The Effect of Economic Integration on Economic Complexity of Latecomer Countries

by

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Abstract

The goal of this paper is to investigate the effect of economic integration on economic welfare of a latecomer and less developed country upon joining an existing economic union. The index of economic complexity was chosen as a good proxy of a country's economic stance and development sustainability. With the use of synthetic control method a causal relationship between the process of economic integration and complexity of three latecomer countries: Romania (member of the EU since 2007), Colombia (associate member of the Mercosur since 2004), and Cambodia (member of the ASEAN since 1999), was assessed for the study. Special attention is paid to determination of the major factors affecting the success and effectiveness of integration processes for a less developed country at the onset of integration. The concluding part of the study contains a set of policy related implications based on the results of the study.

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INTRODUCTION

This research represents an independent study of the key challenges associated with the accession of a latecomer country to an existing economic community, especially of a country that have less favorable economic conditions at the onset of its accession as compared to the founding members of the union. The choice of this topic was determined based on the lack of consensus on side effects from integration processes in recent studies on the one hand, and the growing discussions on the problem of rising income inequality at a regional level on the other hand.

My motivation and interest in this topic is driven by the fact that last year my country, Kyrgyzstan, joined the Eurasian Economic Community (EEC)¹. The rationale behind this process lies in geopolitical interests and the long-term historical socio-economic relations between the member states of the union. According to independent evaluations² the absolute majority of local population support such a decision. However less evident is the economic rationale of integration for the acceding country. Recent studies which will be covered below suggest that there is a potential set of challenges associated with integration processes for a country with less favorable conditions at the onset of its accession that might offset the benefits from trade facilitation with the member states. Unfortunately, there was a lack of deep economic research prior to such an accession within domestic academic circles.

Thus, the task of this paper is to investigate these major challenges which the acceding countries might face upon joining to an economic integration union, to find the evidence for or arguments against such a decision, and most importantly, provide policy related recommendations to prevent or overcome possible side effects from integration in order to attain better and sustainable development prospects

¹ Founding member states: Russia, Kazakhstan, Belarus; acceded by Armenia and Kyrgyzstan in 2015.

² "M-Vector" consulting agency, 2014

for the country and at union levels. The application of findings of the study are, of course, not limited to Kyrgyzstan, but may be relevant to those countries that are heading into an integrated union. The policy recommendations also might be of use for existing economic communities targeting sustainable growth and development regionally.

The performance of three economic communities was analyzed for the study: the European Union, the Association of South East Nations, and the Mercosur. The choice of these communities was based on their high levels of integration processes and existence of latecomer countries acceding the union. The methodological basis of the study is the synthetic control method³ which proved to be a powerful method in comparative case studies when determining a causal relationship between an event and the outcome variable. Also, there is no clear natural experiment allowing to assess the effect of country's economic integration; no clear control countries; and based on unconfoundedness assumption it can be generalized to multiple treated units.

The event of interest is the time of accession to a union by a country. The index of economic complexity⁴ was chosen as a good proxy of a country's economic stance and development sustainability and treated in the study as dependent variable. Place placebo tests and stationary block bootstrap tests were implemented to ensure statistical significance checks of the findings. The effect of integration was assessed for one representative from each of the selected unions: Romania (member of the EU since 2007), Colombia (associate member of Mercosur since 2004), and Cambodia (member of the ASEAN since 1999).

This paper has three chapters. *Chapter 1* provides a discussion of theoretical and methodological background of the research topic. It includes a literature review of various challenges for a latecomer

³ Abadie, Diamond & Hainmueller (2010)

⁴ Haussmann & Hidalgo (2009)

country acceding economic union and defines the methodology of the study. *Chapter 2* generates a comparative overview of the selected integration unions and implements the analysis of the effect of integration on economic complexity of treated countries. *Chapter 3* presents the conclusions, and formulates a set of policy related recommendations towards effective integration process on a country and union levels.

