirmation of the fact that salaries in Ukraine are determined mainly by budgetary decisions rather than by level of productivity. Of course, exact testing of a hypothesis that transfers cause faster salary growth in the poor region should be done with econometric tools, but this problem lies out of scope of this research.

It is important to note that the observed convergence between salaries in rich and poor oblasts may not be true. Ukraine has a large shadow sector of economy and it is a common tradition to pay part of the salary in cash in order to avoid taxes. This practice is popular in privately owned companies, but rare in the public sector. Therefore, the actual difference between salaries in the two regions may be higher.

#### 4.2.3. Gross regional product

Analysis of general trends in GRP per capita is performed in the same fashion as it was done for transfers and salaries. Figure F.3 and Table B1 of the Appendices show the dynamics of this indicator for rich and poor regions for the 8 years since 2004, including descriptive statistics. Like salaries, real GRP shows a stable growth throughout the whole period of observations except for the year 2009. On the other hand, GRP is distributed less equally among the regions. The gap between rich and poor regions had only been closing for a brief period in 2008 and 2009 when the most developed oblasts suffered from the crisis and unfavourable economic conditions in global markets. Since then imbalances have started to increase again.



Figure 4. Variation coefficients for main indicators

Source: State Statistical Services and author's calculations

Figure 4. characterises the levels of variation (standard deviation over the mean) for transfers, salaries and GRP. It is clear that salaries have the smallest dispersion of the three variables; moreover, it tends to decrease over time. GRP exhibits the highest but relatively stable dispersion. Variation of interbudgetary transfers is difficult to predict because of the numerous factors that affect fiscal decisions, due to factors described in an earlier chapter of this present paper.

The left half of Figure 5 represents a scatter plot, which shows the dependence between transfers and GRP (both variables are logged) for every single observation in the data set. The fitted trend line has a negative slope, suggesting once again an inverse relationship between the wealth of a region and the amount of transfers it receives.

The right half of Figure 5 separates the scatter plot into two parts where red dots correspond to poor oblasts, and blue dots to the rich ones. It occurs that the nature of the relationship between GRP and transfers changes between the two groups (poor and rich). Not only their respective trend lines have different slopes, but the relationship between transfers and GRP is negative for the rich region and positive for the poor one. This finding supports the above mentioned idea of grouping the oblasts by their wealth for the purposes of econometric analysis. Such distinction may help to incorporate regional differences into the model and capture additional tendencies.



Figure 5. Grouping of the relation: transfers versus GRP

Source: State Statistical Services and author's calculations

Correlation coefficients between annual growth rate of GRP and annual growth rate of transfers were calculated per each region in order to check if there is any sort of comovement between these two variables. Their values are shown in Table 3.

Correlation coefficients	Annual transfers growth, rich region	Annual transfers growth, poor region
Annual GRP growth, rich region	0.2338	
Annual GRP growth, poor region		0.1600

Table 3. Correlations of transfers and GRP growth of poor and rich regions

#### Source: author's calculations

Both correlations are insignificantly different from zero even at the 10% level of significance, which means that there is no linear relationship between budgetary aid and the economic performance of the regions. Given this fact together with the absence of evidence for economic convergence between rich and poor regions, it is reasonable to suppose that interbudgetary transfers received by the poor region do not have a stimulating effect on production growth. The reasons for this can be quite diverse. For example, interbudgetary aid can have an adverse effect on the behaviour of the regions, if they simply rely on transfers for policymaking purposes instead of providing structural reforms and stimulating higher production. Other reasons may include non-transparency of the transfer distribution process, high level of bureaucracy and corruption<sup>7</sup>, suggesting that transfers might not be allocated and utilized adequately<sup>8</sup>.

As the final remark, it should be noted again that transfers are not designed to stimulate production. Their primary purpose is to decrease the income disparities and provide

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<sup>&</sup>lt;sup>7</sup>According to Transparency International's Corruption Perception Index, in 2012 Ukraine was placed 144<sup>th</sup> out of 174 countries (174<sup>th</sup> being the most corrupt).

 $<sup>^{8}</sup>$  It is actually possible that the positive effect of interbudgetary transfers on productivity growth exists, but the difference between regions does not decrease because of other factors – for example, transfers to the rich region may induce even higher GRP growth.

population across the country with a comparable amount and quality of public goods and services. Indirect positive effect, stemming from such transfers (for example, in the form of improved infrastructure or newly created jobs in the public sector), can only have a delayed influence on GRP that will likely take some years to manifest.

Based on this discussion, two hypotheses are formulated. The first one suggests that in a given year oblasts with higher GRP receive lower amount of transfers, ceteris paribus. The second hypothesis is more complex: increase in the size of the received transfers does not have a significantly positive effect on the production growth. Both these hypotheses will be tested in the next chapter.

#### 4.2.4. Investments

Beside transfers, the Ukrainian government also makes investments in fixed capital of different enterprises. The reason for this is the presence of a large public sector in the economy. The state effectively owns oil and gas companies, the majority of road construction firms, nationwide telecom and postal services operators, not to mention numerous institutions that provide social services to the population. For the sake of comparison, banking loans in fixed capital are also considered alongside public investments.

Appendices G and H contain detailed data and show the respective distribution of public and banking investments in fixed capital for rich and poor regions.

Some common features of public and banking investments can be observed from the graphs (Appendix H, Figure H.1-2.). Both types of investments vary quite substantially in terms of size between oblasts – this fact is confirmed by large values of the variation coefficient. Both the public and the private sector were hit hard by the financial crisis of 2008 – banks postponed lending and the government had to cut extra spending. Consequently, extremely low levels of investments were observed in 2009 and 2010.

