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Economy wide effects of ECO Regional Integration in a Standard CGE Closure (A GTAP Model Approach)

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Keywords:
ECO,
GTAP,
Regional Trade Integration,
Welfare

Abstract
This study assesses the impact of ECO regional integration on some important economic variables in Eco member countries. The role of regional trade agreements in rising of exports and imports, and improving of welfare and many other economic variables of regional economies is the debate of many economists. Empirical literature does not address this issue for ECO. This paper uses global trade analysis project (GTAP) modeling approach to simulate cut of trade barriers between ECO members. In a standard GE closure, using a multi-region, multi-commodity GTAP modeling, simulation results show that, trade policy reform improved ECO members' economic performance, by means of greater exports, imports and output, lower import prices, higher endowment demand, and higher consumption, utility and welfare. Decomposition of welfare changes, demonstrated that impacts of trade policy has different effects on ECO members' welfare components.

1. Introduction
Regional trade agreements (RTAs) are common in today's world economy. Each country in the world is a member of approximately more than one trade agreement. Regional trade agreements have prevailed since 1990s; as of 2013, some 546 notifications of RTAs have been received by WTO. What all RTAs in WTO have in common is that they are reciprocal trade agreements between two or more partners. Most of these bilateral and multilateral agreements are between neighboring countries.

ECO involves seven Asian and three Eurasia countries, which provides a platform for discussing ways to improve development and promote trade, and investment. The main objective is to establish a market for goods and services. It has the potential to change economic and welfare situation of ECO members.

The organization's population and labor force are more than 417 and, 130 million (ECO Statistics, 2013), respectively, which is one of the important consumption and labor markets in the world. Based on the economic situation, there are many countries such as Afghanistan with low income (per capita income of US $ 650 in 2010); and Turkey with medium to high income (per capita income is about US $ 10000 in 2010).

Also, there are countries with a high source of oil and natural gas such as Iran, Azerbaijan and Turkmenistan and those which need to import these resources of energy, like Turkey, Pakistan and Afghanistan. There is a country like Turkey which has ranked 24th among the world's industrialized countries. Iran has a good educated human resource; on the other side, Afghanistan does not have a good situation in this regard. Therefore, these differences between ten neighbor countries, represents an important opportunity for multilateral trade of goods and services to improve economic and welfare situation of all countries of the region.

1 http://www.wto.org/english/tratop_e/region_e/region_e.htm
2 Economic Cooperation Organization
3 Afghanistan, Azerbaijan, Iran, Kazakhstan, Kyrgyzstan, Pakistan, Tajikistan, Turkey, Turkmenistan, and Uzbekistan
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Although ECO has a long history, its economic integration is not strong. Because of ECO members have political links with other political blocks in the world, many of which could be against each other; political integrity is a strong barrier for the inter-ECO integration. Inter-regional trade shows that each ECO member’s trade share is insignificant relative to the country’s whole international trade (Haeryan, 2007). However, Afghanistan, Tajikistan, and Uzbekistan’s ratio of inter-ECO to whole international trade is 51, 50 and 22 percent, respectively; but, this ratio was only 5.1, 6.4 and 6.7 in 2010 for other important countries such as Iran, Turkey and Pakistan, respectively. Therefore, there is an insignificant international trade inside ECO region and more important trade partners do their exports and imports to the rest of the world countries (ECO Statistics, 2013).

ECO members have high potential and many opportunities to link their economy to each other. In order to be successful in developing the members’ relationship, it is necessary to consider each member’s needs and capabilities. In this large area, there are countries which need to buy energy resources while others in the same region export this kind of commodity. There are countries which need to buy education and health services, investment in educational and transportation infrastructures; on the other side, other countries have specialty in producing and exporting this kind of goods and services. In sum, ECO members have the essential basis to promote inter-regional transactions and represent better performance of their agreement.

Many studies have been conducted to recognize advantages of ECO agreement and its impacts on economic development of ECO members (Shahabi and Shiekholeslami, 2010), trade development (Hoseini and Aqheli, 2007), organizational extend (Haeryan, 2007), lack of trade development in ECO (Jalali and Solaimani, 2007), elasticity of markets in ECO countries (Hoseini and Aqheli, 2007) and other aspects. Kulaei and Movaddab (2007) believed that lack of political convergence between ECO members was the main cause of lack of economic integration. Hoseini and Aqeli (2006) argued that inelasticity of ECO members’ markets for imports was the main reason for non-extension of multilateral trade between ECO members. Adeli and Elahi (2006) found that weakness of transportation infrastructures was the main reason for this low ratio of inter-ECO trade. However, Haeryan (2007) showed that between-members’ trade expansion had a positive impact on national production of most countries.

This study intended to investigate impacts of trade promotion by means of reducing trade barriers on trade and welfare variable of ECO members. It aimed to illustrate whether trade barrier cuts could increase between-members’ international trade and each members’ welfare, and if yes, what would be the sources of these increases?

2. Methodology

International trade has impacts on economic variables such as international transportation services, uses of imported intermediate commodities, imported commodities for domestic household consumption, national and international saving and investment, goods and services market, production factors, balance of payments, and many other socio-economic variables. These effects could be predicted by general equilibrium models, which are convenient for international trade policy simulations. Using a multi-region GE model, international trade effects on domestic and trade partners’ economy variables could be reflected. This study used GE approach, which had some advantages compared to econometric models. It accounted for accounting relationship of economic variables, which would be affected by policy shocks.

2.1. Policy Shock

Trade policy refers to trade policy reforms as reduction or removal of international trade barriers. In other words, trade policy is changes in trade tariffs and quotas, except health and religious filters for tradable commodities. In most studies, except cuts in trade quotas
for investigating their impacts on in question variables, researchers use reduction in tariffs as a proxy to reduce all trade barriers. This study used trade tariff reduction as a trade policy reform in ECO regional trade integration.

This study used a GTAP model to investigate effects of trade policy shocks. To describe effects of trade policy reform on economic variables, mathematical structure of this model was used. To start with, consider cuts in bilateral import tariffs of commodity i from r to s \([\text{tms } (i,r,s)]\) region. This variable decreases market prices \([\text{pms } (i,r,s)]\) via price linkage en54. Domestic users substitute cheaper imports according to en7. Also, composite price of imports facing sector j consequently falls via en6 and en4. The demand for imports will rise via en9. Cheaper imports will decrease composite price of intermediate commodities via en9, which will increase profits at current prices via en3, and expends output, which generates an expansion effect via en11 and en12. This issue will increase the demand for production factors via en10, which increases the demand for mobile endowments via en2 and consequently raises the price of these endowments and transmits the shock to other sectors in the liberalizing region.

In r region, production of goods will increase, because import tariffs are reduced. En7 is then used to determine implication of total sales of i from r to s region. En1 dictates subsequent implications of total output \([\text{qo } (i,r)]\). Production behavior equations come into play, by en11 and en12 transmitting the expansion effect back to demand for intermediate commodities and to region r’s factor markets.

An aggregate utility function, which governs regional household behavior, is specified by composite private and government consumptions, and savings. The GTAP model employs a special Stone-Geary utility function, in which all subsistence shares are equal to zero. Also, this utility function uses an index of government expenditure to proxy the welfare derived from the government’s provision of public commodities to private households in the region. If preferences for public goods are separable from preferences for private goods and their utility function is identical across households within the regional economy, then a public utility function can be derived.

The regional household in the model disposes of total regional income according to a Cobb-Douglas per capita utility function, which is specified by private and government household expenditures and savings (en13). In the standard closure, each of these demands represents a fixed share of total income, which can be seen from en14 and en15 that determine changes in real expenditures on savings and government activities as a function of regional income and prices. To assure exhaustion of total regional income, changes in private household spending is computed as a residual.

The private household demand’s function is non-homothetic and percentage change in private utility \([\text{up}(r)]\) is based on per capita. Calculating percentage change in utility of private consumption is dictated by private household preferences. For practical reasons, the constant difference of elasticities (CDE) functional form is selected. It lies midway between the non-homothetic CES and the fully flexible functional. The CDE expenditure function is given by:

$$\Sigma_{i \in \text{TRA}} \text{B}(i,r) \times \text{UR}(r) \times \text{S}(i,r) \times \left[\frac{\text{PP}(r)}{\text{PP}(r)}\right] = 1$$

Here, \(\text{E}(\cdot)\) represents minimum expenditure, which is required to attain a pre-specified level of private household utility \([\text{UP}(r)]\), given the vector of private household prices \([\text{PP}(r)]\). Total differentiation of this equation and use of Shepherd lemma permits to derive the relationship between minimum expenditure, utility and prices that is given in en16, which specifies per capita private household demands for the tradable composite commodities \([\text{qp}(i,r) - \text{pop}(r)]\). Two en18 and en19 describe responsiveness of

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4 Equation number 5 (after this, we use this abbreviation instead of Equation number)
imperfectly mobile endowments of production to changes in the rental rates associated with those sectors in which these sluggish endowments are employed. En18 introduces a price index and en19 determines transformation relationships.

To complete the global economic system, macroeconomic closure needs to be determined. Here, determinants of aggregate investment must be discussed. The GTAP model does not account for macroeconomic and monetary policies, which are the factors that explain aggregate investment. Also, because this model is neither an inter-temporal model nor sequenced through time, it does not affect productive capacity of industries/regions in the model. However, reallocation of investment across regions will affect production and trade through its effects on final demand. There are four common methods for basic indeterminacy of investment in comparative static models; only in the fourth closure, investment is permitted to adjust; however, rather than including an independent investment relationship, it simply accommodates any change in savings.

Moreover, to adopt a closure rule to investment, potential changes in the current account need to be considered. It is common to force domestic savings and investment to move in tandem by fixing the current account balance. To understand this issue, it is useful to recall accounting identity of \( S - I = X - M \), which shows that national savings (S) minus investment (I) is equal to the current account surplus (S is derived as a residual). By fixing the X-M side, the difference between S and I will be fixed, which may be accomplished in the GTAP framework by fixing the trade balance [DTBAL(r) = 0, en46] and freeing up either S (en 14) or I.

If S = I in the initial equilibrium, then \( S - I = 0 \); and, thus \( X - M = 0 \) (provided cif/fob margins are accounted for in exports). Furthermore, by fixing \( X - M = 0 \) on a regional basis, each region's share in the global net of S is fixed. In this way, equality of global S and I in the new equilibrium is also assured. Causality in identity runs from left to right side.

Once S - I is permitted to adjust, the global bank is needed to ensure that the global demand for S equals the global demand for I in the post-solution equilibrium. The global bank in the GTAP model uses receipts from sale of S commodity to the individual regional households in order to purchase (at price PSAVE) shares in a portfolio of regional I goods. However, on a regional basis, some adjustment in the mix of I is permitted; thereby, another dimension is added to determine I in the model.

It is convenient to include other indices to the model, their change rates of which are reported along with other results. En20 and en21 show the aggregate indices of received prices \([psw(r), en20]\) and paid prices \([pdw(r), en21]\) for products sold and purchased by each region. The difference between psw(r) and pdw(r) measures percentage change in each region's terms of trade \( t(r) \). GTAP also computes regional equivalent variation measures, EV(r), the values of which are computed as \( EV(r) = u(r) \times INC(r)/100 \).

Since u(r) is per capita welfare, en22 includes rate of change in population on the right hand so that the EV reported by the model represents total regional welfare. The global equivalent variation (WEV) is then computed as the sum of regional EVs, en23, which is followed by an equation generating percentage in the region-specific consumer price index, ppriv(r).

Other price and quantity indices refer to trade, regional GDP and income. To compute these indices, it is necessary to determine the corresponding value and price indices first. Variable qgdp(r), en25 is quantity of domestic product. The model first computes a value index, vgdp(r), in en24, which accounts for changes in prices and quantities and a price index, pgdp(r), in en25, which accounts for changes in price only. Quantity index, qgdp(r), is then computed as vgdp(r) minus pgdpr(r).

There is a set of equations which determines changes in trade values, prices and quantity indices. En26 to 27 compute percentage change in export and import values: (a) by
commodity and region, (b) by region for all traded commodities, and (c) by commodity for all regions in the world. En28 computes percentage change in the value of total world trade, and en29 computes the percentage in value of world output, by commodity. These are followed by en30 to en37, which compute the associated price indices, after which pure volume changes could be extracted for aggregate trade and output (en38 to en45). En46 is used to compute change in trade balance, which is a value-based concept and DTBAL(r), en46 refers to changes in the current account in each region.5

3. Policy Simulation

To show impacts of the ECO regional integration on ECO members’ economies, it is necessary to remove/reduce trade barriers. To simplify this, trade tariffs was reduced as a proxy for trade barrier reduction as it is a common approach in trade policy simulations. Here 10% reduction in power of tariffs occurred between ECO members: reduction in tariffs (variable of tms in GTAP model) of imported commodity “i” from all ECO regions (r = ECO region) to all ECO regions (s = ECO region). 57 commodities in GTAPAgg were aggregated in 6 new commodity groups.6 Impacts of this trade policy reform on ECO region’s trade and macroeconomic variables were investigated. Because there were not economic data on four ECO member countries of Afghanistan, Tajikistan, Uzbekistan and Turkmenistan their policy simulation effects were not computed. The solution method was the Gragg’s multi-step method, which produced more accurate results than Johansen's method.

The simulation involved a bilateral cut of power of tariffs of ECO imports on ECO all commodity products, tms(all trade commodities, ECO, ECO) = -10%, which implied cut of 10% in power of the ad-valorem tariffs that amounted to 10% cut in domestic price of ECO exports to ECO.

4. Results

Two parts of model results are shown below: the first one represented policy simulation impacts on the ECO members’ exports, imports, trade balance, production and demand for endowments and intermediate commodities and the second part showed effects of trade policy simulation on GDP, household’s income, utility, welfare and its’ components.

The experiment results demonstrated that bilateral import tariffs’ reduction (by 10%) decreased market price of all imported commodities in all ECO countries, which was more than that of other countries in Azerbaijan and Kirgizstan. Reduction was predictable in import prices, because ECO countries reduced import tariffs of commodities, which they imported from other ECO members (Table 1, the pim row). The increased imports in the ECO countries decreased supply of goods and services in world markets; thus, the world price (Table 1, pm in ROW row) of all commodities increased. Because ECO demand for commodities was not very high compared to rest of the world market, effects of trade policy reform did not increase world prices as well.

Price of composite commodity increased in all ECO members. Cheaper imports resulted in the substitution of composite imports for domestic commodity and also increased the demand for imports in the composite intermediate good (qim). The trade barrier cuts in all ECO countries increased the demand for imports to produce more exportable goods and also increased the demand for endowments (except natural resource in all ECO countries except Iran and land in all countries except Azerbaijan). Therefore, production of all ECO members increased and hence the export and imports. As could be seen from export price (px_ir) and quantity of export (qxw) rows, export price of a majority of goods in all countries increased, which resulted in a raise in increase in quantity of exports.

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5 For more details See Hertel, T. W. & Tsigas, M. E. 1997
6 Agriculture, Oil and gas, Food, Light manufacturing, Heavy manufacturing, Transport and other services,
Since ECO economy was not large enough in comparison with ROW economy, changes in non-ECO export price and quantity were insignificant.

Based on commodity type and country, changes in trade balance (DTBAKi) showed that trade barrier reduction in all ECO member countries had positive impacts on trade balance at least in one commodity and had negative effect in others. All ECO members’ negative trade balance and ROW’s positive trade balance changes showed that ECO member’s imports were more than their exports. The increased imports were due to three substitution effects on production and consumption, income effect on imported commodities, expansion effects on production of goods for exports and domestic consumption. All of these effects could be seen in (1) increased imports of intermediate goods [variable qfm(i,j,s)] by production sectors in an ECO member country; (2) between sectoral movement of mobile endowments; and (3) changes in using sluggish endowments' quantities in increased production of some production sectors. For example, table (2) shows that it was the same for Iran and other countries. Percentage changes in the value of production (variable qo) in the ECO countries are shown in Table (3). As shown in Table (3), production of some commodities increased in some countries and decreased in some of them others. However, three rows in bottom of Table (3) demonstrated that value of GNP (qgdp, pgdp, vgdp variables) increased in all countries, except Azerbaijan. Table (4) shows increased imports for consumption and changes in consumption combination of domestic and imported commodities in government and private sectors for all ECO member countries (variables qpm and qpd for private households and qgd and qgm for government households). Consumption of imported commodities increased and that of domestic commodities decreased in both government and private households. However, increased imports in most countries in consumption of both production, and government and private sectors, were more than decreased consumption of domestic produced commodities, which indicated that some of these imports were used to substitute domestic produced commodities and the rest was used for consumption due to income effect of changes in import prices.

Reduction of trade tariffs increased consumption of private and government households; thus, it changed per capita utility (u) and welfare (EV) and also increased production of commodities, which in turn increased using endowments that finally raised endowment incomes for ECO member countries’ households (y). Effects of trade policy experiment on welfare are shown in Table (6). ECO region experienced raises in welfare due to importing cheaper commodities whereas welfare in ROW decreased. The equivalent variation of these changes in the ECO welfare was 1992 $US 705 million gain, which were $US 1065 million loss for ROW. The second to seven columns of Table (6) show combination components of EV. The terms of trade are the most important component of welfare (see 6th column in Table 6) in ECO region. The negative allocative efficiency effect (second column) in ECO ($ -20 US million) had little impact on the overall EV. Also, price of investment and saving commodities had changed by $ 39.5 US million. Decline in the allocative efficiency of EV for ROW was about $ 329 US million. All ECO members' terms of trade improvement increased their welfare by $ 694 US million, which offset much of the allocative efficiency loses. In ROW, effects both allocative efficiency and terms of trade effects were negative. Furthermore, because of using comparative static, GTAP models, and changes in population, endowments and technology, were equal to zero.

5. Conclusion

Using a GTAP modeling approach, this study aimed to investigate implementation of the ECO trade agreement. The purpose of implementing the ECO trade agreement and ECO members’ economic integration was to increase inter-ECO trade, economic development, and welfare improvement. This integration has not been studied using GTAP model, which is special for international trade. In this study, ECO convergence was done using
this model and removal of trade barriers was simulated. The endogenous variables, on
which this study sought to evaluate the impact of trade policy reform, were trade variables,
endowments and intermediate production factors, production quantity of different
economic sectors, GNP, utility, household income, consumption of government and
private households, and welfare of the ECO member countries and ROW. The scenario of
10% reduction in power of trade tariffs from ECO country members to the same
destination countries showed that trade liberalization decreased import prices and
increased quantity and value of imports. The increased imports originated from exports of
other ECO countries; therefore, exports of other ECO members increased. Increases in
exports needed more domestic production, which in turn required more primary and
intermediate production factors. Increased prices of some primary production factors
demonstrated that the demand for them had increased. Demand for intermediate
commodities was formed by two sides. The demand for imports of intermediate
commodity was due to consumption and production substitution effects, the consumption
income effect, and the production expansion effect. All of these effects increased demand
for imports; so inter-regions export must be increased to finance increased imports.

Because increase in imports was more than exports in all ECO countries, the ECO
members faced trade deficit. Increased use of production factors and their increased
prices increased household income and thus household consumption in private and
public sectors. This increase in private and government consumption caused by
households' increased income, and also substitution and income effects of cheaper
imports changed households' composition of consumption in favor of imported
commodities. Increases in consumption increased utility and therefore economic welfare
of ECO countries. Welfare decomposition showed that most of this increase was driven
from improved terms of trade. However, increase in welfare is different depending on
economic conditions of the ECO member countries.

Table (1): Impact of 10% reduction in power of trade tariffs on trade variables of ECO and ROW

<table>
<thead>
<tr>
<th>Region</th>
<th>Sectors</th>
<th>Variab</th>
<th>GGrGrGrCrCrLiFoF</th>
<th>OilGaCoMi</th>
<th>PrFdFex</th>
<th>LightMnfc</th>
<th>HeavyMnfc</th>
<th>SetTraUtiC</th>
<th>Land</th>
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<th>Capital</th>
<th>NatRes</th>
<th>DTBAL</th>
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**Economic Journal, Special Issue 1(6), May 2014**

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a. **pim** = market price of composite import i in region r  
b. **pm** = market price of commodity i in region r  
c. **qim** = aggregate imports of i in region s, market price weights  
d. **Px_ir** = export price index for good i and region r  
e. **qxw** = aggregate exports of i from region r, FOB weights  
f. **DTBALi** = change in trade balance by i and by r, $ US million

**Table (2):** Impact of 10% reduction in power of trade tariffs on demand for endowments and, domestically produced and imported intermediate production factors in Iran

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a. **qf** = demand for commodity i for use by j in region r  
b. **qfd** = domestic good i demanded by industry j in region s  
c. **qfm** = demand for i by industry j in region s  

10
### Table (3): Impacts of trade policy reform on percentage changes in production of ECO countries

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a. qo = industry output of commodity i in region r  
b. pgdp = GDP price index  
c. qgdp = GDP quantity index  
d. vgdpc = change in value of GDP

### Table (4): Percentage changes in composite consumption of private and government sectors in ECO countries

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<td>-0.4</td>
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<tr>
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<td></td>
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<td>1.4</td>
<td>1.2</td>
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<td>-0.4</td>
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<td></td>
<td></td>
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<td>2.4</td>
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<td>1.2</td>
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<tr>
<td>ROW</td>
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<td>-0.1</td>
<td>0.0</td>
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<td>qpm</td>
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<td>-0.1</td>
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<td>0.0</td>
<td>0.0</td>
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<td></td>
</tr>
</tbody>
</table>

a. qdp (qgd) = private (government) household demand for domestic i in region s  
b. qpm (qgm) = private(government) household demand for imports of i in region s
Table (5): Welfare effects of trade policy reform in ECO and ROW

<table>
<thead>
<tr>
<th>Region</th>
<th>EV = Equivalent variation</th>
<th>U = Utility</th>
<th>ya = regional household income in region r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Azer</td>
<td>11</td>
<td>0.99</td>
<td>-0.37</td>
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<tr>
<td>Iran</td>
<td>309</td>
<td>0.21</td>
<td>0.49</td>
</tr>
<tr>
<td>Kaz</td>
<td>72</td>
<td>0.18</td>
<td>0.81</td>
</tr>
<tr>
<td>Kyrg</td>
<td>5</td>
<td>0.24</td>
<td>1.05</td>
</tr>
<tr>
<td>Pak</td>
<td>57</td>
<td>0.07</td>
<td>0.34</td>
</tr>
<tr>
<td>Turkey</td>
<td>250</td>
<td>0.09</td>
<td>0.44</td>
</tr>
<tr>
<td>ROW</td>
<td>-1065</td>
<td>0</td>
<td>-0.01</td>
</tr>
</tbody>
</table>

Table (6): ECO and ROW welfare decomposition

<table>
<thead>
<tr>
<th>Welfare</th>
<th>alloc_A</th>
<th>endw_B</th>
<th>tech_C</th>
<th>pop_D</th>
<th>tot_E</th>
<th>IS_F</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
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<td>0.00</td>
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<td>12</td>
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<tr>
<td>Iran</td>
<td>32.12</td>
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<td>0.00</td>
<td>0.00</td>
<td>282</td>
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<td>309</td>
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<tr>
<td>Kaz</td>
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<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>107</td>
<td>-15.2</td>
<td>72</td>
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<tr>
<td>Kyrg</td>
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<td>0.00</td>
<td>0.00</td>
<td>45</td>
<td>2.5</td>
<td>5</td>
</tr>
<tr>
<td>Pak</td>
<td>-2.99</td>
<td>0.00</td>
<td>0.00</td>
<td>0.00</td>
<td>45</td>
<td>14.9</td>
<td>57</td>
</tr>
<tr>
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<td>0.00</td>
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<td>0.00</td>
<td>230</td>
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<td>250</td>
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<tr>
<td>ROW</td>
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<tr>
<td>Total</td>
<td>-359.30</td>
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<td>-0.1</td>
<td>-360</td>
</tr>
</tbody>
</table>

Appendix A: GTAP model equations

1. \( VOM_{tr} \cdot p_{q_{tr}} = \) \( \sum_{n=1}^{N} \left( VDF_{n} \cdot \alpha_{D_{n}} \cdot \alpha_{V_{n}} \cdot \alpha_{M_{n}} \cdot \alpha_{X_{n}} \cdot \alpha_{A_{n}} \cdot \alpha_{T_{n}} \cdot \alpha_{R_{n}} \cdot \alpha_{E_{n}} \cdot \alpha_{F_{n}} \right) \)
2. \( VOM_{tr} \cdot p_{q_{tr}} = \) \( \sum_{n=1}^{N} \left( VDF_{n} \cdot \alpha_{D_{n}} \cdot \alpha_{V_{n}} \cdot \alpha_{M_{n}} \cdot \alpha_{X_{n}} \cdot \alpha_{A_{n}} \cdot \alpha_{T_{n}} \cdot \alpha_{R_{n}} \cdot \alpha_{E_{n}} \cdot \alpha_{F_{n}} \right) \)
3. \( VOM_{tr} \cdot p_{q_{tr}} = \) \( \sum_{n=1}^{N} \left( VDF_{n} \cdot \alpha_{D_{n}} \cdot \alpha_{V_{n}} \cdot \alpha_{M_{n}} \cdot \alpha_{X_{n}} \cdot \alpha_{A_{n}} \cdot \alpha_{T_{n}} \cdot \alpha_{R_{n}} \cdot \alpha_{E_{n}} \cdot \alpha_{F_{n}} \right) \)
4. \( p_{m_{tr}} = f_{m_{tr}} + \sum_{n=1}^{N} \left( p_{m_{n}} \right) \)
5. \( p_{m_{tr}} = f_{m_{tr}} + \sum_{n=1}^{N} \left( p_{m_{n}} \right) \)
6. \( p_{m_{tr}} = f_{m_{tr}} + \sum_{n=1}^{N} \left( p_{m_{n}} \right) \)
7. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
8. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
9. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
10. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
11. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
12. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
13. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
14. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
15. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)
16. \( q_{tr} = \sum_{n=1}^{N} \left( q_{n} \right) \)