Chapter I. Theoretical implications of integration processes from the perspective of a latecomer country

1.1. The concept and forms of economic integration

The literature review reveals a rigorous interest on the concept of economic integration. The following authors have made a significant impact on the development of this concept: Jacob Viner (1950), Tinbergen (1954), Gehrels and Johnston (1955), Ernst B. Haas (1958), Bela Balassa (1961), R.G. Hawtrey (1970), Fritz Machlup (1975), Robert Marjolin (1989), R. Baldwin (1995) and others. Gehrels and Johnston (1955) were among the first to define economic integration, interpreted as "the presence of important economic links between a group of countries" ⁵. Nevertheless, this definition is quite broad and vague operationally (Haas, 1958), it does not reflect the key aspects of the process of integration. Marjolin (1989) defines it as the process of "embracing all the steps taken toward unification, even though they might fall far short of that ideal...". This definition is also uncertain and sometimes might be misleading as there are various forms and stages of economic integration, and many of them do not necessarily imply the process of unification except of tariff and nontariff barriers to trade (see Table 1 for details).

Bela Balassa (1961) clarifies the concept of economic integration and distinguishes it as a process and state of affairs. By the process of economic integration he provides measures designed to abolish discrimination between economic units belonging to different national states; by the state of affairs he implies the absence of various forms of discrimination between national states.⁶ Importantly, he separates the notions of cooperation vs. integration judging from the extent of reducing of discrimination: in particularly, lessening vs. abolishment of discrimination between the states accordingly.

⁵ Franz Gehrels and Bruce Johnston, The Economic Gains of European Integration, 1955.

⁶ Bela Balassa, The theory of Economic Integration, 1965

Walter Mattli (1998) sums up the background knowledge on economic integration in following: "voluntary linking in the economic domain of two or more formerly independent states to the extent that authority over key areas of domestic regulation and policy is shifted to the supranational level"⁷. This definition reflects properly the concept of economic integration which covers two important aspects: first, the process of linking economic domain of countries, and second, existence of supranational regulation over these processes.

Economic community has generally converged upon the levels, or stages, of economic integration, which are described in manuals of international economics as: (1) preferential and free trade agreements; (2) customs union; (3) common market; (4) economic union. The specifications of each of the levels of economic integration is well presented by Michael Holden (2003), see the table below.

Table 1. Levels of economic integration	n (derived from Holden, 2003) ⁸
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Basic elements of the stages of economic integration					
Free trade agreements	Zero tariffs between member countries and reduced non-tariff				
(FTA)	barriers				
Customs union (CU)	FTA + common external tariff				
Common market (CM) CU + free movement of capital and labour, some pol					
	harmonization				
Economic union (EU)	CM + common economic policies and institutions				

As we can see, each of the following stages of economic integration demonstrates higher convergence of economies: the progress is shown here from simple to a more complex stage of relationship. However, economic integration does not necessarily mean the evolution of the economic relations between countries through all of these stages. Many existing FTA's have no ambition to move to the next stage⁹. The drivers for deepening and widening of economic relations towards, for example,

⁷ Walter Mattli, The Logic of Regional Integration: Europe and Beyond, 1998

⁸ Holden M., Stages of Economic Integration: From Autarky to Economic Union, 2003

⁹ Chauffur and Maur, Preferential Trade Agreement Policies for Development: A Handbook, 2011

customs union, requires specific geo-political, economic and societal rationale¹⁰, and usually require integration on a single regional basis.

Establishment of economic union is seen as the highest level of economic integration. The only example of economic union in practice is the European Union. It remains as an exceptional case and is not comparable to other regional bodies¹¹. One of the closest counterparts to this model of economic integration is the Association of South East Asian Nations (ASEAN). One of the main distinguishing features of the ASEAN is in the goals of this regional integration: ASEAN targets not only the development of the single market but also an establishment of a single effective production base. The latter means the development of a network of industries across ASEAN member states.



Table 2. Differences between ASEAN and Eurozone (derived partially from McKinsey 2014)

¹⁰ Andriamananjara S., <u>Customs Unions</u>: Reasons for choosing a customs union: as prerequisite for future establishment of a political union; foster trust and decrease a risk of conflicts; to shelter policies from domestic lobbies; avoid trade deflection by setting common external tariff, etc.

¹¹ Murray (2008), Breslin and Higgot (2000)

As it can be seen from the table¹² above, the two regional integration models are not fully comparable to each other: unlike the EU, the ASEAN economic community does not target elimination of nontariff barriers to trade, free movement of people, government procurement, and common currency establishment. A more thorough comparative overview is presented in Chapter II.