One important distinctive feature has to be pointed out. For each of the eight years between 2004 and 2011: banking investments to the rich region were higher than to the poor region. This is not the case for public investments (see Appendix H, Graph H 2). In 2009 and 2010 the poor region received more public investments per capita than the rich one. This could suggest that in difficult times, when banks are unwilling to lend financial resources to the distressed regions, the government can take this burden on its shoulders and substitute private institutions.

Figure 6 shows a scatter plot with the dependence between public investments and GRP (similar scatter plot was analysed above for transfers). The left part of the plot demonstrates that the linear approximation of this relationship is upward sloping. However, the situation changes when there is a division into poor and rich regions. On the one hand, poor oblasts (red dots) exhibit a similar positive trend. On the other hand, rich oblasts (blue dots) show a negative relationship. This somewhat surprising fact may be explained with the following considerations. The richest oblasts have less investments opportunities since they are highly developed and operate closer to their full potential. Hence, the investments per capita for such oblasts may be smaller than for the less developed regions with more unrealised potential. Regardless of explanation, the observed differences between rich and poor regions once again support the idea of forming two groups based on the economic development level of oblasts.



Figure 6. Grouping of the relation: public investments versus GRP

Source: author's calculations

Table 4 contains correlation coefficients between year-to-year levels of GRP growth and changes in the different types of investments. Values of coefficients for the poor region are higher and are both significant at the 5% level. Therefore, it is reasonable to suggest the existence of positive linear dependence between annual increase in investments and economic growth in the poor region.

 Table 4.Correlations of public and banking investments and GRP growth of poor and rich regions.

	Annual public	Annual public	Annual banking	Annual banking
Correlation	investments	investments	investments	investments
coefficients	growth,	growth,	growth,	growth,
	rich region	poor region	rich region	poor region
Annual GRP growth,	0.6435		0 6084	
rich region	0.0433		0.0004	
Annual GRP growth,		0.6802		0 7331
poor region		0.0002		0.7551

Source: author's calculations

Based on Figure 6 and Table 4, two hypotheses with respect to investments can be formulated, in similar fashion to the section above. Firstly, it will be tested whether higher regional GRP has a positive influence on the amount of public investments received. The second hypothesis is that an increase in public investments generates a GRP growth in the poor region. If the latter hypothesis is confirmed, it can have important implications for state policies from the perspective of regional economics.

#### 5. MODELS DESCRIPTION AND ESTIMATIONS RESULTS

#### 5.1. Description of models for transfers-related hypotheses

Following the previous discussion on regional specifics and data description, the paper will continue with regression analysis. This chapter will present the specifications of two distinct model types, followed by the presentation and evaluation of results.

In the previous chapter two hypotheses were formulated. The first one states that in a given year, there is a negative association between a region's GRP and amount of interbudgetary transfers received. The analysis is conducted for each year of the available period (2004-2011). Therefore, as a first step, cross-section analysis was made using the Ordinary Least Squares (OLS) method.

Since the oblasts are quite different in size and population, GRP was taken per capita in constant 2007 prices; the same technique was employed in case of total transfers as well. In order to ease interpretation, estimation was carried out in log format. There are two more reasons for this choice. The first one is connected with the fact that using logs may reduce inherent noise and make data in levels smoother (as in case of transfers versus GRP in Figure 7) and may help to eliminate outliers (case of public investments versus GRP in Figure 8).





Source: State Statistical Services and author's calculations

Figure 8. Public investments versus GRP, logs versus levels



Source: author's calculations

Additionally, the choice for using the logged values is also supported by the fact that it is easier to understand the percentage change of variables than be engaged in hryvnia calculations.

The first point of interest is the effect of gross regional product (GRP) on transfers. Since the decision on the exact amount of transfers for the current year is made at the end of the previous year, there is a need to take lagged GRP. The following equation is an estimator of this relationship:

$$\log(transfers_{i,t}) = \beta_0 + \beta_1 \log(GRP_{i,(t-1)}) + \varepsilon_{i,t}$$
(1)

where i – oblast index;

t – year index, it takes values from 2005 to 2011 and is fixed for each regression; log(*transfers*<sub>*i*,*t*</sub>) – logarithm of total interbudgetary transfers to the region i in the year t; log(*GRP*<sub>*i*,(*t*-1)</sub>) – logarithm of gross regional product in the region i for the year (t-1).

Such a simple model can show the possible link between the dependent and independent variables and, in particular, analyse the effect of the dual crisis that hit the

Ukrainian economy at the end of 2008 and continued throughout 2009. Recovery already started in 2011, therefore this year is equally interesting to look at. At the same time, many other possible influencing factors were not controlled for, there is a quite small amount of observations (25) and a very simple OLS estimation technique was used; therefore this model is not very ambitious, but it can still give us a good first approximation of the possible relationship.

The second hypothesis suggests the following: growth in transfers to the poor region has no positive influence on the growth of GRP in that region. The analysis is conducted for the period of 2004-2011 with the help of pooled OLS. The reason for such choice of method is obvious. It is important to confirm that there exists variation in data in both dimensions – across the regions and across the years. Based on the figures presented in Appendix E, it is visible that cross-regional variation in transfers exists; therefore, only time variation remains uncertain. If there is no variation through time, then only 25 observations can be used for a correct model, not 200 (25 oblasts for 8 years). Because of this and all other possible omissions, only the years were used as the control variable, not the oblasts, with 2005 as a base year.

All variables in the model were taken with the first differences. There are two reasons for this: econometrical and logical. In formal interpretation, the differences were taken to alleviate the endogeneity that can quite possibly be present in such model. Additionally, taking the differences also helps to control for region specifics. The logical reason is the following: since the model should describe the influence of transfers on GRP growth, not just GRP at an absolute level, the differences of the logged values were taken.