Value added Nest:
10. \( \Delta VA_{tr} = \Delta VA_{tr} - \Delta VA_{tr} - \Delta VA_{tr} - \Delta VA_{tr} \)
Total production Nest:
11. \( \Delta VA_{tr} = \Delta VA_{tr} - \Delta VA_{tr} - \Delta VA_{tr} \)
Zero Profit
Total Utility:
13. \( INCOME_{tr} = PRIVEX_{tr} \cdot u_{tr} + GOVEX_{tr} \cdot \left[ u_{tr} \cdot pop_{tr} \right] + \Delta SAVE_{tr} \cdot \left[ q_{save_{tr}} - pop_{tr} \right] \)
Regional Saving:
14. \( q_{save_{tr}} = x_{tr} - \Delta SAVE_{tr} \cdot \Delta SAVE_{tr} + \Delta SAVE_{tr} + \Delta SAVE_{tr} - \Delta SAVE_{tr} \)
Government Expenditure
15. \( u_{tr} = u_{tr} + q_{save_{tr}} + \Delta SAVE_{tr} \)
Private Household Demand:
16. \( u_{tr} = u_{tr} + q_{save_{tr}} + \Delta SAVE_{tr} \)
Composite Demand:

17. $q_{pl} = \sum_{i=1}^{N} BE_{ipl} \cdot EY_{ipl} \cdot [y_{il} - \bar{y}_{il}] + \bar{p}_{l} \cdot \bar{v}_{ipl} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg}$
18. $pm_{ipl} = \sum_{i=1}^{N} PROD\_COMP \cdot REV_{ipl} \cdot p_{m_{ipl}} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg}$
19. $g_{oes} = q_{ipl} - \sum_{i=1}^{N} WAVE_{ipl} \cdot \delta_{i} \cdot \bar{p}_{ipl} - \bar{v}_{ipl} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg}$

Ret of Return Component:

$$r_{rpl} = r_{rpl} \cdot \sum_{i=1}^{N} \frac{\bar{v}_{ireg}}{\bar{v}_{ireg}} \cdot q_{ipl} \cdot d_{ipl} \cdot \sum_{i=1}^{N} \frac{\bar{v}_{ireg}}{\bar{v}_{ireg}} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg}$$

Substitute Component:

$$s_{globalds} = \frac{\bar{v}_{ireg}}{\bar{v}_{ireg}} \cdot q_{ipl} \cdot d_{ipl} \cdot \sum_{i=1}^{N} \frac{\bar{v}_{ireg}}{\bar{v}_{ireg}} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg}$$

20. $VW\_LDS\_S_{i} = \sum_{i=1}^{N} \bar{v}_{ipl} \cdot \bar{v}_{ipl} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg}$

21. $VW\_LDS\_S_{i} = \sum_{i=1}^{N} \bar{v}_{ipl} \cdot \bar{v}_{ipl} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg} \cdot \bar{v}_{ireg}$

22. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

23. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

24. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

25. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

26. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

27. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

28. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

29. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

30. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

31. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

32. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

33. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

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41. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

42. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

43. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

44. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$

45. $\mathbf{V}_s = \mathbf{V}_s \cdot \mathbf{P}_{i}$
Export Performance of Transition Countries

Jalal Gaytaranov and Lewell F. Gunter
Republic of Azerbaijan & USA

Keywords: Determination, Export, Foreign Direct Investment, Natural Resources, Port Quality, Supply, Transition Economies

ABSTRACT

This study reports the results from the estimation of an export determination model for former Soviet Union and Eastern European transition countries, for 2005-2011. We present model results from a sample of 28 transition countries and results after excluding five resource rich countries from our sample. We found that closer proximity to Europe had a positive impact on exports from countries and that Foreign Direct Investment (FDI) had larger impacts on exports of resource rich countries. We also concluded that internal trade-related infrastructure of port quality and technological advancement play important roles in exports of transition economies.

1. Introduction

1.1. Purpose of Study

The correlation between a country’s export performance and the growth rate of its economy has been an important point of research for many years. According to the supporters of well-known export-led growth hypothesis (ELGH), positive externalities of exports can be important determinants of growth in a country. Back in 1817, David Ricardo proved theoretically the positive impacts of trade for both countries even in a case when one country had a complete advantage over another in both goods. Contemporary evidences for this perspective can be observed in the studies of Krueger (1979), Michalapolous and Joy (1975), Helpman and Krugman (1985).

The economic growth of the Asian tigers between the early 1960s and 1990s is an often cited example where a strong export orientation resulted in rapid and significant economic growth. Increased production of technology-intensive and innovative products fostered the rate of economic development in the region to a considerable degree. Export-led growth can also result from development of natural resources. Resource rich transition countries, like Azerbaijan and Kazakhstan, provide examples of this. Although economic growth rates differ between countries, a positive relationship between exports and economic development is common. On the other hand, countries with import substitution strategies have shown less satisfactory growth performance of economy (Krueger, 1979).

A rich literature analyzing differences in the economic progress of transition economies since the early 1990s has developed, including some studies of differences in the trade performance of transition economies. These studies often focus on early year differences in privatization, economic, and legal policies and examine how these differences have affected economic growth since then. Differences in growth rates of GDP and trade in transition economies continue to be observed many years after the initial transition policies were put in place.

While some countries opened up to the world markets and allowed domestic producers to participate in international competitions others did not put much effort on the foreign
market globalization. Variation in the growth rate of exports was one of the reasons why some countries overcame transition in a short time span and joined European Union, while others are still experiencing difficulties of shifting to a market economy. Shortly after the collapse of Central Planning System, Eastern European countries adopted liberalization and market-oriented trade strategies by increasing exports and globalizing to European markets. This type of export oriented strategy differed from the gradualism approach to the transition, which was the main strategy for the most of FSU countries.

We focus on recent differences in export performance of transition countries and use recent research on trade facilitation policies and new data on export costs to examine the effect of domestic export costs and external costs to markets on the exports of transition countries. At the same time, productive capacity and domestic demand along with potential market demand are also included in our study. Our focus is on growth in exports rather than growth in GDP, but we are partially motivated by the relationship between the two. Our analysis is going to focus on specific group of transition countries: Former Soviet Union and Central and Eastern Europe countries. In our study we will try to clarify the reasons why the differences continue to exist and what are the main determinants of these variations. Along with traditional export growth determinants we will try to analyze the impact of the specific factors which are related to our sample of transitions.

1.2. Problem Statement

Domestic costs and external export costs to markets can affect a transition economy’s export growth and transition process to a market economy. Better understanding of the impacts of these export determinants on the trade performance and their role in market-oriented policies can be of a positive impact in facilitating exports of the transition country groups. Impacts of export supply capacity, export demand, and competitiveness on the export performance of transitions can help researchers, policymakers and governments to explain “Why do some transitions do better than others, in terms of export and economic growth?”

The location factor may have also be an issue that requires special attention in explaining the export growth of transition economies. In this respect, the importance of global integration (mostly to European Union) and foreign market access factors can be useful in facilitating the export growth of certain transition economies. This problem can be particularly related to resource independent Central Asia and Transcaucasia countries, which are experiencing difficulties in accessing foreign markets access and integrating to the global market.

1.3. Objectives

The major objectives of this study are to estimate the impact of the factors described above on export growth in transition economies. We will examine the relationship between export supply capacity factors and export growth as well as how export demand and costs to major export markets shape export growth in transition economies. Specific objectives are:

- To describe the differences in economic and export growths among the various transition economies in terms of natural resource endowments.
- To identify the issues that cause differences in growth of exports in transition countries
- To build an econometric model that estimates the impact of various trade costs on the exports of transitions
- To analyze the impact of location factor, economic unions and trade agreements on the growth of exports in transition economies.

---

8 Excluding Baltic States
1.4. Organization

The remainder of the thesis is divided into five chapters. In Chapter 2 we describe the concepts of Export Growth in Transition Economies. Chapter 3 presents the summary of previous studies and literature review. Chapter 4 describes the theoretical framework which we applied, empirical estimation techniques and data. In Chapter 5 we present empirical results and Chapter 6 summarizes the study, concludes and outlines the limitation of study.

2. Export Growth and Transition Economies

2.1. Definition of Transition Economies

This work analyzes the export growth performance of 28 transition economies in Central and Eastern Europe, Former Soviet Union (FSU) and Mongolia. As a transition economy, we define countries which used to have a centrally planned system of economic strategy and regulation and are currently are changing to a free market system. In order to focus our analysis on the differences of the specific selected region and countries, we exclude from our sample some other transition economies among which are: Cuba, China, Vietnam and some other transition economies in Africa.

It is helpful to group the economies into Former Soviet Union and non-former Soviet Union countries. Within each category, we further subcategorize countries based on location, which may be correlated with the economic growth. FSU countries are subcategorized to Baltic, confederation of independent states, Transcaucasia and Central Asia9 groups. Non-FSU are subcategorized as: Central/Eastern Europe and Balkan groups (Table 2.2.). This type of categorization will be helpful to analyze and determine the differences in economic condition and export growth between FSU and Non-FSU countries, and also account for differences between specific sub-groups of each category.

The first reforms of the transition process go as far back as the 1960s in Hungary, and the 1980s in China. Certain countries in our sample (Hungary, Czech Republic, and Poland) implemented market-oriented reforms earlier than others, but most of the countries experienced the process of transition after the collapse of Soviet Union into 15 independent states.

Depending on various internal and external economic, political, and global factors the transition process for different countries of our sample might have occurred over different periods of time. While some of these economies have successfully completed the process of transition to a free market economy and are among high income OECD members (Czech Republic, Estonia, Hungary, and Poland), some others (Tajikistan, Kyrgyz Republic, and Armenia) are still experiencing difficulties in transitions.

2.1.1. Resource Rich Economies

One of the specific features of our sample is the presence of certain countries with the high level of total natural resource rents as a percentage of GDP. These countries are the mainly oil abundant countries (Azerbaijan, Kazakhstan, Russia, mineral and mining rich Uzbekistan, and forest and mineral rich Mongolia).

Table 2.1 presents the seven countries in our sample with the highest total natural resource rents as a percentage of GDP in declining order. The first five countries are the ones we regard in our study as resource abundant countries. Other countries in the sample have not been included in the table because of too low total natural resource rent as percentage of GDP (lower than 5%).

---

9 Even though Mongolia was not an official Soviet Union State, its close economic and political relationship leads us to subcategorize it as an exception in FSU category.
Table 2.1. Resource rich countries in the sample

<table>
<thead>
<tr>
<th>Country</th>
<th>Average of Total Natural Resources rents as a % of GDP (2005-2010)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Uzbekistan</td>
<td>70</td>
</tr>
<tr>
<td>Azerbaijan</td>
<td>58</td>
</tr>
<tr>
<td>Kazakhstan</td>
<td>35</td>
</tr>
<tr>
<td>Russian Federation</td>
<td>31</td>
</tr>
<tr>
<td>Mongolia</td>
<td>28</td>
</tr>
<tr>
<td>Kyrgyz Republic</td>
<td>6</td>
</tr>
<tr>
<td>Macedonia</td>
<td>5.5</td>
</tr>
</tbody>
</table>

All other countries in the sample have less than 5% share of total natural resources rents in GDP.

Source: The World Bank Dataset

An important feature of resource rich countries in our sample is the fact that they differ significantly from the other countries in their subgroups by economic and export growth rates and thus their inclusion in our estimation may unduly influence our results. For instance, oil-rich, exporting country, Azerbaijan differs from other Transcaucasia countries (Georgia and Armenia) in terms of export and economic growth. This was caused by an increase in the exports of natural resources as well as increased foreign direct investment inflows to the country during the beginning of 2000s. The same can be related to Kazakhstan when compared to other Central Asian economies. An increased export of mainly natural resources in this country is an important component of its economic growth not available to other countries in the region. According to UN Comtrade database, crude petroleum oils accounted for 61% of exports of Kazakhstan in 2010.

Uzbekistan can be considered as a special case of transition economies as well. In his study, Zettelmeyer (1999) tries to analyze the special Uzbek growth puzzle and states the importance of minerals, mining, and cotton exports along with self-support in energy, which alleviated the difficulties of transition process. Thus, it can be argued that favorable initial condition in terms of wealth of natural resources helped this country during the first years of transition.

From Figures 2.1 – 2.4 we can observe how resource rich countries differ from the other representatives in their region in terms of exports and GDP.

Figures 2.1 and 2.2 differentiate Azerbaijan from its neighboring Transcaucasia countries in terms of GDP and exports respectively for the years of 2005 - 2011. Figures 2.3 and 2.4 show how resource rich transitions in Central Asia (Kazakhstan and Uzbekistan) differed from their neighbors in terms of the total GDP and exports for the same time period. This is the first reason why we are going to regard these five10 countries further in our study as resource abundant countries and as a special case to the transition paradigm.

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10 Azerbaijan, Kazakhstan, Mongolia, Russian Federation and Mongolia – countries with the average of Total Natural Resources rents higher than 25 percent of GDP.
Figure 2.1. GDP of Transcaucasia Countries (2005-2011)

Source: The World Bank Database

Figure 2.2. Exports of Transcaucasia Countries (2005-2011)

Source: UN Comtrade

Figure 2.3. GDP of Central Asia Countries (2005-2011)

Source: The World Bank Database
2.2. Exports in Transitions

The transition economies came out from a mainly common system of government planning and central ownership around the same time but they differed in resource endowments, location and market access, political factors, and the level of transparency. These types of heterogeneities affected foreign trade and export growth from country to country and from region to region. Even though initial conditions were crucial during the transition process, however, types of after-transition trade reforms were also important in causing the variations in export and economic performance.

It is useful to classify transition trade reforms into rapid and gradual liberalization reforms Kaminski, Wang, Winters (1996); Svejnar (2007); Bjornskov, Potrafke (2011). In the study by Kaminski, Wang, and Winters (1996), Central and Eastern European transitions and Baltic States are mostly regarded as the main representatives of the rapid liberalization. As a result of a rapid liberalization: quick market oriented macroeconomic policy changes, openness of the firms to operate in international markets, and the elimination of export barriers have been undertaken. Contrary to quick liberalization reforms, most of the FSU countries (excluding Baltic States) undertook a gradualist approach to the transition process, which restricted domestic producers to successfully participate in international competition and improve trade performance through globalization to the foreign markets. Differences in undertaken political, economic, and above mentioned trade reforms caused a big variation in the time it took countries to transfer their economies from centrally planned to free-market economies (Kaminski, Wang, and Winters (1996)).

2.2.1. Baltic and other FSU Export Trends

The Baltic States were among the first countries that implemented rapid liberalization reforms and market-oriented improvements. These are among the transitions with highest GDP growth for the years from 1994 – 2003 with the average increase of 96% in the region. Being post-Soviet states and thus depending on central planning to a high degree, having poor infrastructure for foreign trade and economic growth did not restrict the Baltic States from efficiently and rapidly transferring to market oriented economies. Shortly after the collapse of Soviet Union, Baltic countries made considerable economic reforms and foreign market orientation. Baltic States increased exports during the first decade of transition by 186%, 137% and 86% for Estonia, Lithuania, and Latvia,
respectively. At the same time, considerable economic growth in this group of FSU countries was also observed. Currently, Estonia\textsuperscript{11} is considered as one of the member states of European Union and has diversified export and service sectors. These numbers are higher than any other Former Soviet state’s GDP and export growth for the given time period. Exception can be Azerbaijan, which, as a result of abundant oil reserves, attracted foreign direct investments, and considerably increased petroleum exports and thus inflated both exports and economic growth.

Estonia is an example of the rapid economic transition of the Baltic States. Contrary to other FSU members, Estonia implemented a rapid market-oriented and liberalization reforms right after the collapse of Soviet Union. From agriculture-oriented exports Estonia transformed to more industrial sector, globalized to the neighbor economies (particularly Scandinavian markets and European Union) and improved overall export and economic performance. Estonia is currently considered as one of the most transparent economies with the lowest corruption rate in the region and holds the 14th position in the economic freedom ranking in the world (Andrus Ansip, Prime Minister of the Republic of Estonia). In recent years the main export products for Estonia are: machinery and equipment, wood and paper, and textiles and food products. Estonia’s average annual export growth from 1994 to 2011 was 19% and with an average annual GDP growth for the same time period of 15%.

On the other hand, export performance and economic growth of transition economies in Central Asia and Transcaucasia was not as high during the first stages of transition and some of them are still experiencing problems of transferring to market-economy. This can be particularly related to natural resource poor countries, such as: Tajikistan, Georgia, and Armenia.

Figure 2.5 illustrates average growth of exports and GDP for the countries in our sample. Countries have been arranged in declining order from the highest average export growth.

The highest export growth countries in Figure 2.5 can be classified into two groups: Natural Resource Exporters\textsuperscript{12} and Good Export Growth performers: The first group includes Azerbaijan, Kazakhstan and Mongolia. After the breakup of central planning system, these countries increased the level of exports by means of abundance of natural resources and integrated into the global markets to at least some extent. Particularly, increased oil and gas exports from Azerbaijan and Kazakhstan increased export levels in these countries and led to positive changes in economies. In addition to this, low starting points of exports and GDP in 1994 is another argument why these countries have such high export growths. The second set of high export growth countries in Figure 2.5 includes the Baltic countries (Estonia, Latvia, and Lithuania), CEEC (Czech Republic, Poland, and Hungary) and some Balkan States (Bosnia and Herzegovina, and Albania). Early levels of exports and GDP for these countries were medium (Baltic States, and Balkans) or high (CEE countries). However, successful implementation of policies, trade-related reforms as well as proximity to Scandinavian and EU markets positively impacted export and economic growth in these countries.

In the lower part of the figure 2.5 we can see less successful transitions in terms of export and economic growth. These are mainly FSU countries and the former Yugoslav Republic (FYR) of Macedonia, Tajikistan, Belarus, Georgia, Armenia, Ukraine, and Moldova. These are the countries that used to have a medium (Belarus, Ukraine, FYR Macedonia) or low (Tajikistan, Armenia, Georgia, and Moldova) beginning GDP, and they did not perform well in terms of export and economic growth from 1994 through 2011 in comparison to other transitions.

\textsuperscript{11} High income: OECD country
\textsuperscript{12} Stared countries in the Figure 2.5
In our study, we focus on recent data and analyze how different trade policy and economic reforms affected export and growth variation in these recent years. While certain countries are classified as high income OECD countries, others are among low income countries, which are still experiencing difficulties in transferring to a market economy. The differences are clear in Table 2.2 which shows export and GDP data for 2005-through 2011.

Table 2.2 shows that export growth from the 2005-2007 bases to 2009-2011 ranged from 12% to 105% for the included transition countries. The largest percentage increases were for resource (mainly oil) rich countries or countries with very low levels of exports in the base period. Differences in export growth can be observed between the transitions located in proximity to European Union and ones more distance. It can be stated that in addition to the fact that CEE and Baltic States implemented early trade facilitation reforms they also had a chance of taking the advantages of closeness to the European Union. On the other hand, transition economies of Central Asia have had difficulties of accessing European Union’s market hence foreign trade with their border countries, China and Russia, account for the main part of their exports. In this respect, the purpose of our analysis is estimate the impact of different export trade-related factors on the export performance of transitions. Initial conditions, geographic location, market access and
reforms all play roles in the export performance of transition economies. We will try to analyze these factors and utilize the results to give a clearer picture of impact of export growth to policy makers, governments, and researchers.

Table 2.2. GDP and Export Growth for Selected Transition Countries (2005-07 to 2009-11)

<table>
<thead>
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<tr>
<td>CE</td>
<td>Poland</td>
<td>473.8</td>
<td>200.0</td>
<td>0.42</td>
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<td>CE</td>
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<td>137.5</td>
<td>0.65</td>
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<td>35</td>
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<td>CE/Balkan</td>
<td>Romania</td>
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<td>43.9</td>
<td>0.26</td>
<td>29</td>
<td>12</td>
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<td>CE</td>
<td>Hungary</td>
<td>135.7</td>
<td>112.9</td>
<td>0.83</td>
<td>15</td>
<td>25</td>
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<tr>
<td>CE</td>
<td>Slovakia</td>
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<td>72.7</td>
<td>0.81</td>
<td>28</td>
<td>23</td>
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<tr>
<td>Balkan</td>
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<td>23.4</td>
<td>0.37</td>
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<td>17</td>
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<td>32.9</td>
<td>0.63</td>
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<td>22</td>
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<td>28.1</td>
<td>0.59</td>
<td>44</td>
<td>47</td>
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<tr>
<td>Balkan</td>
<td>Serbia</td>
<td>41.1</td>
<td>13.9</td>
<td>0.34</td>
<td>32</td>
<td>53</td>
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<td>Bosnia and Herzegovina</td>
<td>17.2</td>
<td>6.3</td>
<td>0.37</td>
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<td>29</td>
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<td>Balkan</td>
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<td>Balkan</td>
<td>Macedonia, FYR</td>
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<td>4.3</td>
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<td>Balkan</td>
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<td>436.1</td>
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<td>12.8</td>
<td>0.33</td>
<td>118</td>
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<td>13.8</td>
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<tr>
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<td>16</td>
<td>0.78</td>
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<td>4.1</td>
<td>0.34</td>
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<td>TC</td>
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<td>0.20</td>
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<td>CA</td>
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<td>3.7</td>
<td>0.58</td>
<td>80</td>
<td>76</td>
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<tr>
<td>Eur CIS</td>
<td>Moldova</td>
<td>6.1</td>
<td>2.5</td>
<td>0.41</td>
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<td>47</td>
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<td>CA</td>
<td>Tajikistan</td>
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<td>0.9</td>
<td>0.16</td>
<td>90</td>
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<tr>
<td>CA</td>
<td>Kyrgyzstan</td>
<td>5.1</td>
<td>2.8</td>
<td>0.55</td>
<td>65</td>
<td>90</td>
</tr>
</tbody>
</table>

CE – Central Europe; BA – Balkan, Eur CIS – European Commonwealth of Independent States; TC – Transcaucasia; CA – Central Asia.
2 Current USD (billions).
3Percentage change from 2005-2007 average to 2009-2011 average
Natural Resource rich countries are in bold Source: Export Data is from UN Comtrade database and GDP data is from World Bank’s Database

Natural Resource rich countries are in bold.
2.3. Major Export Partners

In order to find the theoretical relation between transportation cost and exports in our sample, we analyze each county's export performance and major export partners for the years from 2006 - 2011 and come to the following conclusions:

1) Major export partners between FSU (excluding Baltic States) and non-FSU (plus Baltic States as an exemption) groups of countries tend to differ very much. While main export partners for FSU countries continue to remain Russia, China, and the neighboring countries of the same subgroup, non-FSU countries mostly tend to trade with the European Union member states.

2) Major export partners within each sub-group (Table 2.2.) are mostly similar with the exemption of oil rich countries: Azerbaijan, Kazakhstan, and Russia. In other words, countries within the sub-groups tend to trade with the same markets as a major export partner.

3) Exemptions for the transition country paradigm are oil rich countries of FSU (Azerbaijan, Kazakhstan, and Russia). These transition countries export natural gas and oil to the port countries of Europe as a point from which natural resources can be distributed all over the world. In this respect, the first destination for the exports of natural gas and oil of Azerbaijan is Italy. On average 63% of total exports of Azerbaijan from 2006 to 2011 accounts for Italy. For Kazakhstan major export partners are Italy (for oil and natural gas exports), increasingly China and Russia as the main partners. As the main export partners for Russian Federation can be considered Netherlands and Italy, which on average account for more than 60% of total exports from 2006 to 2011. Germany and China are also among the top export partners of Russian Federation.

2.4. Aggregate Export Products

In this section, we will briefly discuss the main products of export in transition economies covered in our study. Information on the export shares of the countries are based on HS4 product classifications. We exclude the export structure of oil rich FSU countries. We start with Baltic countries structure and then follow by other FSU countries finishing with the export structures of CEE and Balkans. In general, the export structure of FSU and non-FSU countries is markedly different. Raw materials, gold, metals, cotton, and agricultural products account for the most part of the exports of FSU countries with some machinery and equipment exports in Belarus and Ukraine. We cannot say the same about the CEEC, Balkan, and Baltic regions. These last three groups of countries have very diversified export structures, which include significant amounts of technology advanced exports.