The interest of the research is to see if there is some distinctive difference between the rich region and poor one when it comes to economic response to interbudgetary transfers.

The basic model regression is thus the following:

$$\Delta \log(GRP_{i,t}) = \beta_0 + \beta_1 \cdot \Delta \log(transfers_{i,t}) + \delta_1 \cdot Dum_{Poor_{i,t}} \cdot \Delta \log(transfers_{i,t}) + \delta_2 \cdot Dum_{Poor_{i,t}} + years_i + \varepsilon_{i,t}$$
(2)

where i – oblast index;

t – year index;

 $\Delta \log(GRP_{i,t})$  – change of the logarithm of GRP of the region *i* in the year *t*;

 $\Delta \log(transfers_{i,t})$  – change of the logarithm of transfers to the region *i* in the year *t*;

 $Dum_{Poor_{i,t}} = \begin{cases} 1, & \text{if oblast belongs to the poor region;} \\ 0, & \text{if oblast belongs to the rich region.} \end{cases}$ 

 $years_i$  – control dummies for each year;

 $\varepsilon_{i,t}$  – error term.

The interaction term shows the additional effect that transfers have in the poor region in comparison with the rich one. The coefficient of the dummy 'poor' ( $\delta_2$ ) captures the change in GRP attributed to the sheer fact that the oblast belongs to the poor region.

#### 5.2. Results of estimations for transfers models

The results for all years can be found in Appendix I (Table I.1)<sup>9</sup>.

The estimation of this model is presented in Table 5.

<sup>&</sup>lt;sup>9</sup>For all the years the GRP was consistently significantly negative with the next year's transfers. The volatility of the coefficient  $\beta_1$  was not very high. In 2005 and 2006 it was -0.553 and -0.488 respectively. In 2007 there was a surprising drop in the strength of this negative relationship. After the crisis had started, by 2011, it was -0.389, meaning that in the year of growth (2007) the transfers were given to both poor and rich regions. After such an expansion, the fiscal aid weakened and remained at similar trend since then.

	t=2007	t=2011
VARIABLES	$log(transfers_t)$	$log(transfers_t)$
$log(GRP_{t-1})$	-0.282***	-0.389***
	(0.0580)	(0.0915)
Constant	9.319***	10.01***
	(0.534)	(0.850)
Observations	25	25
R-squared	0.508	0.494
n	- 1	

**Table 5.** OLS regression estimate of the first model (transfers)

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

The left column shows the results obtained for 2007 and the right one for 2011. For 2007, a one percentage point increase in GRP level in the previous year can be associated with a 0.282 percentage point drop in transfers, ceteris paribus. For 2011 the respective drop in transfers is 0.389 percentage point, which is higher than in 2007. The statistical significance level is 1% for both time points. The amount of observations is the same for both regressions and corresponds to the number of oblasts in Ukraine.  $R^2$  is quite high and almost the same for both regressions. This means that the variation of GRP explains quite well the variation in transfers. As it was visible from the scatter plots, the relationship of GRP and total transfers showed a negative slope. Based on these results, oblasts with smaller GRP receive more transfers. This result does correspond to the initial assumption of negative dependence. This is the so-called 'Robin Hood effect' of transfers that means that more developed regions are 'feeding' less developed ones, as the latter need more financial aid and support to catch up with the average level of development, to sustain the social welfare system and to be able to increase production. Another interesting result of this model is that the negative dependence between the size of transfers and GRP became stronger post-crisis.

The purpose of the second model is to check the effect of change in transfers on change in GRP in the poor and rich regions throughout 2004-2011. The first equation

specified follows the logic of the cross-sectional regressions (equation (1)) in that it seeks to establish a relationship between transfers and output. However, as first differences are taken, it formulates the effect of the change in transfers on the change in GRP, controlling for the changes connected with time (Table 6, column (1)). The estimation shows that the change in transfers does not affect the change in GRP. The second estimation expands this model with the inclusion of regional specifics (Table 6, column (2)).

In this regression it can be seen that the effect of transfers is not significant in the rich region, but is significantly negative for the poor area in case of the extended model. Variation of log(GRP) over time is mostly captured by the change in the interaction term of the dummy variable and the transfer rate, while controlling for time-specific factors.

Although the significance level is only 10% in case of the interaction term, it does correspond with our initial assumption of a negative effect of transfers in poor regions. One possible explanation for such association could be the fact that the poor oblasts rely on the transfers and this creates moral hazard, since there is less incentive to improve the production rather than filling the budget with the transfers.

	(1)	(2)
VARIABLES	$\Delta \log(GRP)$	$\Delta \log(GRP)$
$\Delta \log(transfers)$	0.0107	0.0159
	(0.0268)	(0.0236)
$\Delta(poor \cdot \log(transfers))$		-0.0272*
		(0.0162)
poor		0.00629
		(0.00592)
years	YES	YES
Constant	0.0320***	0.0288***
	(0.00607)	(0.00714)
Observations	175	175
R-squared	0.775	0.780
 Pobust standar	d errors in par	nthasas

**Table 6.** OLS regression estimate of the second model (transfers)

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### 5.3. Models description for investments-related hypothesis.

#### Results of estimation.

Another part of research is dedicated to an alternative way of influencing regional economic performance: public investments. First, cross-section analysis was conducted for all available years with the special interest towards the same two time points as specified for the estimation of the transfer-GRP relationship: before (2007) and after the crisis (2011). The purpose of this analysis is to test the hypothesis stated in the previous chapter: higher regional GRP has a positive influence on the amount of public investments received. The results for all the regressions are presented in Appendix I (Table I.2)<sup>10</sup>. The results are shown in Table 7.

	t=2007	t=2011
VARIABLES	log(public_inv <sub>t</sub> )	log(public_inv <sub>t</sub> )
$log(GRP_{t-1})$	0.457**	1.011***
	(0.200)	(0.343)
Constant	1.426	-4.370
	(1.883)	(3.164)
Observations	25	25
R-squared	0.159	0.268
	Robust standard errors in	parentheses
	*** p<0.01, ** p<0.05	5, * p<0.1

**Table 7.** OLS regression estimate of the first model (public investments)

Simple OLS regression shows that for 2007 a one percentage point increase in GRP level of the previous year increases public investment by an average of 0.457 percentage points, ceteris paribus. For 2011 the respective increase was 1.011 percentage points, which is higher than in 2007.  $R^2$  for both years is at a similar level, with a larger value for 2011. Both regressions show high significance for GRP.

<sup>&</sup>lt;sup>10</sup>Interestingly, only 2007 and 2011 showed a significant result. All other regression results showed insignificantly different from zero dependence between GRP and next year investments. Therefore, the hypothesis of the positive relationship is proved only for the presented year of pre- and post-crisis.

Another way to analyse and see what is the connection between public investment and GRP is to look at its variation across time.

The model is built around the same principles as the second model for transfers (equation (2)). The general regression equation remains the same as it was with transfers and transfers with regional specification, except these variables are replaced by public investments in each case.

$$\Delta \ln(GRP_{i,t}) = \beta_0 + \beta_1 \cdot \Delta \ln(investments_{i,t}) + \delta_1 \cdot Dum_{Poor_{i,t}} \cdot \Delta \ln(investments_{i,t}) + \delta_2 \cdot Dum_{Poor_{i,t}} + years_r + \varepsilon_{i,t}$$
(3)

Results of the estimation can be found in the Table 8 below. Column (1) contains results of a simplified version of equation (3) that does not take regional grouping into account, while Column (2) represents the estimated coefficients value for equation (3).

The influence of investment growth on economic development is insignificant when regional division is not accounted for (see column (1)). On the contrary, when regional grouping is included in the model, it produces significant results (column (2)). The growth in public investments is associated with a significantly positive (though minimal) change in GRP for the rich oblasts, and with a significantly negative one in case of the poor region. Moreover, the interaction term is significant at the 1% significance level, whereas the rate of investment growth is significant at the 10% significance level.

(1)	(2)	(3)
$\Delta \log(GRP)$	$\Delta \log(GRP)$	$\Delta \log(GRP)$
-0.00431	0.0184*	0.0184*
(0.00728)	(0.0108)	(0.0109)
	-0.0367***	-0.0387***
	(0.0112)	(0.0113)
		0.00878
		(0.00753)
		-0.000652
		(0.00858)
	0.00172	0.00110
	(0.00535)	(0.00539)
YES	YES	YES
0.0297***	0.0280***	0.0231***
(0.00679)	(0.00793)	(0.00825)
175	175	175
0.776	0.791	0.795
	<ul> <li>(1)</li> <li>Δlog(GRP)</li> <li>-0.00431</li> <li>(0.00728)</li> <li>YES</li> <li>0.0297***</li> <li>(0.00679)</li> <li>175</li> <li>0.776</li> </ul>	$\begin{array}{ccccc} (1) & (2) \\ \Delta \log(GRP) & \Delta \log(GRP) \\ \hline & \Delta \log(GRP) \\ \hline & & \Delta \log(GRP) \\ \hline & & & & \\ (0.00728) & (0.0184* \\ & & & & \\ (0.0108) \\ \hline & & & & \\ -0.0367*** \\ & & & & \\ (0.0112) \\ \hline & & & & \\ \hline & & & & \\ (0.00172 \\ & & & & \\ (0.00172 \\ & & & & \\ (0.00172 \\ & & & \\ (0.00793) \\ \hline \end{array} \right)$

**Table 8.** OLS regression estimate of the first model (public investments)

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

As a robustness check, another equation (Table 8, Column (3)) was specified with a control for years and investments that are made by banks. It showed essentially the same result with largely the same coefficients for the public investment variables as the more basic models formulated above.

Interestingly, the hypothesis of the positive effect that public investments exert on GRP growth has to be rejected. It was expected that the growth of public investments in poor oblasts would have some positive effect on GRP. However, results of the regression analysis show that it is not the case. The following intuition can potentially present a reasonable explanation for the existence of this relationship. The estimated value of the interaction term indicates that the growth in the poor region is not that fast as it is in the rich one, when it comes to return for one invested UAH. Indeed, because the poor region has more

underdeveloped and badly organised infrastructure – both physical and human –, the redistribution of funds to its targets is not necessarily a successful process.

As a final remark, such relationship between public investments and regional development is not new in the literature. For instance, Jose Gonzalez-Paramo et al. (2003) claim that according to their result, public investment has not contributed to regional growth in case of Spanish regions over 1965-1977 periods. Paul Evans et al. (1994) analysed panel data for the 48 U.S. states in each year between 1970 and 1986 and found a strong evidence of typically statistically significant negative productivity for government capital<sup>11</sup>.

<sup>&</sup>lt;sup>11</sup>According to their division of the spheres where the government capital goes for, only the education gave a significantly positive effect on productivity

#### 6. CONCLUSION

#### 6.1. Summary of results. Limitations.

The aim of this paper was to investigate the usefulness of interbudgetary transfers and, alternatively, public investments as the tools of regional convergence between poor and rich oblasts in Ukraine. For a big country like Ukraine the question of regional disparities in terms of economic performance is not a new story to tell. Historically, the East of the country has been richer and more productive, whereas the Western part of Ukraine had to rely on tourism and light manufacture. Therefore, the complicated system of the interbudgetary aid had been introduced in order to mitigate the effects of disparities and balance budgets of oblasts, making the realisation of social programmes possible.