The main export products of the Baltic region are: machinery and equipment, wood and wood products, metals, food products, and beverage. According to the CIA World Factbook, more than 20% of exports of Estonia and 10% of Lithuanian exports are machinery and electrical equipment. This fact supports the fundamental changes in export orientation of Baltic region after the breakup of Soviet Union.

In contrast to the Baltic countries, Central Asia and Transcaucasia countries mostly export raw materials and agricultural products. The main export products of Central Asian transitions (Tajikistan, Kyrgyz Republic, Uzbekistan, and Mongolia) are minerals, textile, wool, gold, and agricultural products. Based on the UN Comtrade data source, for

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13 For individual country analysis we used UN COMTRADE and EU Bilateral Trade and Trade with the World Data sources
14 See Table 2 for the sub-groups of FSU and Non-FSU states
15 The exact route of pipelines can differ but mostly they go through: Azerbaijan-Georgia-Turkey-Italy
16 Exemption is Baltic region
the year of 2010, 40% of Kyrgyz Republic’s exports was gold, about 20% was agricultural products and others including wool, garment, and textile. At the same time, more than 50% of Tajikistan’s exports for 2010 were unwrought aluminum and more than 30% agricultural products and raw cotton. As far as Mongolia’s exports are concerned, 33% coal; briquettes, 32% gold content, iron ores, zinc ores and molybdenum ores are about 14 %, gold 9%.

Uzbekistan’s export structure differs from the neighbors to a certain extend. For the last few years, it increased the share of cars and machinery exports. Along with cotton, raw minerals and gold, Uzbekistan tends to diversify its exports, so that in 2010, about 10% of total exports of Uzbekistan (approximately $500 million) were cars, machinery, and electrical equipment.

Transcaucasia countries mainly export raw materials, gold and gold content and different metals. It is important to mention that the total exports of Georgia and Armenia are not that big and therefore, 9% car exports in Georgia in 2010 make only $240 million contribution in dollar amount. For comparison we can mention that this is less than 2% of Estonian total exports for the same year.

Ukraine has a huge potential for production and export of technological goods, however, most portion of its exports consists of ferrous and nonferrous metals, fuel and petroleum products, agricultural products, and some share of machinery and transport equipment. Similarly, Belarus exports mainly consist of minerals, metals; agricultural products and some portion of its exports are composed of machinery and equipment production. Production of agricultural equipment and machinery has been inherited from the Soviet Union to these countries, however, has not been improved too much after the breakup of Central Planning system.

Export structure for Central and Eastern Europe region very diversified and involves technological production. For instance, Czech Republic, Poland, Romania, Hungary, Bulgaria, Croatia, Slovak Republic, and Slovenia export not just metal and mineral products, but mostly industrialized products, innovative and technologically improved machinery and electrical equipment, transportation equipment, plastics, and rubbers.

Balkan region countries export diversified products and natural resources. Even though the total export amounts for some Balkan States are not as high as CEE countries, nevertheless, the composition and diversification of products tend to vary and involve technology and production.

3. Previous Studies

In this section, we discuss contributions to the literature on export growth, export facilitation, and transition countries’ exports.

3.1 Traditional Export Modeling

In this section we will first discuss traditional export models. These studies can be considered as foundation to export supply and demand modeling. Traditional export models used time series data on a group of countries, using a double-log econometric specification and using each country’s GDP and relative price level as the main determinants of exports.

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17 Not including Azerbaijan
18 Even though Georgia exports cars, it does not mean that they are produced in this country. The most part of these car exports goes to Azerbaijan and were acquired from Europe countries. However, due to the fact that the last country before they enter to Azerbaijan is Georgia, in statistics it is being written as Georgian exports to Azerbaijan.
Khan (1974) estimated the impact of relative prices in determining export demand and supply of developing countries for the period of 1951-1969 and concluded that the prices do play an important role in the determination of export performance of developing countries. Econometric model specifications that Khan used in his estimation were widely applied in later literature. This study applied two stage least squares estimation technique on the following models:

**Export Demand:**

\[ \ln X_{it} = \beta_0 + \beta_1 (\ln P_{Xit} - \ln P_{Wt}) + \beta_2 \ln W_t + \varepsilon_{it} \]

**Export Supply:**

\[ \ln X_{it} = \beta_0 + \beta_1 \ln P_{Xit} + \beta_2 \ln P_{Dit} + \beta_3 \ln Y_{it} + \varepsilon_{it} \]

where \( X_i \) quantity of exports of country \( i \), \( P_{Xi} \) is the unit value of exports of country \( i \), \( P_{Wi} \) is world price level, \( P_{Di} \) domestic price level of country \( i \), \( W \) is the real world income and \( Y_i \) is the the real income of country \( i \).

Warner and Kreinin (1983) is an important contribution to the literature on foreign trade modeling. Even though the basic structure of this work is similar to Khan (1974), two dissimilarities are: first, they estimated the impact of variation in exchange rate and in the expected exchange rate on the real trade flows, and second, they estimated an import model with and without petroleum products. After applying OLS technique in the model, Warner and Kreinin concluded that the exchange rates and the prices of exports in competing countries are important determinants of exports.


\[ \ln X_i = \beta_0 + \beta_1 \ln Y_{Wi} + \beta_2 \ln P_{XLCi} + \beta_3 \ln E_i + \beta_4 \ln E_{Pi} + \beta_5 \ln P_{FCcomp} + \varepsilon_{it} \]

where \( X_i \) is the country’s export volume, \( Y_{Wi} \) is the weighted average GDP of 23 major importing countries facing country \( i \), \( P_{XLCi} \) is the export unit value index, 1974=100, \( E_i \) is the effective exchange rate index of the currency in country \( i \) (1975=1), \( E_{Pi} \) is the expected rate of change in exchange rate, and \( P_{FCcomp} \) is the average export price of 64 competing countries expressed in foreign currencies, weighted by each competing country’s exports into each of the markets.

Santos-Paulino (2010) is another contribution to the export studies, which expands on the traditional approach of regarding export growth as a function of GDP and relative prices in the country. This work focuses on determinants of a higher value added of a country’s exports. An Export Productivity index measures how much value is added to the export products of a country. According to Santos-Paulino (SP), countries with the higher export productivity index exports more technologically progressive products rather than the country with the relatively lower index. In his model, SP estimates the importance of human and physical capital, economic freedom and technology-intensity on the export productivity along with traditional export determinants. This study applies panel data for a sample of 74 countries over the period 1990-2004.

\[ EXPY_{it} = \alpha + \delta_t + \beta_1 \text{LRER}_{it} + \beta_2 \text{LPCY}_{it} + \beta_3 \text{LHC}_{it} + \beta_4 \text{EF} + \beta_5 D_C + \beta_6 D_T + \varepsilon_{it} \]

where \( \alpha \) and \( \delta_t \) are country-specific and year-specific effects of panel data, \( EXPY_i \) is export productivity for country \( i \), \( RER \) real exchange rate, \( PCY \) denotes real GDP per capita, \( HC \) is human capital, \( EF \) index of economic freedom, \( D_C \) and \( D_T \) are dummies for technology intensity level, and \( L \) is the natural log of variables.

Santos-Paulino used an export productivity index (\( EXPY \)) developed previously by Hausmann et al. (2007), a quantitative index, which sorts traded goods in terms of the level of value added to them. In other words, higher \( EXPY \) for the country implies
increasing share of higher value added products in the export basket of the country. On the right hand-side, along with the traditional export growth determinants (Real Exchange Rate and real Per Capita GDP), Human Capital controls for the level of education and skills in the country. According to results, the human capital index has positive and significant sign, implying the positive relation between education and skills level of the country and its increasing higher value added of a country’s exports. The Economic Freedom Index (Heritage Foundation) controls for the effect of economic and political liberalization on export performance and also has positive contribution to export productivity. Dummies for medium and high engineering intensive technology ($D_c$ and $D_T$) were created and classified by SP based on the taxonomies of export structure by sector. SP concludes that institutional features and relative prices do play a role in determination of export productivity in the country.

Works of Khan, Warner and Kreinin and Santos-Paulino play an important role in the structure of our approach as they include important base determinants of export growth, which we will take into account in our model. Therefore, our model will refer to the frameworks used in these studies when we will construct the export framework for the economies of transition.

Redding and Venables (2003) measure the effects of external market access and internal supply capacity on export performance and economic growth. They applied standard bilateral gravity models and concluded that economic geography and sources of supply significantly matter for the economic development of a country, even after controlling for a variety of other determinants of income per capita.

Fugazza (2004) emphasized the importance of supply-side conditions on export performance, particularly in Africa and the Middle East. Using quantile regression techniques, Fugazza estimated the impact of foreign market access and internal supply-side characteristics on the export performance of a country. He estimated exports as a function of GDP, population, internal transportation costs, a competitiveness index, and a constructed variable used as a proxy for foreign market access. He found that internal infrastructure and quality institutions along with international market access can be considered key determinants of export development.

Krugman and Venables (1995) made a key contribution to the literature of trade and globalization, which is directly correlated with the scope of our study. Their analysis evaluates the relation between globalization and gains from trade and the importance of transportation costs. According to the results of this study, economic integration and transportation costs play an important role in determination of trade performance of the countries. They also concluded that the level of integration between countries should be balanced to the extent which maximizes the gain from unification for the both sides.

Krugman and Venable’s work can be considered of special interest for our research, as we try to estimate the impacts of external costs to the major markets as well as the impact of economic integration on the export growth of transition country. In this respect, our theoretical approach will partially refer to Redding and Venables (2003; 2004), Fugazza (2004) and Krugman and Venables (1995) studies. At the same time we will define the importance of traditional export models to our analysis.

Works by Krugman, Redding, Venables, and Fugazza contribute to our study by helping to define the importance of ‘External Costs to Markets’ in the theoretical framework. Based on the structure of traditional export studies, we can emphasize the importance of country’s productive capacity, domestic demand, potential market demand and external costs to markets in determining the export growth.
3.2 Trade Facilitation Literature

A recent topic in the export literature is the study of the impact of trade facilitation policies on export performance. These studies mainly differ from traditional export growth models by estimating the impact of specific trade, economic or political reform policies on a country’s export performance. ‘Trade facilitation’ has mainly been defined as increasing the quality of the processes that lead commodities to be exported or imported and improving the efficiency of transactions associated with trade. The most important issue for researchers in this sphere has been how regulations, procedures and trade policies should be organized within countries in order to reduce trade-associated costs and increase trade amounts and efficiency.

Analysis and quantitative techniques used in the works of McCallum (1995), Obstfeld and Rogoff (2001), Iwanow and Kirkpatrick (2007), and Wilson, Mann and Otsuki (WMO) (2004) are significant contributions in trade facilitation studies. Most of these works apply a common methodological approach that measures export performance with respect to trade costs based on Tinbergen’s (1962) model.

McCallum (1995) presented a case study on the impact of the Canada-US border on regional trade patterns. Using gravity type models based on Tinbergen (1962), Linneman (1966) and others, McCallum defines the regional trade between Canada and United States as a function of each region’s GDP and the distance. Then the impact of preferential trade blocs on the trade patterns was estimated. Author concludes that “even relatively innocuous Canada – US border” have significant impact on continental trade patterns.

The study by Iwanow and Kirkpatrick (2007) estimates the impact of trade facilitation reforms, infrastructure, and quality of reforms indicators on export performance. This work applies a standard gravity model in the estimation process with panel data from 2000 to 2004 for 78 countries. They construct a trade facilitation variable from data on hidden export barriers and irregular payments in exports and imports. They also construct aggregate indexes of trade facilitation using components of World Bank’s Doing Business Dataset. They use indicators of ‘Trading Across Border’ and ‘Enforcing Contracts’ categories of Doing Business dataset. They conclude that positive impacts of trade facilitation reform do exist; however, transportation, communication and quality of internal reforms are no less important.

Wilson, Mann, Otsuki (2004) (WMO) estimated the relationship between trade facilitation and trade flows across 75 countries during 2000 and 2001. This work takes into account the importance of four categories on trade flows: port efficiency, customs environment, regulatory environment, and service sector infrastructure. Each of these categories is an aggregate index of indicators from The Global Competitiveness Report dataset. All four factors were positive and statistically significant in trade-flow estimation.

Allen Denis and Ben (2007) estimated the impact of cost of exporting, domestic market entry and international transport cost on export diversification in developing countries. They used data from the World Bank’s Doing Business Database in the study and implemented cross-sectional analysis of a single year 2005. Their estimation was based on a set of 118 countries, and they found that decreases in the cost of exporting or international transport cost resulted in increased export diversification. They also concluded that lower domestic market entry costs can enhance export diversification.

Manchin and Francois (2007) use bilateral trade flows data for the years 1988 – 2002. In their study of institutions, infrastructure, and trade they concluded that both institutional quality and the availability of developed transport and communications infrastructure are important determinants of exports. They also concluded that the impact of colonial and geographic factors and trade preferences on exports is significant.
In her study, Krueger (1980) addresses the issues of importance of trade policies and their relation to economic development. According to results of this study, internal effectiveness and international market-oriented trade policies have a higher rate of return for the economic growth of Least Developed Countries than other possible policy changes. Krueger emphasizes “the enormous difficulties and costs of achieving the institutional and other policy changes that economic growth requires”.

Chris Alexander’s and Ken Warwick’s (2007) study of governments, exports, growth and globalization, defines the positive impacts of exporting, openness and globalization on the economic performance of the country. Even though empirical estimations were not implemented in this research, it very strongly notes certain policy improvements for the governments in favor of exports and growth. According to the authors, eliminating international trade barriers and setting foreign direct investment and government policy in the in the context of various market failures can lead to efficiency gains from increased specialization.

Sanjaya Lall’s study (1997) of the impact of selective policies on export performance discusses the successful experience of the ‘Asian Tigers’ during 1990-94, and draws conclusion from it for other developing countries. The importance of two types of policies was mentioned in this work: ‘permissive’ policies leading to strong macroeconomic and business environment and ‘positive’ policies designed to have more of direct impact on product and factor markets, including export promotion, technological improvements, human capital, trade and foreign direct investment. Even though Lall emphasizes certain limitations of selective policies, in general, he concluded that with the absence of these policies export growth and diversification can be ‘slow and shallow’.

Works by McCallum, Kirkpatrick, and WMO make an important contribution to the scope of our study in terms of defining the significance of trade-related infrastructure, internal transportation and transaction costs in the export performance of transition economies. Based on the literature of trade facilitation mentioned above, we will define the main data sources and variables which can be used for measuring the importance of trade facilitation in the exports of transitions.

### 3.3 Exports of Transition Economies

The main characteristic of this literature is about applying export models and trade facilitation studies to a sample of transition countries. These works estimate the impact of different policies and reforms on the export and growth performance of transition economies. They also define ‘successful’ and ‘poor’ reformers in terms of trade expansion and economic growth.

Most of the transition country export studies (Hamilton and Winters (1992); Harvylysyn and Al-Atrash (1998); Kamiński (1996); analyze Central and Eastern Europe countries’ (CEEC) and other transitions export performance by using bilateral gravity types of models. Findings of these studies indicate that removing central planning limitations on foreign trade and implementing market-oriented reforms and policies increased the amount and shaped the structure of foreign trade in transition economies. Among the changes from such policies were increased exports of CEEC and improved foreign market integration to European Union.

Kaminski, Wang and Winters (1995) study of export performance of transition economies of Europe and Central Asia concluded that early transition implementation of stabilization and liberalization reforms had a positive effect on a country’s export performance. This study emphasizes the necessity of removing export controls over import controls in the short-run; however, in the long-run an “open import regime, realistic exchange rate and privatization are necessary to assure the efficient transmission of market signals and sustained growth”. Kaminski explains export performance of
transitions as a function of exogenous determinants (initial conditions, geography and market access), macroeconomic policy and trade policy reforms. An important conclusion of this study is that macroeconomic stabilization and price liberalization which is associated with the removal of export controls can lead to an improvement in transition country’s export performance.

Damijan, Rojec and Ferjancic (2008) studied export performance of CEEC\(^9\) and certain EU member transition economies from 1994-2004. By applying a gravity model and following the empirical approach of Redding and Venables (2003, 2004), and Fugaza (2004) this work estimated the effects of foreign/EU market access and internal supply capacity on export performance. According to their results, contribution of foreign market access versus supply capacity to export performance is almost equal for all CEEC countries in the sample. The importance of FDI in creating economic potential for future export growth is another important conclusion of the study.

Havrylyshyn and Al-Atrash (1998) analyze the progress of foreign trade in transition economies in terms of foreign market integration and trade openness. From their pooled regression analysis for two years (1995 and 1996) they find significant positive impacts from trade openness and geographical proximity of transition economies to EU countries. Geographical diversification to the European Union has a bigger positive impact for the countries with more advanced economic reforms.

Besedes (2010) investigated structural variation of trade in 17 transition economies from 1996 to 2006. Besedes considered exports of three types of products: homogenous goods, reference priced goods and differentiated goods. He estimated export shares of each type of good and intensive and extensive margins. Most countries increased the share of differentiated goods in exports during this time-period; however a few increased the share of homogenous goods. Larger economies tended to increase the number of countries they export to, while richer economies increased the amount of products, especially in homogenous and reference priced goods.

4. Modeling Exports of Transition Countries

4.1. Introduction

The export models discussed in Chapter 3 focus on different aspects of export determination, but share a common framework that includes variables representing excess supply and excess demand. Excess supply determinants in these models include factors related to the productive capacity and cost in each exporting country and domestic demand for the goods that country can produce. Excess demand determinants include measures of the potential markets for the exporter’s goods including costs of getting exports to the market.

We summarize the most important categories of excess supply and demand variables used in previous studies in Table 4.1 and discuss the variables we use in this study.

Excess supply factors in export models include measures of the productive capacity of the economy, domestic demand, and domestic costs of exporting goods. Productive capacity measures the ability of a country to produce goods that could potentially be exported. Productive capacity variables include measures of the size of economy, resources to produce goods, and characteristics of the business and legal structure of economy, which may impact production efficiency.

\(^9\) The study classifies CEEC countries into two groups: ones which joined European Union in 2004 (CEEC-8: Czech Republic, Estonia, Hungary, Latvia, Lithuania, Poland, Slovakia and Slovenia) and the group which joined in 2007 (CEEC-3: Bulgaria, Croatia, Romania).
Excess supply also accounts for the domestic demand for the goods produced in the country. Domestic demand is associated with market characteristics of the country including measures of the size of the economy, population and income.

The final elements of excess supply are related to costs associated directly with exporting goods. This includes such factors as internal transportation costs, internal export transaction costs, and the costs associated with the quality of trade-related infrastructure.

Excess demand represents the potential demand for exports from a country. The primary elements of excess demand in the export literature measure characteristics of the economies of relevant markets a country may sell to and costs of getting exports to these markets. In bilateral models which focus on trade between pairs of individual countries, excess demand variables are specified for each individual market. Export performance models, such as this study, use aggregates of excess demand characteristics to measure the demand for the country's exports.

### Table 4.1 Theoretical Framework for Export Model

<table>
<thead>
<tr>
<th>Excess Supply</th>
<th>Productive Capacity</th>
<th>Domestic Demand</th>
<th>Domestic Export Costs</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Size of economy</td>
<td>Size of Economy</td>
<td>Population</td>
<td>Internal transportation costs</td>
</tr>
<tr>
<td>Population</td>
<td>Population</td>
<td></td>
<td>Internal export transactions costs</td>
</tr>
<tr>
<td>Natural resources</td>
<td>Income</td>
<td></td>
<td>Port costs</td>
</tr>
<tr>
<td>External resources</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>External Investment</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Human capital</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Institutions</td>
<td>Business Climate</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Technology</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Excess Demand</th>
<th>Potential Market Demand</th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>External Costs to Markets</td>
<td>Size of market</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transportation costs to markets</td>
<td>Relative prices and exchange rates</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Import transactions costs in relevant markets</td>
<td>Income in market</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### 4.2. Empirical Model

#### 4.2.1. Excess Supply Variables

The first category of excess supply variables is productive capacity. Following the literature discussed in Chapter 3, we include measures of the size of the economy proxied by GDP, productive resources including population and natural resources, and the variables associated with the business climate and technology level of the country.

We expect GDP and population to be positively associated with the productive and export capacity of the economy. Higher levels of GDP and population, however, are also associated with increased domestic demand, which decreases the amount of goods available for export. Given that these variables are associated with higher production and higher domestic demand, their expected signs in an export determination model are unclear. These variables are included in previous models, however, and GDP has been
consistently found to be positively associated with higher levels of exports, when higher levels of population are usually associated with the lower levels of exports, ceteris paribus. Heterogeneity in natural resource endowments can be a deterministic factor for the country’s export performance. All other factors held constant, countries with the big amount of natural resource reserves have higher potential to export and grow their economy in comparison to ones with fewer resource endowments. This can be relevant to our study as we have countries in our sample which increased their exports at the beginning of the century as a result of extraction of oil and gas natural resources. We expect the natural resource variable to have positive impact on the country’s export performance.

External investment is another deterministic element of the productive capacity of the country in our model. External investment factor reflects how attractive the country is to foreign investors. We choose to proxy this factor by Foreign Direct Investment (FDI) inflows into the county. Given that FDI is associated with the higher capital inflows into the country and increased business activities, we expect it to positively impact the country’s productive capacity. Some of the previous studies consider this variable as an important element of technological and macroeconomic environment of the country. Based on the UNCTAD (Trade and Development Report, 2002), FDI can improve country’s competitiveness in foreign markets by increasing the technological structure of the exports.

It is expected that countries with more market-oriented institutions, transparent business climate, and with the higher efficiency of regulations are expected to create better conditions for domestic producers to operate. Consistently with the previous literature (Francois and Manchin, 2006), (Sonora, 2008), (Fugazza, 2004) we estimate the impact of business conditions, competitiveness environment and market transparency factors in our study. We apply interchangeably economic freedom and competitiveness indexes to control for the business climate and efficiency of institutions factors. Based on results from previous literature (Francois and Manchin, 2006), (Sonora, 2008), (Fugazza, 2004) and on theoretical consistency, higher economic freedom in the country, transparent competition policy and market oriented institutions are expected to motivate business climate and have a positive impact on the productive capacity and export performance in the country.

The competition variable is an index from the European Bank of Reconstruction and Development (EBRD) that combines several measures of policies that impact the business environment of a country. This index ranges from 1 (little policy improvement toward increasing competitiveness) to 4 (representing the norms of industrialized market economy). This variable is intended to capture country-specific progress in transitions in terms of competition policy and institutional development. Competitive environment and market oriented institutions can be important determinants of productive capacity in transition countries. For this determinant, we use index variable from European Bank of Reconstruction and Development (EBRD) for assessment of competitiveness policy efficiency.

As an alternative to the ‘competition’ variable we use the index of economic freedom from the Heritage Foundation, which aggregates ten separate economic freedom areas grouped into four pillars: rule of law, limited government, regulatory efficiency, and open markets. This index is similar to the ‘competition’ variable in terms of attempting to account for differences in internal market efficiencies in a country but econometrically is less correlated with other exogenous variables in the model. Economic freedom index is expected to control for institutional transparency and market openness. Considering a high level of positive correlation between ‘competition’ index variable and index of ‘economic freedom’ variable, we use them interchangeably.
Another element of productive capacity in our model is the efficiency of legal system in the country. Transparent legal system, less bureaucratic and less corrupted legal system of regulation in the country can be deterministic factor in the country’s internal efficiency, business climate, and productive capacity. We try to measure the impact of transparency in legal system on the export growth of transition economies.

We select to use the ‘number of procedures to enforce a contract’ variable from the World Bank’s Doing Business Dataset, as a proxy for measuring the transparency of legal system in the country. Keeping everything else constant, a lower number of procedures to enforce a contract is associated with less bureaucracy, better legislation system, and higher productive capacity in the country. Therefore, we expect the ‘number of procedures to enforce a contract’ to be negatively correlated with the productive capacity and export growth in the country.

One more determinant of productive capacity category that we use in the study is the level of technology adoption in the country. Higher level of technology adoption can be an important factor in the production process and lead a country to export more technologically advanced goods. On top of this, higher technology adoption can also increase efficiency of production, decrease operational, processing and transaction costs and bring competitive advantage to the exports.

We use the ‘technological readiness’ index from the Global Competitiveness Index Report as a proxy for technology. This is an aggregate index, which ranges from 1 (worst) to 7 (best) and is expected to control for the impact of information and communication technology use and technology adoption in the country. It is expected to positively impact exports of the country and higher levels of ‘technological readiness’ is associated with the lower trade costs, better productive capacity, and higher levels of exports, ceteris paribus.

Human capital is another determinant that characterizes country’s productive capacity. Higher level of human capital is associated with the improved education system and higher productive capacity in the country. Education data is limited for the observation years and the countries in our sample, however, and we did not include an education variable in our model.

Another category of excess supply variables is domestic export costs. Following to the previous literature mentioned in Chapter 3, as well as relevance to our study, we used measures of internal export costs and costs associated with the quality of trade-related infrastructure and ports as determinants of domestic export costs. We explored previous studies on export facilitation (Iwanow and Kirkpatrick (2007), Djankov (2006), Wilson, Mann, Otsuki (2003)) as well as Global Competitiveness Index Report and World Bank’s Doing Business Datasets in selecting the exact determinants for the domestic export cost group of variables.