For analytical purposes, data was collected for 25 oblasts and covered 8 years from 2004 till 2011, with carefully selected variables and specifications to best answer the underlying research questions. For the econometric estimations, OLS and pooled OLS methods were used.

The simplest hypothesis claimed that poor oblasts receive more transfers in real per capita terms than their wealthier counterparts. This proposition was accepted for each year of the observed period. It follows that some sort of "Robin Hood effect" is present in Ukraine: funds redistribution is done in such a way that, basically, the rich oblasts are 'feeding' the poor ones. This finding also confirms one of the principles of fiscal policy.

On the other hand, output data indicates that an increase in the size of the received transfers did not have a significantly positive effect on production growth. This analysis was done with the help of pooled OLS method. A very low, but still significant negative effect of transfers on economic growth was observed for the poor region. This result suggests that interbudgetary transfers do not promote convergence between the rich and poor regions. Intuitively, poor oblasts tend to rely on the governmental financing and consequently do not have enough incentives to stimulate higher production. In the end, as it was also stated in the paper of Kizim (2010), the main purpose of transfers is not to increase regional productivity, but rather make the implementation of social programmes possible.

Two hypotheses were also stated for public investments as a key alternative to transfers. The first one proposed that higher regional GRP has a positive influence on the amount of public investments received by the region in the following year. This hypothesis was supported by cross-sectional analysis for two years only – pre-crisis 2007 and post-crisis 2011. For other years results were not significant.

The other hypothesis suggested that the increase in public investments generates GRP growth in the poor region. Again, analysis was made with the help of pooled OLS. This hypothesis was rejected. The result showed a slightly significant positive effect of public investment in the rich region (at 10% significance level only), whereas the poor region exhibited slower growth in response to the increase in investments. Interestingly, when regional division is not accounted for, the influence of investment growth on economic development was found to be insignificant. The fact that poorer oblasts have worse infrastructure and the returns from the public investment take years if not decades to materialise can explain this finding. Further, the ambiguous relationship between public investments and regional development has existing evidence in literature, pointing at a statistically significant negative productivity for government capital.

As any other research, this one comes with its own pitfalls; therefore some recommendations for the expansion of the analysis should be made. There is a huge amount of literature on regional economic growth in different countries and its dependence on government's aid of different forms, including transfers and public investments. There are some adjacent directions that could possibly contribute to this question. Therefore, several lines for the future researches can be pointed out.

Firstly, a more precise policy recommendation for the distribution of public investments would include a higher focus on practical targets and productivity enhancement. Secondly, the consideration of some other factors that can have a stronger effect on the regional production, like, human capital, (as it was also tackled in the paper of Jose Gonzalez-Paramo et al. (2003)) could deepen understanding.

The circulation of money in the economy is a widely acknowledged fact. Funds that come to the poorer regions in form of transfers end up in the accounts of regional banks. There are reasons to suggest that banks simply redistribute funds back in form of loans to the richer regions with higher business activity and more investment options (Rodriguez-Fuentes 1996). Therefore, the effectiveness of transfer-based regional policy is doubtful. The lack of possibility to trace the flows of money that go to the region, the flows that stay in form of investment and the rest, that are transmitted by the banking system to the other regions, makes such research more difficult, but, nonetheless, quite interesting. In general, the lack of theoretical researches made for Ukraine can be an incentive for further analysis.

Possible problems in the econometric part of the research are also worth mentioning. Among the most important ones there are: omitted variable bias (could happen due to the fact that there are some other variables that have an influence on GRP growth, but are not controlled for by either time or region dummies); measurement errors (some problem with data collection, it is possible that the statistical bureau is either upward or downward biased); sample selection (since the years taken for the research could be different, my results are only valid for the 2004-2011 period); non-linear relation between the explored variables; heteroskedasticity. Baring these limitations in mind, the main purpose of this paper was to catch and highlight possible trends in the explored relations, which aim it could fully reach.

#### 6.2. Policy conclusions

Even though the Ukrainian government is bound by the constitution to offer all citizens and all regions equal opportunity and access to state services, this research clearly pointed out that fiscal transfers and public investment are not yet efficiently aligned to tackle the related issues. As a necessary first step, the state should implement the principle of law: convergence of the economic performances of poor and rich regions should be supported by making the wealth redistribution process more accurate and transparent. There is a clear need for a more stable and well-formulated calculation method that would eliminate the possible interventions from various interest groups. Corruption should be limited or eliminated from the process by more careful and specific targeting of transfer payments and better performance indicators and audit at various levels of fiscal decision-making.

As all the findings were obtained for current levels of interbudgetary transfers, it is logical to assume that higher amounts of transfers and public investments would give a proper return. Given that the state budget is burdened with quite substantial deficit problems (currently the state budget deficit equals to 3.2% of country's GDP (Budget of Ukraine, 2013)), the only possible solution at this stage would be to work on the quality of the revenue allocation and use, rather than on its quantity.

Another concern is that there should be a strict control over the implementation of the interbudgetary transfers. Some of the transfers are not specific enough in terms of their allocation, which can be the reason of redirecting budgetary resources to some other mission due to political decisions.

The process of decentralisation of the budgetary system is a tough and complex challenge, but it is very much needed. The reason for this is that the government cannot account for all the specifics of the needs of each and every oblast. This fact leads to a nonrational redistribution of wealth in form of both transfers and public investments. Therefore the decentralisation of the budget (so-called fiscal federalism) is a necessary step towards higher efficiency of money usage.