As a determinant of internal export cost, we use the ‘cost to export’ variable from the Trading Across Borders group of World Bank’s Doing Business Dataset. It includes the costs of exports ($US), ranging from packing at the warehouse to their departure from the port, costs of all documents, administrative charges and fees (excluding tariffs) for exporting a 20 foot container. It is expected to have negative impact on the exports of a country, as higher internal export fees do not tend to motivate exports of the country.

We select the ‘cost to export’ variable over two other available determinants in the same dataset ‘time (days) to export’ and ‘number of documents required to export’ due to the fact that it combines the features of both of the later indicators in monetary terms. First, it includes all documentation cost and thus, accounts for all the factors under ‘number of documents’ variable in monetary terms. Also, it covers the costs of inland transport handling, customs clearance and inspection, port and terminal handling which are the parts of ‘time’ indicator. Higher variation over time in ‘cost to export’, better relevance to
our theoretical foundation and broader utilization in the previous literature (Djankon, 2008) leads us to select cost to export variable as an important part of our study.

We use ‘port quality’ index from the Global Competitiveness Index Report (GCI) as a domestic export cost factor in our study. It has been used in previous studies (Portugal-Perez, 2010), (Wilson, Mann, Otsuki (2003)) and is expected to measure the impact of the trade-related infrastructure on the export performance. It estimates the efficiency and quality of port facilities and how accessible they are in the country. We expect it to have a positive impact on the export growth as better trade-related infrastructure is expected lessens internal costs and promote exports.

‘Port Quality’ is a sub-index of ‘Infrastructure’ pillar in GCI report. Following the previous literature, we select it over other sub-indexes and pillars of sub-indexes, such as ‘electricity and telephony infrastructure’, ‘transport infrastructure’, ‘electricity and telephony infrastructure’. The main reason for selecting ‘port quality’ over other indexes is its direct relation to the trade-related infrastructure which is one of the main interests of this category.

4.2.2. Excess Demand Variables

The first group of excess demand determinants is external costs to markets. This group includes transportation costs to markets and import transaction costs in relevant markets. We used different studies mentioned in Chapter 3 (by Redding, Krugman, Venables, Fugazza) in selecting the data sources and variables for this group.

As transportation costs to relevant markets we select to use distance from the country to the major export market. Higher transportation cost is expected to have negative impact on exports. In other words, the proximity of major export markets can encourage exports through easiness and lower costs of foreign market access. Based on the discussion from Chapter 2, as a transportation cost for Central Asian countries we used the distance from the country to China or Russia. Following to Iwanow and Kirkpatrick (2007) for the rest groups of countries we used distance from Frankfurt as the proxy for transportation cost, as Frankfurt is being considered as the central point in Europe.

As a proxy for import transactions costs in relevant markets we use dummy variables for being a member of different economic unions or trade agreements. Following studies by Krueger (1980), Redding and Venables (2003) and Fugazza (2004), we measure the importance of being a member of European Union and the impact of Central European Free Trade Agreement on export growth in the country. It is expected that being a member of an important economic union is associated with the better foreign trade relations and thus lower external costs to markets and higher exports. However, the relative signs of impact trade union variables can vary, depending on the members and conditions of trade agreement. Therefore, expected sign of being a member of trade agreements is unclear.

The second category of excess demand determinants is demand in the potential market. This group includes variables associated with the measures of the size of economy, relative prices and exchange rates, and income level in target markets. Two important variables we use as representatives of the potential market demand group are GDP in major markets and the real effective exchange rate.

GDP in major market is used as a proxy for the relative size of economy in potential market. We used the aggregated value for the GDP of the five main export markets for each country in the sample based on the weight they play in the country’s exports. We expect the size of the major market associated with a country’s export to positively impact the country’s trade performance. Therefore, higher GDP in major markets is associated with the higher exports of the country, keeping everything else constant.
The real effective exchange rate (REER) (2007=100) was used as another determinant of potential market demand. We get the data for this variable from the Bruegel database, which is a European think tank specializing in economics.

This variable accounts for exchange rate change in each country in our model over the time span of our analysis. Increases in the value of a country’s currency are expected to decrease the potential market demand for the country’s exports. We can expect the sign for REER to be negative, although in previous studies the significance level of this variable is often low.

4.3. Model Specifications

We started with a simple base version of the model and then added new variables to assess their impacts.

The base model was:

\[
\ln(\text{EX}_it) = \beta_0 + \beta_1\ln(\text{GDP}_{it-1}) + \beta_2\ln(\text{POP}_it) + \beta_3\ln(\text{NatRes}_it) + \\
+ \beta_4\text{Distance}_i + \beta_5\ln(\text{GDPMM}_it) + \varepsilon_{it}
\]

\(\text{EX}_it\) represents the value of exports of country \(i\) at time \(t\). \(\text{GDP}_{it-1}\) denotes lagged gross domestic product, and \(\text{POP}_it\) represents country \(i\)’s population. Both of these variables are related to excess supply capacity and both are expected to have a positive impact on exports through increasing productive capacity and a negative impact on exports by increasing domestic demand. Consistently with the previous literature, we expected GDP and POP to have positive and negative impacts on exports, respectively. \(\text{NatRes}_it\) controls for the natural resource endowments (total natural resource rents as a % of GDP) in the country and is considered an important supply capacity determinant and a positive impact on exports is expected for higher values of this variable. \(\text{Distance}_i\) is an external market access cost determinant in the model and measures the natural log of distance for each country to the major export markets (in our model Germany, China, or Russia) and serves as a proxy for transportation cost. We expect the distance to have a negative impact on exports. \(\text{GDPMM}_it\) is the population weighted average of gross domestic products of the five main export partners for the country \(i\). It proxies the potential market demand in the major market and higher values of this variable are associated with the higher demand for the country’s exports while \(\varepsilon_{it}\) is the error term.

Initial additions to the base model were the macroeconomic variables \(\text{REER}_it\) which is the real effective exchange rate and \(\text{FDI}_{it-1}\) which is lagged Foreign Direct Investment inflows. We lagged FDI and GDP to help avoid endogeneity, which we will discuss later in this chapter.

The next specifications added some of the trade facilitation variables discussed in Chapter 3. These variables account for the impact of policies under control of government on exports. For these specifications we included ‘competition’ and ‘economic freedom’ indexes in the model along with other business climate factors.

We also expanded our model by adding the ‘technological readiness’ index from GCI report and the ‘number of contracts’ variable from World Bank’s Doing Business dataset.

The final specifications add domestic export costs to the models. These are: ‘export fees’ and ‘port cost’ factors. These variables measures: fees for exporting a 20 foot container from each country and quality of internal trade-related infrastructure. We were concerned about endogeneity of export fees with the level of exports so we followed Djankov (2006) and used an instrumental variable approach to include ‘export fees’ in the model. Following Djankov we used export fees in neighboring countries as an instrument.

The most comprehensive model estimated was:
\[
\ln(\text{EX}_{it}) = \beta_0 + \beta_1 \ln(\text{GDP}_{it-1}) + \beta_2 \ln(\text{POP}_{it}) + \beta_3 \ln(\text{NatRes}_{it}) + \beta_4 \ln(\text{REER}_{it}) + \\
\beta_5 \ln(\text{FDI}_{it-1}) + \beta_6 \ln(\text{ExportFees}_{it}) + \beta_7 \ln(\text{PortCost}_{it}) + \beta_8 \ln(\text{EconFreedom}_{it}) + \\
\beta_9 \ln(\text{ContractProced}_{it}) + \beta_{10} \ln(\text{GDPMM}_{it}) + \beta_{11} \ln(\text{Distance}_{it}) + \beta_{12} \text{EU} + \beta_{13} \text{CEFTA} + \epsilon_{it}
\]

\[
\text{ExportFees}_{it} = \eta Z_{it} + \nu_{it}
\]

Where \( Z_{it} \) is the average Export Costs for countries adjacent to country \( i \).

### 4.3. Data

We employ data from multiple sources. ‘Export fees’ and ‘contract procedures’ comes from World Bank’s “Doing Business Indicators”. Export data comes from United Nation’s COMTRADE database, ‘technological readiness’ and ‘port cost’ from Global Competitiveness Report (GCR), distances are from [http://www.indo.com/distance/](http://www.indo.com/distance/), language and other bilateral data are from the GeoDist datasets of Institute for Research on the International Economy (CEPII). Table 4.2 presents a summary of the main variables and data sources used in the study.

**Table 4.2. Summary Statistics**

<table>
<thead>
<tr>
<th>Variable</th>
<th>Obs</th>
<th>Mean</th>
<th>Std. Dev.</th>
<th>Min</th>
<th>Max</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>( \ln(\text{exports}) )</td>
<td>196</td>
<td>23.36</td>
<td>1.62</td>
<td>20.21</td>
<td>26.97</td>
<td>UN COMTRADE</td>
</tr>
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<td>24.05</td>
<td>1.51</td>
<td>21.41</td>
<td>28.13</td>
<td>World Bank WDI</td>
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<tr>
<td>( \ln(\text{population}) )</td>
<td>196</td>
<td>15.67</td>
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<td>13.34</td>
<td>18.77</td>
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<td>( \ln(\text{NatRes}) )</td>
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<td>24.89</td>
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<td>17.99</td>
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<td>21.17</td>
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<td>( \ln(\text{ContractProced}) )</td>
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<td>35.58</td>
<td>5.43</td>
<td>27</td>
<td>50</td>
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<td>( \ln(\text{TechReadiness}) )</td>
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<td>3.45</td>
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<td>45</td>
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<td>( \ln(\text{ExportFees}) )</td>
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<td>6.21</td>
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<td>WB Doing Business</td>
</tr>
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<td>( \ln(\text{PortCost}) )</td>
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<td>1.12</td>
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<tr>
<td>( \ln(\text{GDPMM}) )</td>
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<td>2.27</td>
<td>22.04</td>
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<td>( \ln(\text{Distance}) )</td>
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<td>4.20</td>
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</tr>
<tr>
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<td>0.43</td>
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</table>

### 4.4. Estimation

Our empirical model includes a panel of the 28 transition countries listed in the Table 2.2 for the years from 2005 through 2011. The data period goes back only to 2005 based on the availability of the Export Cost variable. We used Generalized Method of Moments (GMM) and GMM Instrumental Variables techniques for the estimation.

In our estimation we use the instrument variable GMM estimation technique based on Hansen (2000, Ch. 11), Hayashi (2000, Ch. 3) and Wooldridge (2002, Chapter 8). We chose GMM based on advantages of this approach for our model. First, GMM generates efficient estimates in the presence of heteroskedasticity of unknown form. This is the case in our panel data. After applying Breusch-Pagan / Gook-Weihsberg tests we observed
heteroskedasticity in our dataset. Even though standard IV estimators with the robust standard errors can be consistent, they are relatively inefficient. Second, efficient GMM has an advantage of consistency in the presence of arbitrary heteroskedasticity\textsuperscript{20}.

It is possible that ‘export fees’, carries a problem of endogeneity as higher exports in countries may lead to a high or low values of export fees. In this case, it can be correlated with the error term which under the usual OLS can lead us to the biased results. We use export fees of neighboring countries as an instrument for each country’s export fees following Djankov (2006; 2010). Specifically we use the average value of export fees of the neighboring three countries, which will avoid us getting into the problem of selection biasness by using a single neighbor.

Both econometrically and theoretically our instrument is meeting both exogeneity and relevance conditions and was used in the previous studies (Djankov (2010)).

In addition to meeting the GMM test results\textsuperscript{21} in STATA, we also apply Haussmann Endogeneity and Sargan-Hansen test. These tests significantly support the validity of the instrument used in the model.

In addition to the export fees variable there is a possibility of having an endogeneity problem in GDP, FDI. This is the reason why we lagged these two variables in our estimation.

We considered the possibility of applying two other panel data econometric estimation techniques (fixed effect and random effect). However, due to the following reasons we did not use them in our study.

First, in fixed effect any time-constant variable will disappear from the model as a result of ‘within transformation’ process. In other words, “any time-constant explanatory variables are removed along with unobserved effect” (J. Wooldridge, 2006, Chapter 14, page 481). Therefore, we are unable to estimate the impact of distance variable on the export growth in our model which is considered as one of the essential determinants of ‘external costs to markets’.

In addition, fixed effect and random effect econometric estimation techniques require that assumption of strict exogeneity of the explanatory variables to hold. In other words, idiosyncratic error terms in the model should be uncorrelated with each explanatory variable across all time periods. This can be questioned in our model. In order to avoid this and other previously mentioned econometric problems, we choose to apply the GMM estimation technique.

5. Results

Results for various specifications are presented in Table 5.1 and Table 5.2. Table 5.1 includes all 28 countries listed in Table 2.2., and Table 5.2. Excludes five “resource rich” countries (Russia, Kazakhstan, Azerbaijan, Uzbekistan, and Mongolia) where the annual natural resource value of production represents more than 30% of GDP. In general, results are robust throughout the estimations and adding variables step-by-step assists this conclusion. We estimate both groups of countries since the presence of large quantities of natural resources available for export could have effects on exports that can’t be accounted for by other variables in the model.

Both in the base model and as we add other determinants, based on the previous theory and theoretical relevance, estimated signs and significance levels of the important variables do not change considerably. This can be considered as a type of robustness check for the empirical estimation.

\textsuperscript{20} If heteroskedasticity in fact does not exist, then the GMM is ‘no worse asymptotically than the IV estimator’ (Baum, Schaffer; 2003).

\textsuperscript{21} Tests are available in STATA with ivreg2, which is the special type of the GMM modeling.
In order to better communicate the results, we interpret them consistently with our theoretical framework structure in Table 4.1. We start from 'excess supply' group of variables and then interpret results of 'excess demand' determinants. Differences from the “all country” sample to smaller sample can be observed from the tables; therefore, we will present the interpretation of sample groups separately.

5.1. ‘All Countries’ Estimation Results

The “all country” estimation results reported in Table 5.1 will be discussed first. When all countries are included in the estimation, coefficients for the lagged GDP and Natural Resources variables are consistent and robust across all six specifications and they indicate positive and statistically significant effects on exports. Positive and significant sign of GDP and Natural Resource variables also indicate that the transition countries with larger economies and greater endowments of natural resources tend to export more.

The population variable is negative and in two out of six specifications highly significant. This is consistent with our theoretical foundation, as we were expecting negative relation between the domestic demand and the growth of exports. The coefficient of the population variable across specifications is not robust and is not significantly different from zero in four of the models. This is consistent with mixed results for this variable in previous work.

Contrary to domestic demand variable, demand in the major exporting market stays significant as we add other control variables to our base model. Positive and significant parameter on the GDP of major export partners indicates the importance of the demand factor in the main markets. In other words, increase in demand in the export markets promotes exports of transition economies.

Coefficients for distance from major markets are negative, significant, and of similar magnitude across all specifications reflecting the export depressing impact of higher transportation costs. Highly significant parameter of this variable throughout the specifications indicates the robustness and importance of transportation cost for the export performance in transition countries.

As we add macroeconomic variables into the model, magnitude and significance level of the previous variables do not change highly. We can observe some decrease on the impacts of the previous variables; however, all variables stay of the same high significance as in first specification.

The real exchange rate coefficient was insignificant across all specifications, as it was in previous studies as well (Santos-Paulino; Fugazza), it is not being omitted from the studies with the purpose of avoiding the omitted variable bias. In our study it is used as a proxy for relative prices and exchange rates, which are the subcategory variables for the potential market demand.

Lagged Foreign Direct Investment was included in five of the specifications and the coefficients were positive, significant, and of approximately the same magnitude across all of them. Consistently with expectations, higher FDI inflows promote exports of countries through utilization of low-cost human capital and natural resources.

As we add business climate and later internal export cost variables into our model all the previous determinants keep their signs and significance levels, with an exception of population variable which gets insignificant.

Measure of economic competitiveness was significant and positive in the specifications. Index of economic freedom had positive and significant sign in one out of three specifications. Business environment and technology determinants: contract procedures and technological readiness both have expected negative and positive impacts respectively.
Internal export costs were insignificant but coefficient on port cost variable is positive and significant indicating the importance of trade-related internal infrastructure on the export growth. Possible reasons for the insignificance of ‘export fees’ can vary and they go beyond the scope of this study. It is likely that the very small monetary amount of this variable and relatively small number of observations cause a negligible impact on the growth of exports. After including additional countries or years (when available) possibility of getting significant parameter estimates on export fees variable can increase.

The last specifications include dummies of being a member of EU and Central European Free Trade Agreement. Being an EU Member state is estimated to have a positive and significant impact on the export growth in transition countries. On the other hand, Central European Free Trade Agreement estimated to have negative and significant impact on the exports, which is primarily because of the fact that the members of CEFTA trade organization are comparatively less developed (in terms of GDP and exports) representatives of Central and Eastern Europe. As these countries expand their economy and meet the requirements of EU membership, they become no more the members of CEFTA.

5.2. ‘Non Resource Rich’ Countries Estimation Results

Even though the estimation results when the 5 “resource rich” countries are excluded are similar to those for all countries a few exceptions exist. The GDP coefficients remain positive and significant across all specifications but the magnitude of the coefficients increases somewhat with the smaller number of countries. The natural resource coefficients remain positive and significant for 5 of the 6 specifications for the smaller group of countries but their magnitudes are about 1/3 smaller than estimates for the full set of countries. When we drop resource rich countries distance stays highly significant for both groups of countries but larger negative impact on exports for non resource rich countries appears from results. At the same time, FDI gets less significant for simpler models and generally has lower impact on exports. This suggests a larger impact of FDI for countries with abundant resources. Results for the ‘export fees’ variable were almost identical for the two country groups.

As we mentioned earlier in the study, “resource rich countries” can cause distortions to our model which can lead to getting less exact parameter estimates for the usual transition paradigm. This can be observed from the parameter estimates of the transportation variable which are lower when we include resource rich countries in our sample. One of the possible explanations for this might be due to oil and natural gas being major exports in resource rich countries and since they are being exported by pipelines and large tankers, distance has a smaller impact on oil exports.

This can be one of those reasons, why the coefficient on transportation cost gets higher, indicating that as we take out resource rich countries from our sample, purer impact of external costs to markets we obtain.

The significance level for business climate, technological readiness, transportation costs to markets, drop in some model specifications when resource rich countries are excluded. Positive and significant parameter of port cost becomes less significant but remains positive as it was expected.

Significance level of technological readiness and two dummies of import transaction costs in relevant markets decreases but remains significant in specifications, as we exclude resource rich countries. One of the possible reasons can be the decreased number of observations, leading to higher standard errors in the estimation results.
Table 5.1: Estimation Results - All Countries

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Standard errors in parentheses

*** p<0.01, ** p<0.05, * p<0.1
Table 5.2. Estimation Results – Non-Resource rich Countries

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Standard errors in parentheses
*** p<0.01,** p<0.05,* p<0.1
6. Conclusion and Policy Implications

Much attention has been given to studying the economic performance of former Soviet Union and Eastern European transition economies and much of the focus of those studies has been on the economic impacts of early transition policy differences. Recent data indicates that major economic differences among transition countries continue to exist including significant differences between countries in export growth since 2005. In this study we used annual export data for 28 transition countries for the years 2005 through 2011 to attempt to identify sources of these differences in export performance. We had a particular interest in the impact of differences in export fees and other trade-related costs on exports of transition countries. Export cost data has only recently become available and there has been little empirical research on the impacts of these costs. We are also trying to measure the impact of trade-related infrastructure and technological advancements on the export growth in transition countries. Heterogeneity in the level of development of these factors across transition countries likely to impact export growth in the region.

6.1. Study Summary and Conclusion

In this study, we measured the impact of 'domestic export cost' and 'external costs' on the export growth in transition economies. Our study covered the sample of transition economies emerged after the break-up of Central Planning System of regulation. Sample included Former Soviet Union countries, Central and Eastern Europe countries and Mongolia. We applied our analysis on the most recent available years for our data from 2005 through 2011. Theoretical model was based on the previous traditional export growth and trade facilitation literature and on the specific features of transition economies. Theoretical framework of our study defined export growth as a set of variables which were classified into 'excess supply' and 'excess demand' determinants. Together these factors put together main subcategories of variables covered partially in 'traditional export' and partly in 'trade facilitation' literatures. Based on this, we came up with the empirical model and estimations which included both traditional export determinants and specific variables for the structure of our study. In empirical part we applied GMM estimation technique with the instrument for the 'domestic export costs'. Differences in export and growth performance of transition countries continue to exist. Along with traditional export determinants, domestic export costs, business climate and external costs to markets appeared to have important impact on the exports. High importance of Natural Resource and Foreign Direct Investment factors were also specific to the export growth performance of our sample. It appeared that the availability of natural resources plays important role in export growth even after controlling for the heterogeneity in other determinants. Foreign Direct Investment was particularly important in export growth of ‘resource rich’ countries as abundance of resources (particularly oil and gas) attracts foreign investors and increases productive capacity of the country to export. This was concluded from the results as we applied two different models with and without ‘resource rich’ countries.

We presented two tables of results for ‘all country’ sample of 28 transition countries and results after excluding five ‘resource rich’ countries from our sample. Our findings were generally consistent with theory and previous findings where the size of the economy and distance from markets have strong influences on exports. Among these transition countries, we found major positive impacts on exports from greater availability of natural resources.

Our results also suggest that FDI has a greater positive impact on exports for natural resources abundant countries. The importance of Foreign Direct Investment was higher
when we have ‘resource rich countries’ in our sample. It has been proposed that high level of FDI inflow into ‘oil rich’ transitions, such as: Azerbaijan, Kazakhstan and Russia causes increased exploitation of underground resources and promotes exports of these resources. When we excluded ‘resource rich’ countries from our sample, the impact and significance of FDI variable dropped which was consistent with our hypothesis.

Internal export fees appeared to have no impact on exports from transition countries. Port cost seems to be another significant export growth determinant. It appears from results that high quality and easy accessibility of ports in the country decrease domestic export costs and promotes growth of trade.

Importance of transaction cost and economic unions, such as being a member of European Union, appears to have impact on the variation in export performance between transition economies. On the other hand, trade unions are not always causing export growth. This can be observed from the CEFTA variable which does not promote export growth. The main reason for this can be the fact that the members of CEFTA are the economies of Central Europe region with relatively smaller markets when compared to the European Union member state CEE countries.

Competitiveness and business climate factors also have significant impact on the export growth performance in transitions. More market oriented policies and promotion of competitive business environment in the country supports export growth. High level of technological development and transparent legislation system are also deterministic factors for export growth in transitions.

Distance from markets and natural resource endowments are two export determinants that are beyond the control of any country. In contrast, government policies related to a competitive business environment and export costs can be changed in an effort to increase exports and economic growth. This is the motivation for the recent trade facilitation literature and for our interest in recent year export performance of transition countries and the impacts of export costs (fees) on exports.

6.2 Possible Policy Implications

Based on the results of our study, it is important to mention some of the possible policy implications and governmental regulation techniques which can be applied towards increasing export growth in the country. We base our policy implications on the results of this work and on previous studies in this area (Krueger, 1980; Krugman, 1995; Baldwin and Venables, 1995).

Considering high costs of institutional and infrastructure improvements for the countries in transition, one of the important policy implications for the export expansion can be market-oriented trade reforms. Reforms that can increase the opportunities for the domestic producers participate in the world competition, trade liberalization and lowering the domestic market protections.

In order to diminish the impact of transportation and transaction costs, economically separated countries can increase amount of trade by means of Regional Integration Agreements (RIA), international transactions. As we observed from results (Table 5.1, Table 5.2.), being a member of European Union has a positive and significant impact on the export growth of transition economies. Globalization to the European markets, through regional agreements and increased amount of transactions, might decrease the magnitude of the impact of transportation costs for Transcaucasia and CIS-Europe countries. Based on results of this study we can state that regional integration and integrated-economy approach can lead transition economies to take advantage of heterogeneities in factor endowments and increasing returns.
Important contribution to the exports growth in transition economies can be technology improvements in exports. Variation in technology can be a cause of comparative advantage. Performance of ‘Asian Tigers’ group of countries between the early 1960s and 1995 can be a support for this point. Specializing in the areas of competitive advantage and increasing high-tech exports along with other factors enforced export growth in this region to a considerable degree and as a result led to economic growth and development. Similarly, CEE countries in our sample can be classified as relatively high-tech exporting countries thus, achieving higher export growth and economic expansion. This is the opposite to what can be observed in the most of Central Asian and Transcaucasia transition countries. Relatively low levels of technology involved exports are among the factors of low export and economic growth in these regions.

Technological expansion can have positive impact on both supply capacity improvements, through increased exports of high-tech goods, and on foreign market access, through increased foreign direct investments inflows and better relations with the developed markets. In this respect, important policy implication from this study can be putting more emphasize on production and exports of technology involved goods.

Even though trade related infrastructural improvements can be relatively costly, positive impacts on the exports were obvious from the study. Better infrastructure and less time consuming contracting strategies can lower operational costs for export, decrease the time spent on the procedures and thus motivate the countries to increase the amount of bilateral transactions.