There is a necessity to develop the business infrastructure in the poor region in order to promote convergence between the rich and poor regions and to earn positive returns on public investments. The businesses would benefit from a provision of good services (electricity, water, heating), and simultaneous removal of obstacles such as excessive paperwork or annoying bureaucracy.

Since Ukraine is a quite young state, there is a chance that the critical mass of investments has not yet been reached, which means that more time is needed in order for capital to start earning returns. According to Bivens (2012), public investments create new jobs in the short run and lead to growth in the long run.

While perhaps this paper could not present encouraging evidence form past budgetary regulation and decision-making in Ukraine, analysis based on medium-term data, in a period affected by global and domestic crises, should not be indicative of theoretical potential. With refocused and prudentially implemented measures in interbudgetary transfers and public investment the government still may very well help to put the nation on course towards regional convergence.

### 7. APPENDICES

### Appendix A. Population.

### Table A.1. Population of the Ukrainian regions, thousands

Oblasts	2004	2005	2006	2007	2008	2009	2010	2011	Growth
0010313	2004	2005	2000	2007	2000	2005	2010	2011	2004-2011
Dnipropetrovsk	3 489	3 462	3 435	3 411	3 386	3 365	3 346	3 328	-4,6%
Donetsk	4 696	4 647	4 602	4 560	4 520	4 484	4 450	4 418	-5,9%
Zaporizhzhya	1 885	1 869	1 854	1 840	1 827	1 817	1 806	1 797	-4,7%
Kyiv	1 786	1 771	1 757	1 744	1 733	1 725	1 720	1 719	-3,8%
Luhansk	2 456	2 425	2 396	2 369	2 344	2 322	2 301	2 282	-7,1%
Mykolayiv	1 235	1 225	1 216	1 208	1 200	1 193	1 186	1 181	-4,4%
Odesa	2 423	2 409	2 399	2 395	2 393	2 392	2 390	2 388	-1,4%
Poltava	1 582	1 564	1 548	1 533	1 518	1 506	1 494	1 482	-6,3%
Kharkiv	2 858	2 839	2 821	2 804	2 789	2 776	2 762	2 749	-3,8%
AR Crimea	2 000	1 989	1 980	1974	1 969	1 966	1 964	1963	-1,8%
Vinnytsya	1 728	1 711	1 694	1 679	1 666	1 655	1 646	1 638	-5,2%
Volyn	1 047	1 043	1 039	1 037	1 036	1 0 3 6	1 037	1 038	-0,8%
Zhytomyr	1 353	1 338	1 324	1 311	1 300	1 290	1 282	1 276	-5,7%
Zakarpattya	1 250	1 247	1 245	1 243	1 243	1 244	1 246	1 249	-0,1%
Ivano-Frankivsk	1 396	1 391	1 387	1 384	1 382	1 381	1 380	1 380	-1,1%
Kirovohrad	1 092	1 076	1060	1 046	1 033	1 0 2 2	1 014	1 006	-7,9%
Lviv	2 593	2 583	2 573	2 564	2 556	2 551	2 547	2 543	-1,9%
Rivne	1 162	1 159	1 155	1 153	1 152	1 151	1 152	1 153	-0,8%
Sumy	1 253	1 235	1 219	1 204	1 190	1 178	1 167	1 157	-7,6%
Ternopil	1 123	1 116	1 109	1 102	1 096	1 0 9 1	1 086	1 082	-3,6%
Kherson	1 144	1 132	1 122	1 112	1 103	1 096	1 091	1 086	-5,1%
Khmelnytskiy	1 395	1 381	1 367	1 356	1 346	1 338	1 330	1 323	-5,1%
Cherkasy	1 365	1 349	1 335	1 322	1 310	1 300	1 290	1 281	-6,1%
Chernivtsi	913	910	907	905	904	904	904	905	-0,9%
Chernihiv	1 197	1 178	1 160	1 144	1 129	1 115	1 104	1 093	-8,7%
Country	44 799	44 424	44 083	43 782	43 505	43 279	43 079	42 900	-4,2%
The city of Kyiv	2 653	2 680	2 706	2 729	2 753	2 775	2 792	2 807	5,8%