For oil rich economies in our sample, such as: Azerbaijan, Kazakhstan, Russia, implementing export fostering policies can be easier than for others. Wise use of oil revenues and investing into long-term development of economy can promote export and economic growth in the region. Last but not least important policy suggestion can be made to CIS-Europe countries: Belarus, Ukraine and Moldova. Important to mention that these countries are almost at the same distance from the EU markets as CEE or Baltic States are. In this case, taking advantages of the closeness to the developed markets, matching the transition process to the successful transitions in the neighboring countries, increased level and quality of market-oriented reforms can possibly bring to the positive changes on the export growth in these countries.

6.3 Limitation and Future Research

Unavailability of the data on important variables put some restrictions on the current study. As data becomes available, more specific studies with respect to the country groups can be implemented separately. In this respect, future researchers can expand the scope of this study by concentrating on the separate transition groups and studying them individually.

Analysis of policy contributions and improvements in terms of reducing negative impact of trade costs on the export growth can be another topic of interest for the future studies. Researches can put more effort on finding the most efficient way for regulation of domestic costs affecting the export growth. At the same time, future researches can focus on the possible ways of decreasing the negative impact of external costs to markets.

Based on the fact that the most recent available data has been utilized in this study and not many works on the exports of transitions covered the same issues previously, we believe this work will be a good contribution to the literature on the exports of transition economies.
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Appendix

Main Export Partners of Economies in Transitions

For illustration, Kyrgyz Republic is a Central Asian transition country which shares its borders with: Russia, Tajikistan, Uzbekistan, Kazakhstan, and China. Later three countries are also main export partners of Kyrgyz Republic. Exports in 2011 for Kyrgyz Republic was only slightly above $3 billion which accounts for export growth of 17% from 2010 to 2011. In contrast, another landlocked transition economy, Slovak Republic (Central and Eastern Europe transition economy), had exports of more than $84 billion for the same year, with the growth of 23% from 2010. The main trade partners for Slovak Republic were Germany, Czech Republic and Poland. Along with many other factors, proximity to EU and thus, higher chances for global integration can be considered as possible advantages for the exports of CEE countries, when compared to Central Asian economies.

We are interested in determining the possible comparative advantages of CEEC and Baltic States from being located closer to the major markets and having advantages of globalization when compared to Central Asian and Transcaucasia transition countries.

In order to better illustrate the conclusions above we shortly discuss major export partners of each subgroup of countries within the FSU and Non-FSU groups for the years of 2006-2011:

Central and Eastern Europe sub-group:

This sub-group includes Poland, Czech Republic, Romania, Hungary and Slovak Republic. Germany is the major export partner for all of the members of this subgroup. Also Italy is another major export destination for the countries in this sub-group.

For illustration, we take Hungary22 as a representative of CEE group’s sample. From four major export partners of Hungary (Figure A1), on average about fifty percent of exports go to Germany for the years of 2006–2011. For all of the countries in the given subgroup Germany is considered as the major market and accounts for the biggest share of exports.

Figure A1. Hungary’s Export Shares with the four major markets (2006-2011)

Balkan Countries:

This sub-group includes: Croatia, Bulgaria, Slovenia, Serbia, Bosnia and Herzegovina, Albania, Macedonia and Montenegro. Similarly to CEEC these countries mainly trade

\[\text{Figure A1. Hungary’s Export Shares with the four major markets (2006-2011)}\]

\[\text{Source: UN Comtrade Database}\]

22 Instead of Hungary any other country can be applied and the general picture does not change.
with other European Union States as well as between each other. For some countries Germany is the major export partner (Bulgaria, Slovenia) for others Italy (Croatia, Albania, Serbia etc.). Other than these countries, representatives of this group also trade with other Balkan countries.

We select to present Bulgaria and Croatia as two representatives of this group, with the major partners of Germany and Italy respectively. (Figure A2 and Figure A3)

**Figure A2.** Bulgaria’s Export Shares with the major markets (2006-2011)

Source: UN Comtrade Database

**Figure A3.** Croatia’s Export Shares with the major markets of (2006-2011)

Source: UN Comtrade Database

**Baltic Countries:**

Exceptional case for Former Soviet Union is Baltic States which include Latvia, Lithuania and Estonia. Major export partners for this group of countries are European Union member states and particularly Scandinavian countries. More than 70% of Estonia’s exports go to other Member States of the European Union (Andrus Ansip, Prime Minister, 2011). Important to mention that Russia is also considered among the top export partners of these countries even though it has less shares than European Union Member States.

As a representative of Baltic States subgroup in Figure A4 we select Estonia. Exports to Russia accounts for a big share out of total export to the major markets, However, the share of exports to Russia is not as big as the share of Scandinavian countries (Finland and Sweden) taken together. Therefore, in our analysis we consider EU market as the major market for the exports of Baltics.

23 Just like in the previous sub-groups, other representatives of this subgroup (both Latvia and Lithuania) reveal fairly similar picture.
Europe CIS countries:

This group includes: Belarus, Ukraine, Moldova, Armenia and Georgia. Major export partners for this group of countries are both Russian Federation and European Union Member States in addition to other CIS countries. In this respect, Georgian exports mostly go to other CIS representatives like Azerbaijan or Armenia, at the same time Russia accounts for the most of exports of Belarus and Ukraine (Figure A5).

Central Asia:

This sub-group of FSU countries has mostly similar export partners: Uzbekistan, Tajikistan, Kyrgyz Republic and Mongolia. Special characteristic of this group is having as a main export partner either Russia or China. For instance, more than 85% of overall exports of Mongolia for the year of 2011 went to China. Also considering the small economies of these countries they tend to trade between each other and this account for a big portion of the relative exports. In this respect, Kazakhstan plays an important role as an export partner for Kyrgyz Republic, Tajikistan, and Uzbekistan.

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24 Ukraine is an unofficial member of CIS.
25 Even though Mongolia was not officially member state of Former Soviet Union, due to the political and economic similarities in most of the studies it has been included as an FSU country.
26 Source: EU Bilateral Trade and trade with the world
In conclusion, natural resource independent FSU countries (excluding Baltic States) as a major export market tend to trade with Russia and/or China. In contrast, Non-FSU countries of our sample as well as Baltic countries mainly export to EU member states. Later in the model we will come back to these points when we try to estimate transportation costs to exporting to the major markets. Major export partners for Natural Resource rich countries: Azerbaijan, Russian Federation and Kazakhstan have been discussed earlier (Figure A6).

**Figure A6.** Azerbaijan’s Export Shares with the major markets (2006-2011)

Source: UN Comtrade Database
Financial Reform and Liberalization in Iran and comparison with two ECO members: Pakistan and Turkey

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Keywords: Financial Liberalization, Financial reform, Liberalization Index, Principal Component Method, Iran, Turkey, Pakistan

JEL Codes: C43, E65, G28, O16.

The aim of this paper is to examine and construct a financial liberalization (FL) index for Iran and compared with two ECO members (Turkey and Pakistan) employing the principal component method (PCM) and using the annual data of 40 years (1973 to 2013). This index is specifically helpful in monitoring the pace of liberalization and evaluating the impact of the policy on various aspects of the economy.

The constructed index shows that the financial liberalization process in Iran speeded up during the period of 1990 to 2009.

Comparing the FI index for Iran with Turkey and Pakistan shows that Iran and Pakistan both started financial reform since the early 1990s but Turkey started since the early 1980s. The figure of FL for Turkey reached to 5 out of 8 but for Iran and Pakistan was 3.5.

1. Introduction

Financial system of Iran has evolved through a number of stages since the 1979 Revolution. After widespread nationalization in the early 1980s, the reform of financial system in the early 1990s, in the context of the First Five Year Development Plan (FYDP) (1989-1993), focused on improving the regulatory environment and streamlining controls to enhance efficiency. In addition stock market reopened and some state owned corporations listed in the market. In the second FYDP (1995-1999) the reform emphasized on setting interest rate at levels that ensure positive real return on bank deposits, decreasing the credit ceiling, issuing investment certificates, and encouraging the entry of private non-bank credit institutions. In the third FYDP (2000-2005) the reform focused on decreasing the use of administrative controls on credit allocation and interest rate, recapitalization of the state banks by issuing participation papers, and preparing the condition for the operation of private banks and non-bank credit institutions. The stock market was opened to foreign investors during this period up to 10% of each share and later increased up to 20% and foreign investors supported by Foreign Investment Law approved by the Parliament. In the Fourth FYDP (2006-2010) reform programs focused on reducing government intervention in banking allocation, limited modification of the member of money and credit council in line with central bank independence, and increasing foreign investment ceiling in stock market to 20 per cent. Some state owned banks privatized. In the Fifth FYDP (2011-2015) foreign banks are allowed to start financial intermediary either opening branches or participation with Iranian banks.

All of these policy instruments were expected to complement each other in achieving the overall objectives of competition and efficiency, smooth functioning of money and capital markets, and attainment of stability in the financial sector of Iran. These policy measures are discussed below:

Deregulation of Interest Rate

After widespread nationalization in the early 1980s, the reform of banking system started in the early 1990s, focused on improving the regulatory environment and streamlining controls to enhance efficiency.

The ceiling on lending rates was removed in 1991 only for the domestic commerce and services sectors, but reimposed in 1993, again removed in 2001. However, for other sectors the ceilings still remain. Until 2004, as always, the priority sectors like agriculture had the lowest loan rates and those for domestic commerce and services had the highest rates.

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In the early of 2000s decade, the central bank has relaxed slightly its control on the interest rates on deposits for longer term, e.g., since 2001 public banks have been authorized to determine the rate of interest on 2-4 year investment deposits within the range of 13-17 per cent per annum, but still there are tough restrictions on lending rates. However, in the context of participation Islamic contract the loan rate to somehow is flexible because the predetermined interests rate is provisional, at the end of project the loan rate can be adjust based on the project return.

**Direct Credit controls**

Until the early 1990s the banking system is subject to many controls including administrative controls including sectorial credit allocation, directed credits, high reserve requirements, and government interference in management: interest rates are set at start of each year with production goals and are rarely changed.

The government continues to dictate what proportion of lending by the state banks is allocated to each sector, set by the money and credit Council (MCC). However, some small advances have been made in recent years related to sectorial credit allocation. Since 1989 credit ceiling control on total banks loans has been relaxed and finally was removed in 1991. Since 2000 a part of banking credits have been excluded from the scheduled sectorial allocations. But, recently no compulsory scheduled sectorial allocations for banks. If the government wants to support especial economic sectors with directed credit or preferred rate, it should be compensated with some funds allocated in the annual government budget approved by the Parliament.

**Reduction in the Reserve Requirement**

Generally, reserve requirements for commercial banks deposits were high. However, in the recent years small reduction in the reserve requirements has happened, e.g., since 2000 reserve requirement for shorter term deposits declined from 25% to 20%. Furthermore, in the year later central bank decreased the reserve requirements for short term deposits, on average, by 5%. In 2009/10 again decreased, on average, by 2%.

Although no more reduction happened in reserve requirements of commercial banks, but the rate was relatively low for specialized banks (about 10%).

**Entry barriers**

Following the 1979 Revolution, all commercial banks were nationalized and foreign participation in banking practically (but not legally) was banned, although permission for foreign banks to set up full operation on the Iranian mainland has approved in principle.

The banking laws (1973) limited foreign participation to 40 per cent in any banks operated in Iran. The Central Bank limited foreign ownership in new banks to 35 per cent. In 1998, the government authorized foreign banks to offer full banking services in Iran’s free trade zones. However, in the context of the Fifth FYDP (2011-2015) foreign banks are allowed to start financial intermediary and banking either opening branches or participation with Iranian banks. The law approved by Parliament in 2011 and its necessary regulations prepared by the central bank of Iran.

In 1994, the central Bank authorized the creation of private credit institutions. At the end of 2001, the central bank approved license for 3 credit institutions to become fully functioning private banks. Now Iranian banking system composed eight state owned banks and eighteen private banks.

**Restructuring of Government Owned Commercial Banks**

In the third FYDP (2000-2005), the state banks by issuing participation papers recapitalized and prepared the condition for the operation of private banks and non-bank credit institutions.
Following passing of an amendment to Article 44 of the constitution in July 2006, a new privatization program on state banks has been approved. During 2009/10 three state owned banks privatized, i.e., Sadrat, Mellat and Tejarat banks.

Introduction of Prudential Norms

Recently, some regulatory reforms are in place, including licensing, net open positions in foreign exchange, the definition of statutory capital, capital adequacy, large exposures, connected lending, and anti-money laundering regulations for banks.

Supervisory functions have been unified under one single department at the Iranian central bank. On- and off-site inspections have begun, using risk-based criteria. Finally, reporting forms and supervision manuals are being developed. Despite this progress, a full-fledged, risk-based supervision framework has not been established yet, and the supervision of state-owned banks continues to rely on tight monitoring of credit allocation and compliances with administrative restrictions.

Exchange rate reform and international capital transaction

Article VIII which prohibits member countries from imposing exchange restrictions and multiple currency practices without prior IMF approval accepted in September 2004. Until March 2000, the exchange rate system consisted of 3 approval rates: 1) official floating rate $1 = Rials 1758, 2) official export rate $1 = Rials 3000, 3) effective TSE rate which was determined in the market.

In 2000, the official export rate abolished. In March 2002, the official exchange rate lifted and the exchange rate system unified. So, the central bank abolished the multi-tier exchange-rate regime and established a single rate from the start of 2002/03.

However, in the late 2010 the single exchange rate regime cannot continues due to sanction and the difference between the informal market exchange rate and official rate gradually was increased such that in October 2012 the government institute the foreign currency trading center. Therefore, three rate works in the economy: 1) Official rate ($1=12260 Rials) for basic and necessary goods, 2) the exchange rate in the center and 3) exchange rate in the informal market.

Generally, capital transaction is subject to tough controls. The government controls inflow and outflows of capital.

Reform in the Capital Market


Nonresident may invest in investment traded on the TSE, but until 2002 such investments are not protected under the investment law. However, since 2002 the investments were supported in the context of the new foreign investment law became in effect in Oct 2002. Furthermore, new law for Foreign Portfolio Investment was approved in the Parliament and became operational in June 2005. According to the law:

- Foreign companies and individuals can invest in the TSE after receiving license from “Organization for Investment, Economic & Technical Assistance of Iran (OIETAI), affiliated to the Ministry of Economy and Finance.
- Foreign investors can invest a maximum of 10 percent of each listed company, but late increased to 20%.
- Foreign investors can not withdraw their main capital and capital gain at the first three years of their investment, while repatriation is possible under current regulations.
- Such limitations are not mentioned in the Foreign Direct Investment (FDI) Act.
TSE Kish Floor, located in Kish Island Free Trade Zone, has more relaxed conditions for foreign investors. Unlike mainland, foreign individuals can easily obtain their “trading code” in few minutes without any need to grant the license from OIETAI; while establishing a company in Kish will be considered as “Iranian”, and bear no such limitations existing in the mainland for foreign entities.

Since 2005 capital market dramatically developed and commodity market and energy exchange have opened and agricultural products, metals, petrochemical products and electricity have traded in these markets. Furthermore, derivative instruments have been introduced such that future contract for gold coin has started since 2008.

2. Construction of financial liberalization index

Financial liberalisation is a process that involves the implementation of a number of policies as discussed above. In order to show the degree or the level of financial liberalisation at a particular time, a financial liberalisation index (FLI) for I.R. of Iran is constructed based on principal components method following Abiad et al (2008).

Demirgüç-Kunt and Detragiache (2001) date liberalization for 53 countries since 1980. In that study, liberalization of the domestic financial sector is interpreted as liberalization of domestic interest rates. Bekaert et al. (2005) date liberalization according to the stock market liberalization for a sample of 95 countries. They also consider the liberalization of capital account. Ranciere et al. (2006) use two sources for the dates of financial liberalization. First, a *de jure* binary indicator constructed using the official dates of equity market liberalization described in Bekaert et al. (2005); and second a *de facto* binary indicator based on the identification of country-specific trend breaks in private capital flows. Williamson and Mahar (1998) date liberalization according to six distinct dimensions of financial liberalization: existence of credit controls, interest rate controls, entry barriers to the banking industry, government regulation of the banking sector, and privatization of state-owned banks in the financial system, and international transactions. The same approach has been followed by Kaminsky and Schmuklerwe (2003), Abiad and Mody (2005) and More recently by Abiad et al. (2008). They use a comprehensive measure which captures financial liberalization in different markets including not only the domestic financial system but also the equity market as well as capital account liberalization.

To measure the liberalization of the domestic financial system, in this paper following Abiad et al. (2008), so, I analyze six different dimensions of financial sector policy considered in the literature (Mahar, 1998; Laeven, 2003; Abiad et al., 2004; Abiad and Mody, 2005). These dimensions, and the questions used to guide the coding, are listed below:

1. *The elimination of credit controls, such as directed credit to preferential sectors, ceilings on credit, and excessively high reserve requirements,*
2. *The deregulation of interest rates, including whether the government directly controls interest rates, or whether floors, ceilings, or interest rate bands exist,*
3. *The restrictions on the entry into the financial system of new domestic banks or of other potential competitors; allowing foreign banks to do activities in the domestic financial sector,*
4. *Privatization of state owned banks in the financial sector;*
5. *The end of regulations on capital account restriction such as offshore borrowing by domestic financial and non-financial institutions, the use of multiple exchange rates, and controls on capital inflow and outflows,*
6. *the restrict or encourage development of securities markets such as developing bond market, derivative markets; the evolution of regulations on the acquisition of shares in the domestic stock market by foreigners, and law regarding repatriation of capital and repatriation of dividends and interest.*
Along each dimension, a country is given a score on a graded scale, and then normalized between 0 and 3. With zero corresponding to being fully repressed and 3 to largely liberalized. Since I use 6 policy variables, the policy variable codes sum to 18.

The index developed here has several features. First, it considers different aspects of liberalization. This is important because emphasizing on just one financial market liberalization may result in a biased picture. Controls in one sector can also affect the behaviour of other parts of the financial system. Second, I do not use a binary indicator as deregulations seem to change slowly. Since deregulations seem to change slowly, valuable information is lost when the indicators only try to assess whether or not the liberalization has occurred. Third, it avoids overlapping between measure of financial liberalization and measure of prudential supervision which is usually recommended by the Bank for International Settlement so called the Basel accord. This is an important characteristic because economic theory suggests that a certain degree of regulation of financial markets might be optimal in the presence of uncertainty, market failures, moral hazard, and adverse selection issues. Therefore, the concept of financial liberalization can be interpreted as those deregulations and policies that are not aimed at dealing with the above externalities (Roubini and Sala-i-Martin, 1995).

Table 1 shows some arbitrary value is assigned to each of the financial liberalization policy variables. Each policy variable can take a value between 0 and 3 depending on the implementation status. When a particular sector is fully liberalised, that policy variable takes a value of 3 and when that sector remains regulated, it takes a value of 0.

From the values presented in Table 1, the financial liberalisation index (FLI) for Iran is derived. To this end, the weight of each of the components is calculated by employing the principal component method. The composition of the FLI can be expressed in the following terms:

\[
FI_t = w_1 * CC_t + w_2 * IRL_t + w_3 * EB_t + w_4 * BP_t + w_5 * CAP_t + w_6 * SMD_t
\]  

(1)

CC: credit control; IRL: interest rate controls; EB: entry barriers; BP: bank privatization; CAP: capital account restrictions; SMD: stock market development.

In the above equation, \( w_i \) is the weight of the component given by the respective eigenvector of the selected principal component. The Eigen values and eigenvectors of the correlation matrix of financial liberalisation policy variables are reported in Table 2.

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<th>BP</th>
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Table 2. Eigenvalues and Eigenvectors of the Correlation Matrix of Policy Variables

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<th>Proportion</th>
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Principal components (eigenvectors)

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<td>0.3855</td>
<td>-0.4637</td>
<td>-0.4906</td>
<td>0.3342</td>
<td>0.5211</td>
<td>-0.1155</td>
</tr>
<tr>
<td>Capn</td>
<td>0.2923</td>
<td>0.8058</td>
<td>0.0175</td>
<td>0.1560</td>
<td>0.4559</td>
<td>0.1809</td>
</tr>
<tr>
<td>Smdn</td>
<td>0.4613</td>
<td>0.0836</td>
<td>0.0864</td>
<td>0.4691</td>
<td>-0.5219</td>
<td>0.5295</td>
</tr>
</tbody>
</table>

Taking the first principal component, which accounts for 70 per cent of the total variance, in the six policy variables and substituting the respective eigenvalues for wi's in equation (1):

\[ FL_t = 0.463 \cdot CC_t + 0.444 \cdot IRL_t + 0.375 \cdot EB_t + 0.385 \cdot BP_t + 0.292 \cdot CAP_t + 0.461 \cdot SMD_t \]  

The index for the individual policy components are calculated by substituting the values for ICC, IRL, EB, BP, CAP, and SMD in equation (2) from Table 1 and multiplying by the respective values of \( w \), The financial liberalization index for each year is derived by summing up the calculated values of all the six policy components for the respective year. The calculated individual and total index are presented in Figure 1.

While the financial liberalization (FL) index for Iran was low, the 1979 Revolution which leads to widespread bank nationalization in the early 1980s and the exit of foreign banks from the home country pushed the level of FL to be declined. Furthermore, government continued to directed credit controls and administrative determined interest rate policy. All of these caused
that the FL index till the late 1989 was very low and the financial sector extremely was repressed. However, the reform of financial system in the early 1990s, in the context of the First Five Year Development Plan (FYDP) (1989-1993), focused on improving the regulatory environment and streamlining controls to enhance efficiency.

During the first year of the first five years after the revolution, due to deregulation of directed control over credit ceiling and increasing interest rate corresponding with inflation rate, giving permission to financial institutions and non-bank credit and the entry of private banks in the financial sector (since 1994), the index slightly has increased.

In the third development plan (2000-2005), banks have given limited scope for determining interest rates on term deposits in limited ranges (13-17%). In addition, exchange rate unification policy in 2001 was another most important factor in FL progress.

Furthermore, the recent state own bank privatization, development of stock market and derivative instruments all had important factors that caused the FL index reached to 3.5 out of 8 (the max code for FL)

**Figure 1.** Financial Liberalization Index for Iran

2. **Comparison with other countries: Turkey and Pakistan**

The same methodology followed for Iran, I construct the FL index for two ECO members: Turkey and Pakistan based on information about the chronology of financial reforms for those countries reported in the Appendix.

**Figure 2.** Financial Liberalization Index for Turkey
Comparing the Fl index for two countries with Iran indicates that Iran and Pakistan both started financial reform since the early 1990s but Turkey started since the early 1980s. However, the pace of financial reform in Turkey was not continues. In the mid-1980s the reform reversed then the late 1980s again financial liberalization restarted.

Comparing the degree of financial liberalization shows that the figure of FL for Turkey reached to 5 out of 8 but for Iran and Pakistan was 3.5.

**Figure 3. Financial Liberalization Index for Pakistan**

![Financial Liberalization Index for Pakistan](image)

### 3. Concluding remarks

The financial liberalization index for Iran has been constructed by including six different policy measures implemented over the period 1973-2013. The liberalization index is based on principal component method and also takes into account the partial liberalization policy measures. The financial liberalization index for Iran shows that the decades of 1990-2009 were the period during which most of the financial liberalization measures were implementation in Iran.

Comparing the Fl index for Iran with Turkey and Pakistan shows that Iran and Pakistan both started financial reform since the early 1990s but Turkey started since the early 1980s. Comparing the degree of financial liberalization shows that the figure of FL for Turkey reached to 5 out of 8 but for Iran and Pakistan was 3.5.

However, it is obvious that in order to evaluate the level of financial reform in the ECO area we need to investigate the financial reform in all ECO members that await future research.
## Appendix 1: financial liberalization process in Turkey

<table>
<thead>
<tr>
<th>Domestic Financial Sector</th>
<th>Stock Markets</th>
<th>Capital Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Turkey</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Interest rates ceilings are eliminated in 1981 (except on sight deposits and on preferential lending) and reimposed on deposits in 1983. Controls eliminated again in 1988. Government securities are auctioned in 1985, their yields are market determined. Interbank money market established in 1987. Directed credit phased out by 1989. Reserve requirements were quite high through the period (1973-96). Foreign banks permitted since 1980 with some restrictions. Scope of banking activities widened in 1980. In 1981, barriers to entry were lowered. State owned banks’ share in total assets remained constant at around 52% over the period 1980-90. Some banks privatized during 2001-02. Recent efforts at bank privatization in for Turkey have brought down public banks’ market share to 20%. The prudential framework was strengthened further in October 1989, when the capital adequacy ratio was brought in line with the guideline of the Basel Committee on banking supervision. The Capital adequacy requirements were set at 5% in 1989, 6% in 1990, 7% in 1991 and 8% in 1992. Also standards for the classification and provisioning of nonperforming loans were brought closer to international best practice.</td>
<td>In 1983, the capital market board (CMB) promotes and monitors developments in the securities markets. Istanbul stock market operational again in 1986. In July 1988, foreign investors and investment were given access to the Turkish capital market and were allowed to buy and sell securities and become partners in Turkish companies. The major liberalization of international capital transaction happened in August 1989, including the opening of the securities markets to foreign investors where non-resident were allowed to buy and sell any type of Turkish securities registered on the stock exchange and transfer abroad the income of these securities.</td>
<td>By the mid-1980s, all quantitative restrictions on trade were lifted and only minimal controls on current account remained, and by the end of 1980s, the current account was fully liberalized. In March 1990, Turkey formally accepted the obligation of Article VIII, section 2(a), 3, and 4. In February 1990, residents were allowed to invest abroad in limited amount and to secure foreign credits abroad, provided that they use banks or special financial institutions as intermediaries. In June 1991, non-residents were allowed to purchase foreign currency and transfer it to abroad without limitation, and to transfer Turkish Liras abroad; residents were permitted to sell freely abroad securities issued by company in Turkey. Before 1999 when the tax was reduced to zero, credits obtained by banks from abroad were subject to a 4% tax which was earmarked for the Resource Utilization Support Fund. Resident banks may extend credit to non-residents in foreign exchange up to the total amount of foreign exchange credits they have obtained and the balance in their foreign exchange deposit accounts. In Jan 2005, a new currency, the new Turkish Lira was introduced, replacing the Turkish Lira at the rate of YTL 1 per TL 1 million.</td>
</tr>
</tbody>
</table>
### Appendix 2: financial liberalization process in Pakistan

<table>
<thead>
<tr>
<th>Domestic Financial Sector</th>
<th>Stock Markets</th>
<th>Capital Accounts</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Pakistan</strong></td>
<td><strong>In order to encourage foreign investment, restrictions on capital inflows and outflows were liberalized during 1991-98. More specifically, not only foreign investment in all industries (particularly in services, infrastructure, and agriculture sector) was allowed without prior approval, investors were also permitted to purchase up to 100 percent of the equity in industrial companies on repatriable basis. Furthermore, investment shares (issued to non-residents) could be exported and remittance of dividend and disinvestment proceeds was permissible without prior approval of SBP.</strong></td>
<td><strong>In July 1994, the government accepted the obligations of Article VIII, sections 2, 3 and 4 of the IMF Articles of Agreement; consequently the Rupee was made convertible on current international transactions. Other major changes in exchange rate regime were introduced in February 1998 when authorized dealers (AD) were permitted to determine their own exchange rates for currencies (other than US dollar) in terms of Rupee depending upon demand and supply position of the market. The exchange rate of US Dollar against Pak Rupee continued to be determined by state bank of Pakistan (SBP). In the exchange rate regime, a new mechanism was introduced in July 1998, comprising of: a) official exchange rate, and b) floating inter-bank exchange rate (FIBR). Finally, the market-based unified exchange rate system was adopted in May 1999, and FIBR became applicable to all foreign exchange transactions. However, by the end of May 1999, an unofficial cap on the Rupee trading was imposed in the inter-bank. This cap remained effective for over one year, before its final removal on 21st July 2000 when the Rupee was put to a complete float. During 1991-98, private sector entrepreneurs were allowed to obtain long-term foreign currency loans from abroad subject to certain conditions. Bank borrowings are allowed for temporary periods and only if they become necessary for the normal course of business. Since 2001, Pakistan residents including firms and companies were allowed to make equity-based investments including portfolio investments in companies abroad on a repatriable basis with prior SBP permission.</strong></td>
</tr>
<tr>
<td>Caps on maximum lending rates of banks and NBFI for trade related modes of financing (except for LMM and export finance scheme) were removed in March 1995. Floors on minimum lending rates, for project and trade related financing were abolished in July 1997. Accordingly, banks and NBFI were able to set their lending rates in relation to the demand/supply conditions in the market. A flexible system of Credit-Deposit Ratio (CDR) was initiated in August 1992, which replaced ceilings for allocation of credit (under this system, commercial banks were required to extend credit to the private sector within limits in relation to their deposit base). This system was gradually liberalized and eventually abolished altogether in September 1995. No significant reductions in reserve requirements, still it is high. Apart from cash reserve requirement (CRR), which normally stood at 5 percent on weekly average basis since 1996, banks were also required to maintain a given percentage of their demand and time liabilities in government securities as the statutory liquidity ratio (SLR). As a part of reforms, this ratio was gradually reduced from 45 to 35 percent in October 1993 and further to 25 percent in March 1994. At present, the ratio stands at 15 percent, set in June 1998. In order to rationalize the subsidized credits, the lending rates on special financing schemes including locally manufactured machinery (LMM) and export finance were gradually raised. At present, returns payable on special financing schemes are close to market rates, except for export finance and export sales of LMM. The Bank Nationalization Act 1974 was amended in 1990, empowering the Federal Government to sell all or any part of the share capital of NCBs. Therefore, Muslim Commercial Bank privatized in stages between 1991 and 1993, as well as 51% of Allied Bank. Some more banks privatized during 1996-97 and 2002-04. Eleven new private banks, including three foreign, established since 1991. Although, no new bank was allowed to open since 1995, but branch policy for both the domestic private banks and foreign banks was eased. Nationalized banks were prevented to open new branches in December 1996 and asked to close unprofitable ones in 1997. Since the first of 1998, banks were required to maintain the capital adequacy ratio of 8%, in line with the Basel Accord.</td>
<td><strong>In July 1994, the government accepted the obligations of Article VIII, sections 2, 3 and 4 of the IMF Articles of Agreement; consequently the Rupee was made convertible on current international transactions. Other major changes in exchange rate regime were introduced in February 1998 when authorized dealers (AD) were permitted to determine their own exchange rates for currencies (other than US dollar) in terms of Rupee depending upon demand and supply position of the market. The exchange rate of US Dollar against Pak Rupee continued to be determined by state bank of Pakistan (SBP). In the exchange rate regime, a new mechanism was introduced in July 1998, comprising of: a) official exchange rate, and b) floating inter-bank exchange rate (FIBR). Finally, the market-based unified exchange rate system was adopted in May 1999, and FIBR became applicable to all foreign exchange transactions. However, by the end of May 1999, an unofficial cap on the Rupee trading was imposed in the inter-bank. This cap remained effective for over one year, before its final removal on 21st July 2000 when the Rupee was put to a complete float. During 1991-98, private sector entrepreneurs were allowed to obtain long-term foreign currency loans from abroad subject to certain conditions. Bank borrowings are allowed for temporary periods and only if they become necessary for the normal course of business. Since 2001, Pakistan residents including firms and companies were allowed to make equity-based investments including portfolio investments in companies abroad on a repatriable basis with prior SBP permission.</strong></td>
<td></td>
</tr>
</tbody>
</table>
References:


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The issue of the analysis of the economic integration efficiency of the ECO countries

S. Baizakov, L. Eleusiz, K. Karimova
Republic of Kazakhstan

Keywords: GDP deflator, growth rate, GDP, Output, The purchasing power of money, inflation index

Abstract
The article presents the method of analysis of the objectives of economic management. It can be used to analyze the development of the region's economy. The purpose of the analysis is to determine the overall capacity of the region, as well as to examine the level of development of market forces of the real and financial sectors of the economy. The analysis provided by the Organization for Economic Co-operation includes three blocks of economic calculation, which allow installing the mutual relationship between the ten indicators of economic development.

Introduction
Organization for Economic Cooperation (ECO) is a regional intergovernmental economic union formed by the countries of Central Asia and the Middle East. The purpose of the union is the deepening of economic, technical and cultural cooperation among its members. OEC is the successor of organization of Regional Cooperation, which operated based on the Charter - the Izmir Treaty, signed by the three founding countries - Iran, Pakistan and Turkey in 1977.

To date, the Organization for Economic Cooperation includes 10 countries: Iran, Pakistan, Turkey, Afghanistan, Azerbaijan, Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan and Uzbekistan with a total population of over 400 million people. This organization is in terms of territory and population is the second largest regional association in the world. The total share of the region's trade in world trade is around 2%, in 2000 - 2010 average annual GDP growth rate was more than 6%. In terms of production OEC's GDP in the global economy in 2010 was 1.6%

Methodology of analysis of economic management problems
Methodology of work is based on the work of S. Baizakov [1-2]. It consists of several steps:

Step 1 determines the overall impact of the adopted incentives for innovative investment of economy and for scientific and technological improvement - c(t):
\[ c(t) = \frac{CDP(t)}{(QP(t)+GDP(t))} \]

Step 2 determines the purchasing power of money - pp(t):
\[ pp(t) = \frac{c(t) \times i2}{i1(t)} \]

Step 3 determines the price of goods and services - 1/pp(t):
\[ 1/pp(t) = \frac{i1(t)}{c(t) \times i2(t)} \]

Step 4 determines the real growth of economy (i3(t)) on the growth index i1(t):
\[ i3(t) = pp(t) \times i1(t) \]

Step 5 determines the real growth of economy (i3(t)) on the growth index i2(t):
\[ i3(t) = c(t) \times i2(t) \]

Step 6 determines the general price deflation - p(t):
\[ p(t) = c(t) / pp(t) = i1(t) / i2(t) \]

Step 7 determines the net impact of stimulation of scientific and technological enhancements - \( \Delta c(t) \):
\[ \Delta c(t) = c(t) - 100 \]

In accepted notation i1 (t) denotes the index of GDP growth in the prices of the current year, and i2 (t) is the index of GDP growth at comparable prices, QP (t) denotes the current material costs necessary for the production of GDP (GDP (t)).
Formulation of the analysis problem

There is a task of analyzing the development of the regional economy on its broad sector, on the real and financial sectors. The purpose of the analysis is to determine the overall capacity of the region, as well as to examine the level of development of market forces in both sectors of the economy. The analysis includes three sets of economic calculation, which allow installing mutual relationship between ten indicators of economic development.

Analysis of the economy of the region is made on the database of international institutions of the IMF and the United Nations for the period of 2000-2010. The following are the main indicators attracted to the analysis:

- **The volume of production** is the notional amount of products in the natural-material expression (Q).
- **Cost of goods sold** is the amount of cash received from the sale of products \((X = p \times Q)\).
- **Number of employees** is the indicator characterizing the number of employees at an annual rate (L).
- **Fixed assets** are assets in the monetary expression (K). "Total Number of employees, in thousands" and "Fixed Assets" indicators in monetary units represent production capacity of material goods and its cost volume of sales in monetary terms. These basic indicators reflect market forces of the economy of the region. Therefore, number of employees of the region and fixed assets have market prices as the productive forces of the economy of the region.
- **The average annual salary** is the salary, calculated on the average of an employee, represents the market price of labor \((\gamma)\), and the ratio of gross profit to fixed assets represents the market price of fixed capital \((r)\).
- **Intermediate consumption** represents the amount of current material cost of goods and services that are used in the production of GDP (QP).
- **GDP at current prices** is the value of final goods and services produced over a year in the state (GDP).
- **Gross external debt** is the outstanding amount of the actual liabilities of residents of the country to non-residents, requiring payments of principal and / or interest at a particular time (GED).

The analysis of development indicators of real sector of economy

The analysis of development of the real sector of the economy of this region includes the following indicators, which are reflected in the matrix of the main indicators of the sector:

- **Industrialization indicator** (capital-labor ratio – \(f= KL\)), thousands USD/person.
- **Indicator of managing the market labor price** - \(\gamma\), thousands USD/person.
- **Indicator of managing the total factor labor productivity and fixed capital** - \(\varphi=GDP/ L\), USD/year.

Based on processing of database for 2000 to 2010, which is defined by a set of key indicators of all states-participants of the OEC, results were obtained in growth rate of key indicators of management, which are listed in Table 1.
Table 1. The efficiency matrix of market forces development of real sector in the growth rate, 2000=100%

<table>
<thead>
<tr>
<th>The economic content of indicators, the base unit of measure, unit designation</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Armament of one working person in the economy with fixed assets of production, USD / person (f)</td>
<td>152</td>
<td>183</td>
<td>200</td>
<td>223</td>
<td>218</td>
<td>244</td>
</tr>
<tr>
<td>The average annual salary (γ), USD</td>
<td>113</td>
<td>121</td>
<td>145</td>
<td>169</td>
<td>154</td>
<td>181</td>
</tr>
<tr>
<td>Total factor productivity of labor and capital (φ), USD/year</td>
<td>162</td>
<td>178</td>
<td>219</td>
<td>248</td>
<td>225</td>
<td>272</td>
</tr>
</tbody>
</table>

One of the key indicators of the effectiveness of market forces development in real sector is **armament of physical labor with the fixed capital**, the economic content of which is defined as the armament of one working person in the economy with fixed assets of production (in thousands of USD / person). The dynamics of this indicator is directly related to the degree of industrialization of the real economy. In the future, this indicator will be referred to simply as an indicator of industrialization. Level of its growth is determined not only by the intensity of investment of economy, but also by the increase in the number of employed people in the economy.

As can be seen from Table 1, the growth rate of the indicator of industrialization in all the years outpaced the growth rate of average annual salaries. There is a well-defined trend of outpacing growth rate of total factor capital and labor productivity over the growth rate of average annual salary. But such well-defined trend of outpacing is not observed between the growth rate of labor indicator of industrialization and factor productivity. However, it should be recognized that the degree of intensity of labor is the patron of growth in total factor productivity of labor and capital.

According to the data in Table 1, the level of armament of one working person in the economy of the region with the fixed assets of production increased 2.4 times, while the average annual salary per employee increased 1.8 times and total factor productivity of labor and capital increased 2.7 times.

In this trinity of economic indicators of real sector development the primacy belongs to indicator of industrialization, which serves as a barometer of the driving forces of the economy due to investments. As can be seen from the Table 1, the level of work armament of current year is higher than the level of armament in the past year, although their growth rates are different in the countries of the region. During these years a positive trend was formed respectively in salary levels and productivity. We must assume that of the last two indicators the total factor productivity of labor and capital should be considered as a key indicator, **counter of effective functioning of the real sector**. In total, in OEC the level of total factor productivity has increased from $4,211.1 in 2000 to $11,448.55 in 2010. This is a very good result, even from the perspective of the development of many of the advanced countries of the world.

In this block of economic calculation, the harmony in the development of the real sector of the economy can be achieved, if the elasticity of total factor productivity of the capital-labor and the elasticity of the average annual wage of total factor productivity are positive values. The market is the market; the right ratio is not always done in its work. However, tracking the market is a condition of the anti-crisis measures.

**Analysis of indicators of development of the financial sector**

Analysis of the development of the financial sector of the economy of this region includes the following indicators, which are reflected in the matrix of the main indicators of the sector:
The indicator of economic labor productivity, determined by the ratio of the total factor productivity of labor and capital \((q)\), USD / USD.

- The return on assets indicator (an indicator of the market price of fixed assets) - \(r\), percentage.
- The return on fixed financial assets indicator - \(rr\), percentage.

The purpose of the analysis in this sector was to assess the dynamics of these indicators of development of the financial sector and in establishing their chain of command, based on their mutual dependence. Table 2 shows the dynamics of the economic indicators of financial sector development, resulting from the analysis of economic aggregates of OEC members for the period from 2000 to 2010.

### Table 2. Matrix of effectiveness of market forces development of the financial sector (2000 = 100)

<table>
<thead>
<tr>
<th>The economic content of indicators, the base unit of measure, unit designation</th>
<th>2005</th>
<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Productivity of units of wages in monetary terms ((q)), USD / USD</td>
<td>2.45</td>
<td>2.54</td>
<td>2.6</td>
<td>2.53</td>
<td>2.51</td>
<td>2.59</td>
</tr>
<tr>
<td>Price of fixed assets ((r)), USD/USD* 100%</td>
<td>42</td>
<td>39.5</td>
<td>44.8</td>
<td>44.8</td>
<td>41.5</td>
<td>45.6</td>
</tr>
<tr>
<td>The return on financial assets ((rr)), USD/USD* 100%</td>
<td>7</td>
<td>6.7</td>
<td>7.2</td>
<td>7.2</td>
<td>6.3</td>
<td>7.8</td>
</tr>
</tbody>
</table>

As can be seen from Table 2, the dynamics of indicators of development of market forces in the financial sector represented by the **ratio of the total factor productivity to the average annual wage**, named productivity of economic labor, has an increasing trend. This is a rare event, even among developing countries. As for the prices of fixed assets and financial assets, both indicators over time grow unevenly, but express a positive trend. The overall level of productivity of units of wages within the OEC in 2010 was 2.59, which exceeds the value of the base year 1.5 times; while for 2005-2010 its rate slightly decreased and amounted only 106%.

The dynamics of the second indicator of market forces development of this sector is represented by the **return on capital**, expressed by market **prices of fixed assets**. Amazing thing is that these figures have the same trend as the productivity of units of wage. Thus, over the period from 2000 to 2005 as a whole there was a significant increase in the price of fixed assets in 1.5 times. But then there was a moderate rate growth of the price of fixed assets from 42% in 2005 to 45.6% in 2010. At the same time for the entire period of analysis, the growth rate of this index here was 109%, with a slight excess in comparison with the rate of growth of economic labor.

A positive aspect of financial sector development is the fact that the dynamics of the **return on the fixed financial assets** indicator developed strictly due to the impact of fixed assets. The relevant indicators are located much lower than the return on capital indicator. If in 2005 and 2010 the average level of the return on capital indicator was 43%, the average rate of return of financial assets accounted for 7% of the same years. This ratio allows the real sector to provide self-financing. The causes of the current debt crisis in some European Union countries, as shown by our study, are associated with the violation of this proportion.

In this block of economic calculation, the harmony in the development of the financial sector of the economy can be achieved if the dynamics of the indicator of economic labor productivity, defined by the ratio of total factor productivity to the average annual salary is increasing amount.
But in the conditions of market relations it is unlikely to comply with this ratio. Especially the implementation of this relationship depends on the level of scientific and technological excellence of production areas. But the tracks that ratio is a key condition for the stability of development of the region’s economy.

**Analysis of indicators of national economic development**

Analysis of the economic development of the region includes the following indicators, which are reflected in the matrix of the socio-political development:

- Coefficient of performance of turnover (production technological excellence) – \( c \)
- The energy and ecological efficiency indicator (productivity of intermediate inputs) - \( \mu \)
- The working time indicator (indicator of employment in the total population) – \( L \)
- The indicator of competitiveness of the region – \( B \), USD/person

Table 3 shows the results of calculations of these indices for the period 2000 - 2010 within the framework of the OEC.

<table>
<thead>
<tr>
<th>The economic content of indicators, the base unit of measure, unit designation</th>
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<th>2006</th>
<th>2007</th>
<th>2008</th>
<th>2009</th>
<th>2010</th>
</tr>
</thead>
<tbody>
<tr>
<td>Counter of technological excellence of production (c), USD / USD</td>
<td>0.49</td>
<td>0.49</td>
<td>0.5</td>
<td>0.52</td>
<td>0.52</td>
<td>0.54</td>
</tr>
<tr>
<td>Resource productivity (( \mu )), USD/USD</td>
<td>0.98</td>
<td>0.97</td>
<td>0.98</td>
<td>1.08</td>
<td>1.09</td>
<td>1.17</td>
</tr>
<tr>
<td>The share of employment in the total population (( L/N )), person/person</td>
<td>0.34</td>
<td>0.35</td>
<td>0.34</td>
<td>0.35</td>
<td>0.34</td>
<td>0.33</td>
</tr>
<tr>
<td>GDP per capita (GDPN), USD/ person</td>
<td>2287.7</td>
<td>2597.2</td>
<td>3158.5</td>
<td>3602.6</td>
<td>3188.6</td>
<td>3810.3</td>
</tr>
</tbody>
</table>

One of the indicators of effectiveness of regional economic development is the level of technological excellence of production. This indicator is defined by the ratio of the growth rate of nominal GDP to gross output. It represents the coefficient of performance of turnover. This indicator by OEC has a trend of growth from 0.5 to 0.54, which growth rate was 1.08.

The next indicator of the effectiveness of social and political development is an indicator of energy and ecological efficiency, which reflects the productivity of intermediate inputs. Over the ten-year period there was an increase in value of the indicator of 1.17 times in the OEC, and the sequential increase was observed in the second half of the decade.

It should be noted that there is a functional relationship between the indicator of energy and ecological efficiency and the coefficient of technological excellence:

\[
    c(t) = \frac{\mu}{1 + \mu}
\]

Another important indicator of the effectiveness of regional economic development is an indicator of working time, the economic substance of which is reflected in the share of employment in the total population. Over the decade, the total share of employment in the economy in the total number of people in OEC remained about the same but very low level. The reasons for this negative indicator require the use of other more qualitative research method.
The last key indicator of the effectiveness of development of market forces of national economy is an indicator of competitiveness of the country, which is expressed in GDP per capita.

Leaders in the level of economic development among the countries - members of the Organization for Economic Cooperation are the Turkish Republic, the Islamic Republic of Pakistan and the Republic of Kazakhstan.

In general in the OEC countries GDP per capita in ten years increased by 2.8 times and amounted $3,810.29/person in 2010. This level is somewhat higher than the average level of the overall economy of the world. The UN institutions monitor this most important criterion for the countries development, and the dynamics of its growth are analyzed.

References


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Socio-demographic determinants of the support for Turkey’s Justice and Development Party

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Republic of Turkey

ABSTRACT

Using district-level census data for the province of Istanbul, we identify the determinants of the support for the Justice and Development Party (AKP) which has been in power in Turkey since 2002. Socio-demographic indicators such as the gender gap in education and the mean age, that are expected to proxy for social conservatism and the fertility rate, respectively, perform remarkably well as predictors of the party’s vote share. The econometric findings are in line with the hypothesis that the AKP has benefited from the existing living conditions of the urban population, especially in peripheral metropolitan areas, and has been particularly successful in identifying the worldviews and addressing the needs of conservative voters many of whom are first or second generation migrants.

1. Introduction

According to 2012 population census figures, Turkey has a population of 75.6 million, just over three-quarters of which lives in urban locations, i.e. province and district centers, while the rest resides in villages and rural municipalities. With an official population of 13.8 million, the Istanbul province is not only Turkey’s most populated province, but it also stands out from the rest of the provinces with an urbanization rate of 99 percent and a population density of 2,666 people per square kilometers. During the past six decades, Istanbul – like many western provinces of Turkey – has received millions of internal migrants from the rest of the country, especially from the north and east where employment opportunities have been more limited. Although up-to-date figures on the share of those born outside the province are unavailable, the share of those whose population registry is in another province gives a rough idea of the predominance of the migrant population. According to 2012 figures, only 16 percent of Istanbul residents are listed in the Istanbul population registry. Due to its unique characteristics, the Istanbul province promises to be an appropriate setting to observe whether political outcomes are dependent on quantifiable socio-demographic characteristics of the different areas that make up the province.

Migration from rural to urban areas in Turkey, particularly to Istanbul, has been the subject of a large body of research in many areas of social sciences. While economists have focused on socio-economic implications from a macro perspective, sociologists have mainly examined the life styles of internal migrants, their patterns of integration, as well as their influence on the cultural structure of the recipient localities. Political scientists, on the other hand, have devoted much of their attention to political implications such as the impact of migrants on election outcomes and the political economy of the urbanization process. A common theme of these studies is that the political assimilation of internal migrants is hardly ever complete since they who hold on to much of the cultural values acquired in their origins, and they differ from the ‘natives’ in terms of their socio-demographic characteristics, economic endowments, and - in many cases - ethnic backgrounds (Inglehart and Baker, 2000). It is this distinction that has made it difficult for political parties to strike a balance between the needs and wishes of the native and migrant populations. In fact, their skillfulness in appealing to the underprivileged and conservative urban masses has been seen as one of the main reasons behind the dramatic rise of the pro-Islamist parties in Turkey during the past two decades.

The main purpose of this study is to carry out simple descriptive and econometric analyses to identify the socio-demographic determinants of the electoral success of the currently-ruling Justice and Development Party (Adalet ve Kalkınma Partisi, AKP). The reason for the choice of focusing on the AKP is that it has been the dominant party

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in the Turkish party system since 2002, and also that it is the latest to come in the line of pro-Islamist parties that are believed to have benefited the most from the existing living conditions of the urban population, especially in the metropolitan areas. While the local administrations led by centrist-parties (mostly until the mid-1990’s) were overwhelmed with, or reluctant to address the needs of the rapidly growing urban populations, pro-Islamist political parties have proven to be much more adept in serving especially the lower class segments of the population. One reason why the rise of political Islam in Turkey is unique and interesting for academics is that the gradual increase in the support for pro-Islamist parties took place within the democratic multi-party system. In addition to their satisfactory performance on the economic front, long-term socio-economic developments, demographic and cultural changes, and interventions to the democratic system by the military and the judiciary have all been cited as key factors in the success of the pro-Islamists. Our main goal, therefore, is to produce empirical findings that might provide some new clues regarding the importance of socio-demographic factors.