Source: State Statistical Services and author's calculations

#### Appendix B. Real gross regional product per capita.

Oblasts	2004	2005	2006	2007	2008	2009	2010	2011	Average 2004-2011	Growth 2004-2011								
Dnipropetrovsk	16 715	18 078	19 677	20 868	20 453	17 185	18 284	19 006	18 783	13,7%								
Donetsk	17 827	17 493	19 133	20 197	19 784	16 274	18 218	20 441	18 671	14,7%								
Poltava	15 787	15 840	17 316	18 500	17 727	15 514	17 123	17 562	16 921	11,2%								
Zaporizhzhya	14 609	15 410	16 483	18 022	18 385	14 589	15 140	15 665	16 038	7,2%								
Kharkiv	12 711	13 411	14 508	15 645	16 059	13 925	14 232	14 946	14 430	17,6%								
Kyiv	11 873	12 848	14 089	15 033	15 796	14 157	14 923	16 680	14 425	40,5%								
Odesa	12 472	12 495	12 987	13 827	15 485	13 449	13 782	14 080	13 572	12,9%								
Luhansk	11 941	12 133	12 809	13 628	13 620	11 922	12 303	13 538	12 737	13,4%								
Country average (w/o Kiev)	11 274	11 605	12 464	13 231	13 553	11 723	12 339	13 167	12 419	16,8%								
Mykolayiv	11 209	11 316	12 208	12 227	13 155	12 243	12 702	13 107	12 271	16,9%								
Cherkasy	8 315	9 000	9 607	10 331	11 978	10 322	11 011	11 798	10 295	41,9%								
Lviv	9 602	9 458	10 281	10 915	11 026	9 754	9 994	10 883	10 239	13,3%								
AR Crimea	8 630	9 024	9 670	10 574	11 301	10 264	10 623	10 916	10 125	26,5%								
Kirovohrad	8 681	9 026	9 625	9 546	10 995	9 531	10 159	11 179	9 843	28,8%								
Sumy	8 826	9 345	9 792	10 249	10 744	9 625	9 612	10 451	9 830	18,4%								
Chernivtsi	8 739	8 889	9 333	10 081	10 449	9 476	9 575	10 421	9 620	19,3%								
Ivano-Frankivsk	9 112	9 681	9 952	10 055	9 818	8 774	8 823	9 398	9 451	3,1%								
Rivne	8 433	8 638	9 260	9 695	9 656	8 358	8 920	9 320	9 035	10,5%								
Volyn	7 997	8 326	8 646	9 711	10 315	8 868	8 881	9 343	9 011	16,8%								
Vinnytsya	7 696	8 187	8 781	9 159	9 703	8 799	9 115	9 820	8 907	27,6%								
Khmelnytsky	7 858	8 247	8 677	9 100	9 158	8 349	8 394	9 113	8 612	16,0%								
Zhytomyr	7 473	7 639	7 998	8 485	8 919	7 990	9 067	9 357	8 366	25,2%								
Kherson	7 625	7 641	8 021	8 122	8 993	8 415	8 609	8 977	8 300	17,7%								
Zakarpattya	7 400	7 306	7 803	8 452	8 784	7 205	7 747	8 093	7 849	9,4%								
Ternopil	6 0 2 0	6 208	6 892	7 510	7 936	7 533	7 596	8 487	7 273	41,0%								
Chernihiv	6 301	6 419	6 790	7 369	7 779	6 891	6911	7 183	6 955	14,0%								
The city of Kyiv	36 543	38 272	41 961	49 795	51 536	41 767	42 095	42 171	43 018	15,4%								
Descriptive statistics																		
Mean	11 274	11 605	12 464	13 231	13 553	11 723	12 339	13 167										
Standard deviation	3 277	3 371	3 729	3 999	3 798	3 037	3 380	3 607										
Variation coefficient	0,29	0,29	0,30	0,30	0,28	0,26	0,27	0,27										
Max/min ratio	2,96	2,91	2,90	2,83	2,63	2,49	2,65	2,85										
5 Regional analysis																		
Bich ragion	14 5 2 2	1/ 022	16 122	17154	17224	14 746	15 692	16 740	15 005	15 3%								
Poor region	Q 1E0	Q / 01	70 T22	0/07	0 070	24740 2271	0 1 9 /	0 70/	0 105	20.1%								
	So	ource: S	tate Sta	tistical	Service	s and at	Poor region         8 158         8 421         8 953         9 482         9 970         8 874         9 184         9 794         9 105         20,1%           Source: State Statistical Services and author's calculations											

### Table B.1. Real gross regional product per capita. The Ukrainian regions, thousands

Appendix C. Composition of rich and poor regions.

Region	Oblasts included
Rich	Dnipropetrovsk, Donetsk, Zaporizhzhya, Kyiv, Luhansk,
	Mykolayiv, Odesa, Poltava, Kharkiv
Poor	AR Crimea, Vinnytsya, Volyn, Zhytomyr, Ivano-Frankivsk,
	Zakarpattya, Kirovohrad, Lviv, Rivne, Sumy, Ternopil,
	Kherson, Khmelnytsky, Cherkasy, Chernivtsi, Chernihiv.

	Table C.1.	Composition	of rich	and	poor	regions.
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### Figure C.1.



Source: Wikipedia  $\widehat{F}$ oundation, author's editing

#### Appendix D. Description of variables used in analysis.

a) Gross regional product (GRP):

Gross regional product is a general measure that characterises the level of a region's economic development. It is calculated by the SSSU that uses the production approach (also known as value added method). The SSSU publishes nominal GRP figures for all regions on its website and in the annual Statistical Publications "Regions of Ukraine". Nominal GRPs were thereafter expressed in real prices of 2007 as described in the main text of the present paper.

b) Interbudgetary transfers:

According to the State Budget of Ukraine, interbudgetary transfers are: levelling grants, extra grants and subventions to the budgets of oblasts. All of them were included for the analysis. Only the transfers to the oblast budgets were considered for the analysis.

By the end of each year, the Ukrainian Parliament approves and publishes nominal values of different types of transfers for the upcoming year. The data was collected from the Budget Codes for each respective year and then recalculated in real terms of constant prices of 2007.

c) Monthly salaries:

Regional average monthly salaries for each year are published by the SSSU on its website. Hired employees of all official organisations and business entities regardless of their form of ownership are covered, but private entrepreneurs are not included. Salaries were expressed in real constant prices of 2007 using consumer price indexes for each region.

Real disposable income is an alternative measure of population wealth, data for which is also published by the SSSU. Unfortunately, it mimics GRP to a large degree; therefore, for the purposes of this analysis, salaries were chosen.

#### d) Investments in fixed capital:

This indicator includes factual expenditures on construction and reconstruction works, purchase of machinery and equipment, renovation and repair. Total investments are grouped into the subcategories according to the source of financing.

Public investments in fixed capital cover governmental expenditures from budgets of all fiscal levels. Banking investments are loans that are given for the increase or substitution of fixed capital. All other investments were labelled as 'private'. This broad category includes foreign direct investment, own funds of individuals and enterprises, as well as other minor categories.

Nominal values were collected from the annual statistical publications of the SSSU and recalculated in real terms.