2. Background information on Turkish politics and internal migration

Turkey is a large country that exhibits a great deal of diversity in terms of demographic, economic, social, ethnic, and cultural characteristics, and consequently, in terms of political tendencies. Commonly referred to as “a bridge between the East and the West” and “a cradle of civilizations”, it borders European Union countries Greece and Bulgaria on one end and Iran, Iraq, and Syria on the other. A recent study by Akarca and Başlevent (2011) deals with the regional patterns in political outcomes in Turkey as well as the association between party choices and the disparities in socio-economic indicators across the country. The authors use cluster analysis to identify the provinces that have similar voting patterns in terms of the vote shares of the main political parties. They find that, for each of the five elections between 1999 and 2009, a 3-way partition of the provinces captures much of the variation in voter behavior across the country and also that many of the provinces remain in the same cluster election after election, in a period of major political turmoil. The cluster of (mostly central and northern) provinces where social conservative right-wing parties including the Justice and Development Party have the highest support is also the one where most internal migrants are originally from. Province level data on socio-demographic indicators further reveal that the three clusters are distinct from each other not only in terms of political outcomes, but also socio-economic characteristics. The observed link between political outcomes and the socio-demographic characteristics suggests that there could be much to learn from a multivariate examination of these factors.

In November 2002, the Justice and Development Party (AKP) won two-thirds of the seats in the Turkish parliament with only 34 percent of the votes, due to the election system that imposes a ten percent national threshold for representation. The rapid rise of the AKP, which was only founded a year earlier following the dissolution of the pro-Islamist Virtue Party (Fazilet Partisi) by the Constitutional Court of Turkey, was seen as “another step in the electoral collapse of centrist politics in the country” (Çarkoğlu, 2002a). Nevertheless, the AKP, considered by many as a pro-Islamist party until the elections, was known to have

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27 Çarkoğlu and Avcı (2002), Dulupçu (2005), West (2005), Tüzün (2007), Güvenç and Kirmanoğlu (2009), and Tezcür (2012) are some of the other studies that deal with the geographical patterns observed in election outcomes in Turkey.

28 Akarca and Başlevent (2010) have found a strong region-of-origin effect on the party choices of internal migrants in Turkey. This finding implies that the migrants are more likely to support conservative parties at their destinations as well.

29 For detailed analyses of the 2002 elections, see also Açikel (2003), Özel (2003), Tosun (2003), Bacık (2004), Turan (2004), Akarca (2008), and Başlevent and Akarca (2009).
received votes from other sections of the constituency, especially the center-right, at a time when the existing center-right parties were highly unpopular as a result of widely-believed allegations of corruption and poor performances when in power. The AKP has also been the recipient of a substantial amount of protest votes by large masses who have been adversely affected by the dismal economic conditions that prevailed in Turkey after the former ruling coalition led the country into its worst ever economic crisis. The charismatic AKP leader Recep Tayyip Erdoğan’s successful image since his days as the mayor of Istanbul (1994-1998) and his moderate rhetoric also made the AKP attractive to a “diverse array of voters ranging from Islamists to rural nationalists and moderate urban voters” (Çagaptay, 2002). Since 2002, there have been many unprecedented developments in Turkish politics, one of the most remarkable of which is that the ruling party has managed to increase its vote share further in the two subsequent general elections with shares of around 47 and 50 percent in 2007 and 2011, respectively.30

In the year 2000, 61 percent of Istanbul’s population was born in another province. In view of this extraordinary figure, it is natural to expect that the urbanization process has been a challenging one in many respects and also that migrants have had a strong influence on the local and national political-economic affairs. In fact, there is a large body of literature which offers a specific and comprehensive description of the web of relations that account for the political behavior of Turkey’s urban population, especially that of internal migrants. These studies provide convincing explanations as to why the political assimilation of migrants is especially unlikely in the Turkish context (Pinarcıoğlu and Işık, 2009; Kurtoğlu, 2005; Hersant and Tounarkine, 2005).

Narlı (2002) argues that the failure of centrist political parties in the past two decades has to with their inability to ‘mobilize’ urban voters while the informal and formal networks among migrants have provided the suitable setting for the grassroots politics that pro-Islamist parties have engaged in to great electoral success during the past two decades. Kalaycıoğlu (2007) claims that the AKP owes its success not only to its ability to appeal to the value systems of conservative masses, but also to “providing for rapid improvement in socio-economic welfare” to those who otherwise would have a much smaller chance of upward social mobility. Öniş (2000) also notes that such informal networks provide a rudimentary form of welfare provision, and that they are crucial to the understanding of the volatile electoral politics in Turkey.

According to Narlı (2002), it is mainly through the above-mentioned links that people are able to make economic gains ranging from finding jobs to obtaining construction permits or title deeds to the pieces of land that they illicitly occupy. Ayata (2008) also argues that the place of origin plays a significant role in community formation and land occupation around the city especially in the early stages of migration. Assuming that the majority of internal migrants lack the financial means to purchase proper housing, it makes sense that their political choices are likely to be affected by their prospects of becoming a part of this redistributive process. In an empirical study of electoral outcomes, Özler (2000) finds that the pro-Islamist Welfare Party fared better in the 1995 national elections in neighborhoods with larger shares of illegally built housing units. Yağıcantan and Erbaş (2003) also carry out an extensive study demonstrating the strong link between the squatter settlements and election outcomes in Istanbul. Finally, Buğra (1998) points to the economic consequences of squatting and refers to this phenomenon as the “immoral economy of housing in Turkey”.

As the literature review above suggests, in the Turkish context, the concept of urbanization is closely related with internal migration which has been a major driving force behind the steep rise in Turkey’s urban population as well as the socio-political developments in those areas. This is why the current study considers internal migration as an indicator of the type of urbanization that poses the greatest challenge for policy makers, and thus, is the most relevant in the political-economic sense.

3. Methodology, Data, and Regression results

Our empirical examinations rely on the premise that political preferences reflect the decisions made by utility maximizing individuals. Voters decide to participate in political processes and vote for a given party based on their current socio-economic conditions as well as their expectations for the future. They are also likely to take into account the conditions that affect the general population. Thus, we argue that the support for the ruling AKP is influenced by the urbanization patterns in Turkey’s provinces as these patterns have been a major determinant of the existing social, economic, and cultural conditions prevailing in each province.

In the absence of individual level data from a comprehensive nationwide survey designed specifically for the purpose of examining the relationships in question, the best alternative is to work with official socio-demographic and election data available at the levels of the major administrative units in Turkey. Our empirical work comprises a district level analysis which is restricted to the province of Istanbul. With 39 districts that exhibit a considerable amount of variation with respect to schooling levels and migrant and vote shares, Istanbul appears to be an ideal context for testing hypotheses relating to the relationships between the indicators at hand, considering that a nationwide study would have required a lot more factors to be controlled for before reliable estimates could be obtained.

In preparing our data set, we made use of two databases available at the website of the Turkish Statistical Institute (TurkStat). These databases can be used interactively to generate the district level indicators to be used in the empirical work. One of these databases contains the results of the 2010 census of the Address Based Population Registration System, which allowed us to compute urbanization rates, migrant shares, etc. This database also contains information on the number of people in various age groups as well as those who have completed a given level of education. The other database on the TurkStat website contains the results of 2011 General Elections at the province and district levels. Participation rates as well as party vote shares are available from this database (See Table 1).

The empirical work to be presented in the next section involves the estimation of a multiple regression model where the AKP vote share appears as the dependent variable. As for the explanatory variables, the population registration rate of a district is the percentage share of those who are listed in the population registry of Istanbul. In the absence of information on net migration figures, we expect this variable to serve as a measure of the stock of internal migrants in the districts. Although technically it is possible not to be registered in the province of current residence despite having lived there throughout one’s lifetime, the distribution of this variable in the data suggests that it is a good indicator of long-run migration patterns.

The mean years of education measures the average years of schooling received by the 15+ years old population of a district. Since the available information in the population census provides only the number of people who have completed a certain level of education, the average figures were obtained by a scheme that converts this information to years of schooling. The mean age in the district is also obtained by using information on the number of people in different age groups. We utilize this variable to capture the variation across districts in the fertility rates under the assumption that the mean age would be lower in districts where families typically have a larger number of children. The reason we expect the fertility rate to be

31 Districts are small administrative units that make up provinces. They have municipalities run by elected mayors.
relevant to our analysis is that in a predominantly Muslim society, it reflects the degree of adherence to a traditional life-style where contraception is frowned upon and ‘quality vs. quantity of children’ considerations are largely ignored. Since the relationship between mean age and the outcomes of interest need not be linear, the square of the mean age is also included as a regressor in the regression models.

Table 1: District-level data for Istanbul province, 2011 general elections

<table>
<thead>
<tr>
<th>District</th>
<th>Population</th>
<th>Turnout rate</th>
<th>AKP vote share</th>
<th>Population registration rate</th>
<th>Mean age</th>
<th>Mean years of education</th>
<th>Gender gap in education</th>
</tr>
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<tbody>
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<td>Adalar</td>
<td>14,221</td>
<td>84.1</td>
<td>32.1</td>
<td>41.4</td>
<td>39.1</td>
<td>9.1</td>
<td>7.2</td>
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<td>85.2</td>
<td>26.2</td>
<td>36.9</td>
<td>38.5</td>
<td>10.5</td>
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<td>84.8</td>
<td>20.3</td>
<td>35.9</td>
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<td>32.2</td>
<td>8.2</td>
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<td>50.6</td>
<td>15.9</td>
<td>31.7</td>
<td>7.5</td>
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<td>Çatalca</td>
<td>62,001</td>
<td>91.4</td>
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<td>34.3</td>
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<td>29.7</td>
<td>7.3</td>
<td>15.9</td>
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<td>40.5</td>
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<td>30.1</td>
<td>7.4</td>
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<td>30.6</td>
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<td>Beypazarı</td>
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<td>43.4</td>
<td>22.1</td>
<td>31.2</td>
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<td>53</td>
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<td>26.8</td>
<td>6.8</td>
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</tr>
</tbody>
</table>
The availability of educational attainment figures by gender allows us to construct a variable that is expected to serve as a measure of gender inequality not only in education, but also in other domains of social life.32 This variable, which we call the **gender gap in education**, is computed as the difference between the mean years of education for males and females expressed as a percentage of the overall mean years of education in the district. We expect this variable to proxy for the ‘conservativeness’ of the cultural environment.

Across Istanbul’s 39 districts, the AKP vote share ranges between 20 and 70 percent which means that there is a lot of variation that can be explained provided that the right set of variables are put together. The binary relationships between the AKP vote share and the potential explanatory variables are presented in Figures 1a through 1d. The scatter diagrams reveal clear associations between the AKP vote share and the variables in hand such that the vote share is negatively related with the population registration rate, the mean age, and the mean years of education while it is positively associated with the gender gap in education.

The district-level regression results are summarized in Table 2. With an R-square figure of 0.87, the estimated model yields a very good fit. In line with the binary relationships observed above, we find that the population registration rate and the years of education are inversely related with the vote share, while the gender gap in education has the opposite effect. The coefficients on age and its square imply that the vote share of AKP is maximized when the mean age in the district is around 34. According to our estimates, a one-percentage point increase in the population registration rate leads to a 0.25 percentage point decrease in the AKP vote share. This finding is in accordance with the hypothesis that the AKP is stronger in areas with large migrant populations. The coefficient on the gender gap in education also has the expected positive sign meaning that the AKP has stronger support in conservative districts where men typically receive more education than women. A one unit increase in the value of this variable increases the vote share of the AKP by 1.6 percentage points. This estimate implies that the AKP vote share in a district where men have 10 percent more years of education than women is expected to be 16 percentage points more than a district where men and women have equal schooling levels.33

### Table 2: Regression results

<table>
<thead>
<tr>
<th>Variable</th>
<th>AKP vote share</th>
</tr>
</thead>
<tbody>
<tr>
<td>Population registration rate</td>
<td>-0.247 (0.008)</td>
</tr>
<tr>
<td>Mean age</td>
<td>8.762 (0.012)</td>
</tr>
<tr>
<td>Mean age^2/100</td>
<td>-12.883 (0.012)</td>
</tr>
<tr>
<td>Mean years of education</td>
<td>-2.867 (0.060)</td>
</tr>
<tr>
<td>Gender gap in education</td>
<td>1.581 (0.001)</td>
</tr>
<tr>
<td>Constant</td>
<td>-91.627 (0.172)</td>
</tr>
<tr>
<td>No. of observations</td>
<td>39</td>
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<tr>
<td>R-squared</td>
<td>0.869</td>
</tr>
</tbody>
</table>

Note: The p-values of two-sided tests of significance are in parentheses.

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32 As discussed in Scott (2006), there are connections between gender inequality in one domain and that in another, such as the link between political representation and laws that aim to narrow the gender pay gap.

33 Since the dependent variable in our regressions is restricted to the zero-one interval, an alternative to OLS regressions would be estimating Grouped Logit models with correction for heteroscedasticity. These estimates, which yield patterns that are mainly in line with those presented here, are available from the authors upon request.
4. Conclusion

The purpose of this study was to identify the socio-demographic determinants of the vote share of the Justice and Development Party (AKP) which has been in power in Turkey since 2002. Making use of data available at the district level, we were able to observe the patterns that apply in the province of Istanbul. Our findings were in line with the hypothesis that the AKP has benefited the most from the existing living conditions of the urban population, especially the lower and middle classes residing in metropolitan areas. Apparently, the party has been particularly successful in identifying the worldviews and addressing the needs of conservative and generally-underprivileged masses of voters many of whom are first or second generation migrants. The high level of support for the party in parts of the province where lower-class migrant populations are concentrated was among the key findings of the econometric work. Alongside ideological and cultural factors, we attribute this success to the party’s prioritization of the provision of public services to the lower-class neighborhoods.

One example of such services are housing projects undertaken by the Housing Development Administration of Turkey (“Toplu Konut İdaresi Başkanlığı” or TOKİ for short in Turkish) that have allowed many families to purchase their own homes and saved them from having to pay monthly rents. In addition to gaining access to affordable housing units, many lower-income families have also had the opportunity to sign contracts with construction companies and build larger and more modern housing units on the property that they have been occupying. Such projects initiated within the framework of what is known as the “urban transformation” of many districts and neighborhoods of Istanbul are among the prime examples of how local administrations provide the underprivileged masses with social mobility opportunities that they have been pursuing for a long time, even though much of the profits are nowadays taken in by construction companies.\(^{34}\) The extension of public transportation services to the suburbs and improvements in access to health services have also made life easier for the residents of peripheral districts.

The discussion presented so far may not have given many clues as to whether or how the AKP’s success has to do with its pro-Islamist roots. We must, therefore, point out that many services provided by local AKP officials continue to have a religious aspect to them, and since Islamic conservatism is much more common among low-income families living in poorer districts, such actions have repeatedly paid off at the ballot box. Among the many ways of catering to the religious sentiments of the people are the provision of food stamps and free meals in Ramadan, social activities and free public transportation during religious holidays, and mass circumcision ceremonies for male children. Local politicians also take the initiative in the construction and restoration of mosques which they themselves visit every week for Friday noon prayers. Funeral and burial services are provided for free to all residents, and if the family of the deceased wishes the burial to take place in their original hometown, the transportation of the body is also done free of charge. Thus, over the years, party officials have become experts in not only providing basic services, but also in using them as public relations activities that aim to reinforce the positive images of the party leaders in the eyes of their constituencies. In a country where ethnic and religious identities play important roles in shaping people’s political preferences, these parties have also portrayed themselves organizations that bring together “good Muslims” who will do only what is in the best interest of the people. Barring any substantial socio-economic changes, it seems that they will continue to dominate Turkish politics in the years to come.

One aspect of the current study that deserves reiteration here is that basic information drawn from district-level census data proved to be highly instrumental in providing empirical evidence in favor of hypotheses regarding factors behind the success of a certain political party. The gender gap in education, in particular, turned out to have a sizeable impact on the

\(^{34}\) At this time, there is no district level data that can be used to quantify the impact of this process.
party choice, in the presence of a control for the mean years of schooling in the district. In fact, this variable has a similar effect in a province-level regression across Turkey’s 81 provinces. Thus, it promises to be applicable in different contexts where social conservatism appears to be of relevance. Future empirical work that makes use of this variable which can be calculated using both census and survey data will reveal whether or not its usefulness extends to areas other than voting behavior.

**Figure 1a:** AKP vote share vs. the population registration rate in 39 districts

**Figure 1b:** AKP vote share vs. the mean age in 39 districts
Figure 1c: AKP vote share vs. the mean years of education in 39 districts

Figure 1d: AKP vote share vs. the gender gap in education in 39 districts
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Globalization and Social-Economic Development: Progress or Regress

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Keywords:
Globalization, Economy, Growth, Recession, Integration, Market Forces

Abstract
Globalization has been developing since 1980 and it was an important reason of some changings and development in not only world economy, but also our daily life. There are some reasons affected on the development of globalization. To exemplify, ending of cold war with the collapsing of Union of Soviet Socialist Republics, acceleration of information technologies and communications with the development of contemporary technologies, declining costs and even increasing saved capital, new demands and other factors let globalization develop. Economic and social issues and political movements happened in the world in recent years were one of the essential factors of re-actualization of globalization and integration. Some experts point out that, 2008 great “Financial Crisis” having negative impacts on economic and social life was an important result of globalization. On the other hand, “Arabic Spring”, the political movement is another considerable result of globalization. For sure, globalization and integration can directly or indirectly effect such situations. Before starting to analyze the association between globalization and countries’ economies, implementation, regulation and supervision of Globalization in a country and world should be considered. In our modern life, Globalization can be mainly observed in investment and financial markets. The Republic of Azerbaijan is also one of the participants of globalization process. After gaining its independence in 1991, some essential activities and reforms were needed to be done in order to integrate to the world economy. Other newly independent countries have also been under positive and negative impacts of globalization. Mainly, the effects of globalization on social-economic development will be discussed in this article.

1. Introduction
Globalization constitutes a critical motivation for development in the contemporary world of today as a result of the challenges it poses to nation states (M.J. Ibrahim). The equation of global influence is fundamentally determined by a vibrant economy that is characterized by inherent ability to sustain a steady state growth path and development.

Business today is in a global environment. This environment forces companies, regardless of location or primary market base, to consider the rest of the world in their competitive strategy analysis. Firms cannot isolate themselves from or ignore external factors such as economic trends, competitive situations or technology innovation in other countries, if some of their competitors are competing or are located in those countries. Companies are going truly global with Supply-chain Management (SCM). A company can develop a product in the United States, manufacture in India and sell in Europe. Companies have changed the ways in which they manage their operations and logistics activities. Changes in trade, the spread and modernization of transport infrastructures and the intensification of competition have elevated the importance of flow management to new levels. Azerbaijan is also globalized within globalization process and it has great effects on Azerbaijan’s economic, social, cultural and educational development.

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Driving Forces of Globalization

The last two decades have seen the evolution of the global manufacturing environment. Majority of the manufacturers have global presence through exports, strategic alliances, joint ventures or as a part of a committed strategy to sell and produce in foreign markets.

Global Market Forces

There is tremendous growth potential in the foreign emerging market which has resulted in intensified foreign competition in local markets which forces the small- and medium-sized companies to upgrade their operations and even consider expanding internationally. There has also been growth in foreign demand which necessitates the development of a global network of manufacturing bases and markets. When the markets are global, the production-planning task of the manager becomes difficult on one hand and allows more efficient utilization of resources on the other. Few industries remain today in which the international product life-cycle theory still applies. Product markets, particularly in technologically intensive industries, are changing rapidly. Product-cycles are shrinking as customers require new products faster. In addition, the advances in communication and transportation technology give customers around the world immediate access to the latest available products and technologies. Thus, producers hoping to capture global demand must introduce their new products simultaneously to all major markets.

In addition, the integration of product design and the development of related manufacturing processes have become the key success factors in many high-technology industries, where fast product introduction and extensive customization determine market success. As a result, companies must maintain production facilities, pilot production plants, engineering resources and even Research and Development (R & D) facilities all over the world (Romer, 1992). For instance, according to the formal web site of Apple Inc., Apple Computer has built a global manufacturing and engineering infrastructure with facilities in California, Ireland and Singapore. This network lets Apple introduce new products simultaneously in the American, European and Asian markets. Companies use the state-of-the-art markets as learning grounds.
for product development and effective production management, and then transfer this knowledge to their other production facilities worldwide. This rationale explains why Mercedes-Benz decided recently to locate a huge manufacturing plant in Vance, Alabama. The company recognizes that the United States is the state-of-the-art market for sport utility vehicles. It plans to produce those vehicles at the Vance plant and introduce them worldwide by 1997.

On the other hand, although UK based British Petroleum (BP) operates in Azerbaijan, but the company is able to sell crude oil and oil products in worldwide. BP is a globalized company having several branches in different countries specialized in oil and gas sector, such as: Azerbaijan, Turkey, Denmark, France, Brazil, Canada, USA, India and etc.

**Technological Forces**

M.J. Ibrahim (2010) points out that, a peculiar trend which was prevalent in the last decade, besides globalization, was a limited number of producers which emerged due to diversity among products and uniformity across national markets. Product diversity has increased as products have grown more complex and differentiated and product life cycles have shortened. The share of the US market for high-technology goods supplied by imports from foreign-based companies rose from a negligible 5 per cent to more than 20 percent with the last decade. Moreover, the sources of such imports expanded beyond Europe to include Japan and the newly industrialized countries of Hong Kong, Singapore, South Korea and Taiwan. There has been diffusion of technological knowledge and global low-cost manufacturing locations have emerged. In response to this diffusion of technological capability, multinational firms need to improve their ability to tap multiple sources of technology located in various countries. They also must be able to absorb quickly, and commercialize effectively, new technologies that, in many cases, were invented outside the firm thus overcoming the destructive and pervasive ‘not-invented-here’ attitude and resulting inertia. There has been technology sharing and interfirm collaborations. The well-known joint ventures in the auto industry between US and Japanese firms (GM-Toyota, Chrysler-Mitsubishi, Ford-Mazda) followed a similar pattern. US firms needed to obtain first-hand knowledge of Japanese production methods and accelerated product development cycles, while the Japanese producers were seeking ways to overcome US trade barriers and gain access to the vast American auto market. As competitive priorities in global products markets shift more towards product customization and fast new product development, firms are realizing the importance of co-location of manufacturing and product design facilities abroad. In certain product categories, such as Application Specific Integrated Circuits (ASICs), this was the main motivation for establishing design centres in foreign countries. Other industries such as pharmaceuticals and consumer electronics also have taken this approach.

**Global Cost Forces**

Stiglitz (2001) says that, new competitive priorities in manufacturing industries, that is product and process conformance quality, delivery reliability and speed, customization and responsiveness to customers, have forced companies to reprioritize the cost factors that drive their global operations strategies. The Total Quality Management (TQM) revolution brought with it a focus on total quality costs, rather than just direct labour costs. Companies realized that early activities such as product design and worker training substantially impact production costs. They began to emphasize prevention rather than inspection. In addition, they quantified the costs of poor design, low input quality and poor workmanship by calculating internal and external failure costs. All these realizations placed access to skilled workers and quality suppliers high on the priority list for firms competing on quality. Similarly, Just-in-time (JIT) manufacturing methods, which companies widely adopted for the management of mass production systems, emphasized the importance of frequent deliveries by nearby suppliers. A number of high-technology industries have experienced dramatic growth in the capital intensity of production facilities. A state-of-the-art semiconductor factory, for instance, costs close to half a billion dollars. When R & D costs are included, the cost of production facilities for a new generation of electronic products can easily exceed $1 billion.
Most of the globalized companies produce their products in low-cost countries, such as India, China, Bangladesh and so on. This strategy let globalized companies employ work force by paying low salary. To exemplify, USA based company Apple Inc. produces and assembles its products in China and sell the products in almost all countries. Another example is Swedish company H&M. Almost all clothes are produced in Asian countries, Bangladesh, Vietnam and Taiwan, but all H&M branded clothes are sold in worldwide. That is why H&M is so famous among young generation and H&M has got a slogan: “H&M-where stylish meets cheap” (M. Shafag, 2013).

Political and Macroeconomic Forces

Getting hit with unexpected or unreasonable currency devaluations in the foreign countries in which they operate is a nightmare for global operations managers. Managing exposure to changes in nominal and real exchange rates is a task which the global operations manager must master. If the economics are favorable, the firm may even go so far as to establish a supplier in a foreign country where one does not yet exist. For example, if the local currency is chronically undervalued, it is to the firm’s advantage to shift most of its sourcing to local vendors. In any case, the firm may still want to source a limited amount of its inputs from less favorable suppliers in other countries if it feels that maintaining an ongoing relationship may help in the future when strategies need to be reversed. Becton Dickinson has built a global manufacturing network for its disposable syringe business, with production facilities in the United States, Ireland, Mexico and Brazil. When the Mexican peso was devalued, the company quickly shifted its production to the Mexican plant, thereby gaining a cost advantage over its competitors’ US factories. Another example is from Azerbaijan automobile market. Russian automobile company named “VAZ” used to produce a sedan car of “VAZ 2107”. Most of the Azerbaijani were interested in this car. Between 2005 and 2008 Azerbaijan national currency manat undervalued and Russian company started to export their car “VAZ 2107” to Azerbaijan. Such kind of economic situations allow company to deal with effectively (personal observation).