#### Appendix E. Basic statistics

	2004	2005	2006	2007	2008	2009	2010	2011	Average 2004-2011
Country average	391	368	366	777	497	498	593	572	508
The city of Kyiv	112	29	-78	-66	-909	-1 532	-978	131	-411
Descriptive statistic	S								
Mean	391	368	366	777	497	498	593	572	
Standard deviation	64	79	65	96	86	79	79	91	
Variation coefficient	0,16	0,22	0,18	0,12	0,17	0,16	0,13	0,16	
Max/min ratio	1,87	2,70	2,01	1,61	2,21	2,05	1,86	1,96	
Regional analysis									
Rich region	368	309	314	704	425	433	547	512	451
Poor region	421	435	426	864	579	573	650	643	574

#### Table E.1. Interbudgetary transfers.

Source: State Budget of Ukraine for corresponding years; author's calculations

#### Table E.2. Average monthly salary.

	2004	2005	2006	2007	2008	2009	2010	2011	Average 2004-2011	Growth 2004-2011
Country average	778	958	1 100	1 217	1 319	1 246	1 348	1 513	1 185	52,4%
The city of Kyiv	1 412	1 736	2 092	2 300	2 528	2 292	2 266	2 497	2 141	51,6%
<b>Descriptive statistics</b>										
Mean	778	958	1 100	1 217	1 319	1 246	1 348	1 513		
Standard deviation	135	149	139	154	138	122	135	168		
Variation coefficient	0,17	0,16	0,13	0,13	0,10	0,10	0,10	0,11		
Max/min ratio	1,83	1,71	1,57	1,63	1,47	1,43	1,46	1,52		
<b>Regional analysis</b>										
Rich region	910	1 107	1 236	1 365	1 457	1 368	1 479	1677	1 325	84,3%
Poor region	656	823	981	1 088	1 203	1 145	1 240	1 375	1 064	109,6%

Source: State Statistical Services and author's calculations

#### Appendix F. Variables in graphs.

Figure F.1. Transfers analysis.



Source: State Statistical Services and author's calculations





Source: State Statistical Services and author's calculations



Figure F.3. **GRP analysis.** 

Source: State Statistical Services and author's calculations

### Appendix G. Public and banking investments in tables.

	2004	2005	2006	2007	2008	2009	2010	2011	Average 2004-2011	Growth 2004-2011
Country average	378	205	248	315	279	141	139	210	239	-36,7%
The city of Kyiv	1 149	1 285	1 501	1 422	1 739	508	886	910	1 175	2,3%
Descriptive statistic	es									
Mean	378	205	248	315	279	141	139	210		
Standard deviation	338	98	101	103	150	101	79	106		
Variation coefficient	0,89	0,48	0,41	0,33	0,54	0,71	0,57	0,51		
Max/min ratio	19,18	7,17	5,03	3,65	7,76	9,96	8,55	7,59		
<b>Regional analysis</b>										
Rich region	406	240	266	354	279	128	131	258	258	-36,5%
Poor region	356	173	235	281	284	157	149	166	225	-36,8%

Table G.1. Public investments in fixed capital.

Source: State Statistical Services and author's calculations

	2004	2005	2006	2007	2008	2009	2010	2011	Average 2004-2011	Growth 2004-2011
Country average	180	322	401	543	553	265	236	378	360	100,3%
The city of Kyiv	738	1 854	2 268	2 731	2 846	1 179	825	1 384	1 728	134,2%
Descriptive statistic	es									
Mean	180	322	401	543	553	265	236	378		
Standard deviation	71	124	162	258	316	149	230	313		
Variation coefficient	0,40	0,38	0,40	0,48	0,57	0,56	0,98	0,83		
Max/min ratio	4,01	5,48	4,86	7,57	6,74	9,28	44,09	28,22		
<b>Regional analysis</b>										
Rich region	221	407	470	630	601	299	304	338	409	85,3%
Poor region	141	242	339	464	514	235	172	295	300	113,1%

Source: State Statistical Services and author's calculations

Appendix H. Public and banking investments in tables.





Source: State Statistical Services and author's calculations





Source: State Statistical Services and author's calculations

#### Appendix I. Regressions' results.

#### Table I.1. Cross-sectional analysis: influence of GRP on transfers.

	(2005)	(2006)	(2007)	(2008)	(2009)	(2010)	(2011)
VARIABLES	log_transfers						
L.log_grp	-0.553***	-0.488***	-0.282***	-0.472***	-0.455***	-0.358***	-0.389***
	(0.106)	(0.0974)	(0.0580)	(0.0945)	(0.0779)	(0.0734)	(0.0915)
Constant	11.05***	10.47***	9.319***	10.67***	10.52***	9.735***	10.01***
	(0.975)	(0.890)	(0.534)	(0.872)	(0.724)	(0.678)	(0.850)
Observations	25	25	25	25	25	25	25
R-squared	0.656	0.638	0.508	0.654	0.674	0.540	0.494

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

#### Table I.2. Cross-sectional analysis: influence of GRP on public investments.

	(2005)	(2006)	(2007)	(2008)	(2009)	(2010)	(2011)
VARIABLES	log_public_inv						
L.log_grp	0.572	0.257	0.457**	0.149	0.102	0.443	1.011***
	(0.364)	(0.261)	(0.200)	(0.307)	(0.330)	(0.459)	(0.343)
Constant	-0.0828	3.072	1.426	4.161	3.889	0.598	-4.370
	(3.332)	(2.415)	(1.883)	(2.876)	(3.146)	(4.242)	(3.164)
Observations	25	25	25	25	25	25	25
R-squared	0.112	0.037	0.159	0.011	0.003	0.042	0.268

Robust standard errors in parentheses \*\*\* p<0.01, \*\* p<0.05, \* p<0.1

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