1. Social Development

“Globalization” is currently a popular and controversial issue, though often remaining a loose and poorly-defined concept. Sometimes too comprehensively, the term is used to encompass increases in trade and liberalization policies as well as reductions in transportation costs and technology transfer. As far as its impact is concerned, discussion of globalization tends to consider simultaneously its effects on economic growth, employment and income distribution - often without distinguishing between countries and within-country inequalities – and other social impacts such as opportunities for poverty alleviation, human and labor rights, environmental consequences and so on.

Globalization has some social impacts on countries. Such as, employment, income inequality, education, cultural changes and etc. Presently, Azerbaijan and the effects of globalization on Azerbaijan and its culture, education and employment rate will be discussed.

It is said that globalization has bad effects on any countries’ culture, whereas, most of the article do not agree with this point. N.Kamalov (2009), quoted that if the functions and facilities of globalization are effectively and smartly used, globalization is very healthy, and otherwise it may have very bad effects on a country. If a globalization is about transferring good indicators of a country to other countries, it is useful. For example, European Union is a good example for this point. There is no border, there is no customs, and each country’s nation is able to go another one without having visa and their cultures have been looked like to each other, but they could be able to preserve their own national cultures.

On the other hand, as a result of globalization, most of the multinational companies try to
adopt their product to the host countries’ culture they do work. In order to be a global company such kind of strategies are unavoidable. For instance, Mc. Donald’s is a multinational company and tries to adopt its product to the host countries’ culture and taste.

Coca cola is sweet in Azerbaijan, but it is not sweet in Georgia. This strategy is called localization.

Another effect of globalization is education. Azerbaijan education has got a development since 2005 as a result of globalization. There is a governmental support to education in Azerbaijan. This support is provided as a scholarship by the government and the State Oil Company of Azerbaijan Republic. These two scholarships allow well qualified students to continue their educations in several first ranked universities situated in developed and emerging countries. Students come back after completed their education and they implement modern and global techniques and theories in Azerbaijan.

Furthermore, there is another program which is widely used within European Union named Erasmus Mundus Scholarship Program. The program allows students to continue their education in 2 different universities in several European countries. At the end, they get two diplomas.

Globalization has an effect on national cultures, transferring national cultures to other countries’ cultures. Azerbaijan State Oil Company of Azerbaijan Republic (SOCAR) is a sponsor of a Spanish football club named Atletico Madrid. According to the contract between Atletico Madrid and SOCAR, Atletico Madrid is responsible for carrying the name of Azerbaijan (Azerbaijan, Land of Fires) on their football uniforms during contract time.

SOCAR tried to transfer and promote Azerbaijan’s culture in the world by signing such a sport sponsorship contract. On the other hand, scholars of SOCAR are responsible for creating an Azerbaijan Cultural Nights at the Universities they study abroad. Such kinds of activities are the product of globalization.

2. Conclusion

The world economy is becoming borderless and integrated, driven by global market forces, global technological forces, global cost forces and political and macro-economic forces. The integrated world economy and global competitive arena is changing the way in which companies traditionally operated. If a company attends to globalization process and uses it effectively and smartly, that time the company will be able for further development, otherwise the company will going to bankrupt.

All in all, above mentioned facts it would be concluded that if a globalization is effectively and efficiently uses that time, the result of the globalization is progress, otherwise is regress.

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Globalization of economy and tax base erosion

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1. Introduction

The economic globalization, the expansion of the economic activities of international companies and financial-investment organizations, their operation in the states with various tax systems and tax rates in recent periods have created new opportunities in manipulation operations for tax evasion purposes through income transfers. The fast growth of digital economy, development of the role of different types of intangible assets, enhancement of e-commerce operations, appearance of new economic segments have generated a number of complicated problems in international world such as the income transfer from high tax rate states to low tax rate states. In its turn this causes the tax base erosion, reduction of budget revenues which leads to the new threats to economic security.

The development of the role of Azerbaijan in the international economic relations and its integration to world economy requires the investigation of a number of significant problems related to the analysis of socio-economic behavior of transnational companies and their taxation. Today, international companies, corporations and a large number of transnational companies covering interdependent legal entities operate in Azerbaijan. The growing number of companies, on the one hand increases the economic activity in the country, improves the investment climate, and raises living standards and welfare of the population by creating new jobs. But on the other hand, there arises a need for tax authorities to investigate more deeply the issues related to the correct determination of tax revenues and expenditures of the company. That is, a number of transactions carried out by companies are applied in other countries after practice.

In recent years, both in developed countries and developing countries, transfer pricing and multinational enterprises in their application of intragroup transactions carried out by analyses of issues to a large extent. One of the major reasons is fast growth of number of these companies and more than 70% of international transactions falling to the share of transnational companies.

Recently, the application of transfer pricing in developed countries has been in the center of attention and their legislative base has periodically improved in accordance with multiple transactions. But growth of transnational companies and a significant increase in the activities of multinational companies and intragroup, making them the subject of double taxation, as well as different tax rates in different countries to investigate the issues and the application of international conventions in this field is the need to improve the legislation. The matter is, double taxation conventions have been developed based on the principles of 20-30th years of last century. Over the years, however, the economic structure has changed radically and the nature of international economic relations has transformed. Today, there is such a situation that no country is able to solve the problems in the area of tax policy without joining international conventions.

Presently, especially in the situation of financial crisis, the income transfer from countries with high tax rates to the countries with preferential tax rates and centralization of spending trend is being observed. In many developed countries of Europe, especially in Greece, Portugal, Spain the increase in the state budget deficit, as a result of decreasing the growth rate of the tax revenues, caused the acceleration of inflation and the unemployment. The tax base erosion problems related to income transfer is currently one the major challenges of OECD (Organization for Economic Cooperation and Development [4,9,10,11].
In order to reduce the tax burden on income and capital in offshore zones, free trade and the establishment of inter-related entities in the collection of revenues and the experience of their re-investment based on certain strategy is widely used. Transfer prices are basically applied in intra-group operations by transnational enterprises and are characterized being the price of tangibles and intangibles and services supplied to related enterprise. This price differs from the market price which is formed between independent parties in the market. That is, as opposed to market prices transfer prices are formed not between the independent parties, but between the related parties and in accordance with arm’s length [2,3,4]. But its realization in practice is quite complicated issue. Just for this reason actually the tax bodies face important issues such as investigation of transfer prices application by transnational enterprises.

2. Transfer pricing

The identification of prices different than market prices in the transactions between related parties are called transfer prices. Transfer prices could be higher or lower than general prices. Such kind of pricing is one of the widely spread methods of tax reduction. The pricing different than market prices causes a lot of difficulties in the analysis of economic processes as well as changes the real tax base.

Transfer pricing goes back to 50 - 60th year of XX century. The president of the USA R.Kennedy wrote that a number of American companies transfer their income to their daughter enterprises abroad and this way evades taxation. [16]. However as the tax evasion cases increased with the transfer pricing, these issues drew more attention and interest. In the 80th years of XX century there were a great deal of companies in the USA, Great Britain and other developed countries using transfer pricing. Appearance of such a situation gave opportunity to the companies to evade the taxation legally that is applying transfer pricing in the framework of existing legislation. In order to eliminate these cases a number of international organizations and first of all OECD brought forward the issue of appropriate legislative base. Presently, the transfer of taxable base by applying transfer pricing is the most challenging issue not only within OECD, but also in non-member states. The meeting of G20, June 2012, also noted that the tax system should be improved in every state to protect the taxable base. But on the other hand, stimulation of the modern globalized world, multinational companies and the creation of new jobs linked to their role in the area of tax policy in the international arena. From this standpoint, the following aspects should be taken into account while taking steps in the area of transfer pricing in international world:

1. Presently, multinational companies operating in the world are the major driving force in the economic growth and in the creation of new and innovative technologies. Income of these companies is higher than the budgets of most countries. Transfer pricing legislation should be formulated in such a way that doesn’t limit their economic activity and encourage the companies to bear social responsibility.

2. As multinational companies operate in different countries, they directly become subject to double taxation. The legislative base and international conventions have to be improved in this area as well.

3. The goal of business is to maximize the profit by reducing expenses and taxes as well. Therefore those businesses have responsibility to the states they operate and to the shareholders.

The Guidelines of the Organization for Economic Cooperation and Development «Tax services and transfer prices for transnational companies» (hereinafter transfer pricing Guidelines of OECD) are applied in the transactions between related parties in Member states. Presently, as a result of the transfer pricing tax base erosion is one of the most
important problems that make economists and politicians to investigate the issue. However, many aspects of the application of transfer pricing tax policy, tax risks in the first place, depending on the criteria for the identification of sources of information and analysis is required to investigate. Successful transfer pricing programs should cover the following main steps:

- Identification of risks related to transfer pricing is the first significant stage. The risk assessment requires determination of the risk indicators;
- After identification of risk-oriented companies, the audit inspections confirm whether the companies apply transfer pricing or not. In this stage taxpayers and tax authorities communicate and discuss the issues regarding the collection of necessary data;
- As the transfer pricing cases are usually applied by highly profitable companies with sufficient financial resources, planning is carried out by highly qualified specialists in order to avoid the tax payment. In this case, the proof of this matter requires highly skilled and well educated human resources by tax authorities. The tax officials operating in the area of transfer pricing should possess economic and legal skills as well as comprehend the essence of business policy. Otherwise long term proceedings are required to prove it.
- It should be noted that actually the tax evasion cases by means of transfer pricing are typical to developing and developed states. The major reason is transnational companies operate in most of these states during globalization.

3. **Risk assessment and information sources**

One of the most important issues encountered during the transfer pricing is the risks assessment. Existing resources of tax authorities of every state are restricted. This has created the need for the identification of the risks regarding the transfer pricing. The area and companies where such risks and companies increase the effectiveness of audits, enables to save time and resources. There are lots of methods of risk identification in transfer pricing:

- Risk identification by analyzing appropriate data by means of information systems application;
- Analysis of companies’ turnover conducting transactions through daughter companies by the enterprises located in free trade zones;
- Analysis of companies’ activity with loss;
- High share of transactions concluded with the companies operating in the states of low tax rates;
- Analysis of transactions between related persons.

However, the analysis of the sources of information to investigate the characteristics of each area of the business requires understanding of its essence. The tax planning in the companies applying transfer pricing is carried out by consulting companies with high rating. Around 1000 highly qualified specialists only in Ernst&Young provide consulting services on tax planning. A number of taxpayers in the majority of court proceedings won the case with help of these consultants.

**Sources of information**

With purpose of determining analysis and transfer pricing risk, the tax authorities enhance the use of information from specialists, state authorities and comparable information apart from provided initial data.
One of the important points in the process of transfer pricing is to obtain adequate information. It's impossible to tell any opinion on the application of transfer pricing without proper information. The recent acquisition of the relevant information for tax purposes in connection with the removal of restrictions in the field of developments has taken place in the international arena. In fact, for many years it was possible to get information on bank accounts for tax purposes even in Switzerland protecting the bank secrets.

If the investigated enterprise’s financial statements don’t coincide with comparable figures of database, it creates a reason to investigate the enterprise in more detail. But during comparison it's important the differences between the indicators of activity area and comparison to be clear. If the results are not conclusive, the tax authorities shall take into account the other factors.

**Customs information:** For the purposes of customs duty calculation, the customs data on international transactions between related parties in real-time regime is possible to obtain and to use. However, the availability of transactions on movement of goods beyond the borders (because, the goods is moving without changing the owner) and other transactions, for example royalties, are not reflected in the rates of customs data.

**Patent office:** During the transactions of intangible assets abroad, for the purposes to clarify which intangible asset can be improved by business activity, the data about licenses are collected, e.g. Patent and Trade Office in Denmark. According to these data the peculiarities of intangibles are investigated. But the analysis of patent is quite complicated and in most cases requires the involvement of additional experts.

**Tax information contract**

As the transfer pricing is applied basically during the foreign economic relations, tax authorities require the exchange of information and necessary data of the countries in which the company operates. In its turn it requires the conclusion of treaties on the tax information exchange between various states. The data obtained from other tax bodies, as well as the availability of special enquiries enable to determine the risk of transfer pricing. From this standpoint the information exchange between the states plays a great role in determining the transfer pricing risk and their elimination.

**Press reports, trade magazines and other information in public domains**

By means of these information sources it's possible to collect the necessary data on special enterprises and their business activity. The articles on business activities may cover, e.g. as a result of the entrance of competitive enterprise to the market, the decrease in sale of this enterprise, its reasons and other related information.

**Internet search:** It’s quite possible to obtain information about various legal entities and industries by means of Internet. Also through Internet one can get access to the open database of a number of state authorities. For example, the database of financial statements of companies of Security and Monetary Commission operating in the USA.

4. **Conclusions**

As a result of the reforms carried out in recent years in all areas, great achievements have been attained not only in public administration, but also in the field of tax administration. Taking into account the best international practices in this area, as a result of measures taken, the sustainable development of the tax system, efficient tax control mechanism formation over the taxpayer’s activity and tax legislation base to prevent the tax evasion in a timely manner was established and is continuing to be improved.
The conceptual basis for the improvement of tax legislation covers the expanding the rights of taxpayers, equal economic conditions for the taxpayers, the organization of the fight against tax evasion cases, the creation of favorable investment climate for the development of entrepreneurship and formation of free competition.

Moreover, in connection with Azerbaijan’s increasing role in international economic relations and its integration of the world economy, the expansion of multinational companies’ activity requires the creation of governing legislation in terms of taxation. That is local and foreign companies operating in countries with different tax rules of their business operations; they can increase the risk of tax evasion cases. Today, by application of transfer pricing, business transactions carried out by companies in a number of cases of tax evasion is almost expanded all over the world.

Among the states of the former Soviet Union for the first time in Kazakhstan the transfer pricing law was adopted in 2008. Transfer pricing law in the Russian Federation was adopted in 2011 and entered into force in January 2012. In the period of accelerated process of integration into the world economy and leading global legislation it is necessary to establish a legal framework for the transfer pricing.

The following are the key factors in the establishment of a legislative framework:

⇒ Currently, the international companies, and a large number of interdependent transnational corporations with a variety of composition are operating in Azerbaijan. The growing number of companies, on the one hand increases the economic activity in the country, improving the investment climate, creating new jobs, living standards of the population, its material well-being and quality of life to a qualitatively new level, but on the other hand, directs the tax authorities to the correct determination of income and expenses of companies, to protect the tax base and creates the need to investigate more deeply the issues related to transfer pricing;

⇒ Transformation of the income as a result of transfer pricing reduces the taxable base of the state and as a result of it significant changes take place in tax revenues. Therefore, to investigate the occurrence of these changes in the process of transfer pricing the risk assessment methodology should be developed;

⇒ The use of the arm’s length principle in the legislative framework of transfer pricing, on the one hand allows for the coordination of national legislation with international norms, on the other hand, facilitates the use from practical point of view;

⇒ As transfer pricing is basically carried out between the related parties, the determination criteria and mechanisms for practical application of such criteria should be simplified;

⇒ The risk determination in transfer pricing process should be one of the main stages. In addition to saving resources, risk assessment increases the effectiveness of tax authorities;

⇒ Steady training of specialists in the field of transfer pricing makes it necessary to carry out experience exchange with the tax administrations of the states having a lot of experience in this field, as well as with international financial institutions;

⇒ In order to ensure the exchange of information in determining transfer prices in this area creates the need for expanding the network of international agreements signed.

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Fuzzy econometric model for forecasting of oil and gas production

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ABSTRACT

Fuzzy econometric model for forecasting oil and gas production volume is proposed in the present paper. For the modeling purposes, M.Hubbert equations and fuzzy regression model of H.Tanaka and J.Watada have been applied. Problem corresponding to the model were solved by using data for Azerbaijan Republic, in order to forecast value of oil and gas production in 2014 – 2015 years.

Introduction

Oil-gas industry is main contributing factor of Azerbaijan economy development. Recoverable reserves of oil and gas nowadays are one billion tonnes and two trillion cubic meters correspondingly [1]. Our research was implemented in order to define the natural capitals level show that volume of oil production in Azerbaijan was equal to 85.5 % in 2010 and volume of gas production was 2.9 % of this capital. This is why forecasting of oil and gas production volume is very important. Historically, there have been many researches in the field of modeling of oil and gas production forecasting. Among those we would underline geologist model of M.Hubbert [5] and econometric model of R.K.Kaufmann and C.J.Cleveland [6]. In this paper fuzzy econometric model of forecasting of the oil and gas production is proposed. For construction of this model, on first stage, we have used geological model of M.Hubbert and on the second stage – fuzzy model by Tanaka and Watada [2].

Fuzzy linear regression model by Tanaka and Watada.

Fuzzy linear regression model is described as follows:

\[ Y = A_0 \oplus (A_i \otimes X_i) \]  

(1)

\( Y_i, X_i, A_0 \) и \( A_i \) - fuzzy numbers and \( \oplus \) - addition of fuzzy number, \( \otimes \) - multiplication of fuzzy numbers.

Tanaka and Watada proposed the following linear programming formulation to estimate fuzzy parameters:

\[ F(c) = \sum_{i=1}^{n} \sum_{j=0}^{k} c_j x_{ij} \rightarrow \min \]

\[ \sum_{j=0}^{k} (a_j + (1-\alpha)c_j)x_{ij} \geq y_i + (1-\alpha)e_i, \quad i = 1,..,n \]

\[ \sum_{j=0}^{k} (a_j - (1-\alpha)c_j)x_{ij} \leq y_i - (1-\alpha)e_i, \quad i = 1,..,n \]

\[ a_j = \text{free}, \quad c_j \geq 0, \quad j = 0,1,..,k, \]

where \( a_j \) is the center and \( c_j \) is the spread of fuzzy parameter \( A_j, j = 0,1,..,k \). \( x_{ij} \) is the crisp independent variable \( (x_{i0} = 1) \), \( y_i \) is the center and \( e_i \) - is the spread of fuzzy dependent variable \( Y_i, (i = 1,2,..,n) \), \( \alpha \) – membership level of fuzzy set.
In order to construct fuzzy model for forecasting of oil production in Azerbaijan we have used the following input variables:

- oil recovery ratio - $z(t) = \frac{q(t)}{N_R}$

where $q(t)$ – volume of oil production at time $t$, $N_R$ – ultimate recoverable oil resources;

In order to define volume of oil production geological models of M.Hubbert were used, which are described by the following logistic equation:

$$N_p = \frac{N_R}{1+e^{-b(t-t_m)}}$$

where $N_p$ - volume of oil production, $N_R$ - ultimate recoverable oil resources (URR), $b$ – parameter of the curve slope and $t_m$- time, corresponding to the production peak.

- Investments volume to the oil and gas sector of economy – $INV$;
- Oil price in the world market - $WOP$;
- World economy growth rate - $WEG$.
- Output parameter of the model is the volume of oil production– $OP$.

For fuzzification of information for 2000-2013, input and output parameters were divided into the following fuzzy numbers:

Volume of oil production was divided to an input step ($OP_1$), slow growth step ($OP_2$), quick growth step ($OP_3$), maximum level step ($OP_4$). Step of decrease includes two stages – recession and the stage of completion. In the parameters of the recession stage calculating process, slow and fast growth parameters were used.

Oil recovery ratio was divided to steps of production correspondingly.

World oil price and growth of world economy were divided into four levels – low, close to low, high and very high.

Fuzzy numbers of input and output parameters of the model are described in table 1.
As result of the problem solution we have obtained following regression equation:

\[ y = 3.4 + 442.3z(t) + 0.09w_{op} + 0.5Inv + 4.2weg \] (5)

Results of forecasting for corresponding stage of oil production consist of following:

\[ y(input) = 15.92 ; \]
\[ y(rising) = 29.6 ; \]
\[ y(decline) = 38.04 ; \]
\[ y(max) = 50.32 \]

Indicator of World economy growth was taken from Global Economic Prospects [4], and is equal to 3.2 and 3.4 percent, correspondingly. Investments in oil sector were adopted for 2014 – 4 bln, and for 2015 – 5 billion US dollars. By using the above mentioned data we have produced forecast of oil production in Azerbaijan. According to the forecast, oil production in 2014 will be equal to 45 mln. tonnes, and in 2015 – 42 mln. tonnes.

**Gas production forecasting.**

In order to develop fuzzy model for forecasting of gas production in Azerbaijan, we have applied following input information:

- Gas recovery ratio \( zg(t) \), which is defined by the logistic equation (4);
- Investments volume to the oil and gas sector of economy – \( INV \);
- Gas price in the world market - \( Gwp \);
- World economy growth rate - \( WEG \).

Output parameter of the model is value of gas production – \( Og \).
**Figure 2.** Azerbaijan gas production Hubbert curve. when \( b=0.1 \), \( T(\text{max})=2030 \), \( Q_P=107 \).

**Figure 3.** Azerbaijan gas production Hubbert curve. when \( b=0.2 \), \( T(\text{max})=2025 \), \( Q_P=200 \).

**Table 2.** Parameters of the fuzzy econometric model of the gas production forecast

<table>
<thead>
<tr>
<th>( O_g ) Bln. cubic meters</th>
<th>( z_g(t) ) Gas recovery ratio</th>
<th>( Gwp ) US dollars for cubic meters</th>
<th>( Inv ) Investments in bhn. US dollars</th>
<th>( Weg ) World economy growth rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>( y_1 = 6.5 ) ( e_1 = 3.5 )</td>
<td>( z_{g1} = 0.001 - 0.008 ) ( a_{11} = 0.005 ) ( c_{11} = 0.003 )</td>
<td>( Gwp_{g1} = 0.1 - 0.2 ) ( a_{21} = 0.15 ) ( c_{21} = 0.05 )</td>
<td>( Inv_{g1} = 0.5 - 1 ) ( a_{31} = 0.75 ) ( c_{31} = 0.25 )</td>
<td>( Weg_1 = 0 - 1 ) ( a_{41} = 0.5 ) ( c_{41} = 0.5 )</td>
</tr>
<tr>
<td>( y_2 = 14.5 ) ( e_2 = 5.5 )</td>
<td>( z_{g2} = 0.007 - 0.014 ) ( a_{12} = 0.010 ) ( c_{12} = 0.004 )</td>
<td>( Gwp_{g2} = 0.19 - 0.3 ) ( a_{22} = 0.25 ) ( c_{22} = 0.06 )</td>
<td>( Inv_{g2} = 0.9 - 3 ) ( a_{32} = 1.95 ) ( c_{32} = 1.05 )</td>
<td>( Weg_2 = 0.9 - 2 ) ( a_{42} = 1.45 ) ( c_{42} = 0.55 )</td>
</tr>
<tr>
<td>( y_3 = 22.5 ) ( e_3 = 3.5 )</td>
<td>( z_{g3} = 0.013 - 0.025 ) ( a_{13} = 0.014 ) ( c_{13} = 0.011 )</td>
<td>( Gwp_{g3} = 0.29 - 0.4 ) ( a_{23} = 0.35 ) ( c_{23} = 0.05 )</td>
<td>( Inv_{g3} = 2.9 - 4 ) ( a_{33} = 3.45 ) ( c_{33} = 0.55 )</td>
<td>( Weg_3 = 1.9 - 3 ) ( a_{43} = 2.45 ) ( c_{43} = 0.55 )</td>
</tr>
<tr>
<td>( y_4 = 38 ) ( e_4 = 12 )</td>
<td>( z_{g4} = 0.024 - 0.045 ) ( a_{14} = 0.034 ) ( c_{14} = 0.011 )</td>
<td>( Gwp_{g4} = 0.39 - 0.5 ) ( a_{24} = 0.45 ) ( c_{24} = 0.05 )</td>
<td>( Inv_{g4} = 3.9 - 6 ) ( a_{34} = 4.95 ) ( c_{34} = 1.05 )</td>
<td>( Weg_4 = 2.9 - 4 ) ( a_{44} = 3.45 ) ( c_{44} = 0.55 )</td>
</tr>
</tbody>
</table>
As a result of solution of the problem we have obtained following regression equation;

\[ Og=1.08+468.8zg(t)+0.15Gwp+0.72Inv+5.02Weg \] (6)

By using regression equation (6) Azerbaijan gas production forecast was calculated for 2014 – 2015. Parameters of gas recovery ratio - \( zg(t) \) defined in two variants \( b = 0.1, zg(2014)=0.014, zg(2015)=0.015 \) and \( b=0.2, zg(2014)=0.024, zg(2015)=0.028 \). According to [3] gas world price in 2014 and 2015 years correspondingly equaling to 322,6 and 311,3 US dollars for thousand cubic meters. According to [4] world economy growth rate in 2014 and 2015 years is forecasted at 3,2 and 3,4 percents correspondingly. Investments in gas sector are adopted for 2014 at 4 bln, and for 2015 year at 5 billion US dollars. On the basis of above mentioned indicators and regression equation (6) we have obtained following forecast values of gas production:

\[ Og2014 – 27,2bln. \text{Cubic meters}, Og2015 – 29,4 \text{bln. cubic meters for } b=0.1; \]
\[ Og2014 – 31.9 \text{bln. cubic meters}, Og2015 – 35.54\text{bln. cubic meters for } b=0.2. \]

Conclusion

Results of the forecasting of oil and gas production could be used in decision making process for the management of national economy of Azerbaijan. In future perspective, political and ecological indicators could be used as input parameters of the fuzzy econometric model.

Reference


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