Some scholars¹³ go beyond regional economic communities and claim that economic integration such as the common market or economic union should not be seen "as final as ends in and of itself". Rather success on its fronts should be seen as building momentum towards a longer term goal of reforming the multilateral trading system. Thus regional economic communities in this sense represent a step forward, or serves as a prerequisite to economic globalization. They are stepping stones for the member states to develop a competitive production network in order to effectively integrate as solid world players in the global market.

1.2. Economic benefits and challenges for a latecomer country acceding to economic union

The development and strengthening of integration processes in the last decades reflects a natural process of evolution and intensification of international economic relations. The literature review converges in the following: (1) an intensification of integration processes which has reshaped the global economic landscape for the past quarter century can be observed; (2) the impact of integration processes on a member country's well-being is not straightforward.

On the one hand, the classical market approach of free trade theories reveal significant potential economic benefits out of such economic integration which intensifies economic openness of a country to other member states of the union. Elimination of trade barriers among member states of the union

¹² Woetzel et al., South East Asia at the crossroads: Three paths to prosperity, 2014, McKinsey Global Institute

¹³ Lim Hng Kiang - Singapore trade and industry minister – speech delivered at the Conference on Asia-Pacific Economic Integration and Connectivity, 22-23 February, Singapore (derived from Siow Yue Chia, The ASEAN Economic Community: Progress, Challenges, and Prospects, 2013).

allows for static and dynamic gains¹⁴, such as trade creation benefits, i.e. an increase in trade volumes; higher specialization and economies of scale that induce productivity increase and price level falls; an increase in foreign direct investments that induces technological transmission; learning by exporting and importing effects¹⁵; total consumption level and variety increase¹⁶.

Another rationale behind integrational processes is to unitedly resist political and economic global challenges. It is hardly possible for an individual country to withstand international rivalry, and achieve and sustain a solid niche in the global market. For example, it is challenging for the "old industrial regions" to stand up to low-cost production competition from less developed and emerging markets. At the same time, less developed countries can hardly withstand the rivalry on their own from the existing trade and production leaders who enjoy first comers' benefits. An economic cooperation of member states allows for creation of an effective production network through deeper specialization within an economic union. In this regard integration processes act as opposition to globalization, since by promoting abolishment of internal trade discrimination, the participating member states maintain protectionist activities, to different extent, towards third parties through a common external tariff.

However, on the other hand, new studies reveal and warn about potential challenges for the countries joining an existing economic union, especially for those less developed and late coming countries as compared to the founding member states. The literature review on this topic uncovers the following challenges: increasing regional inequality, a low product trap, trade diversion, circular causation effect, environmental damage, macroeconomic vulnerability.

¹⁴ Brown et al. (1995): 'static gains' include the efficiency gains from exploiting comparative advantage, the reduced costs from scale economies, reduction in distortion from imperfect competition, and increased product variety. A corresponding definition of 'dynamic gains' accrue over time, in addition to the conventional static gains from trade'. (Deardorff's Glossary of International Trade, 2001). Dynamic gains from trade from integration represent an increase in production opportunities of members of the union due to dynamic effect of scale and free technology transmission, and increase in FDI flows.

¹⁵ Halpem, Koren, Szeidl (2005)

¹⁶ Hornok C., Koren M., Winners and Losers of Globalization: Sixteen Challenges for Measurement and Theory.

- ✓ Increasing regional income inequality. In some cases, regional manufacturing and production value chains will form, possibly with higher-income countries producing more intricate components and low-wage countries acting as assembly hubs.¹⁷
- ✓ Low product trap. When countries export only "low products" they are fall into a low product trap. The situation would worsen in case of integration without making any reforms towards sophistication of its production structure.¹⁸
- ✓ Trade diversion. Trade diversion may surpass trade creation benefits in case of higher taxes imposed to third key trade partner countries or may destroy the domestic production by more effective companies from other country-members.¹⁹ Analysis of trade of ASEAN members reveal trade creation effect among both developed and less developed members of the union. It does not seem to promote trade within the bloc at the expense of trade with non-members.^{20,21} However, these countries do not have common external tariff, instead, they conduct an independent foreign trade policy.
- ✓ *Circular causation e*ffect. Manufactured production will tend to concentrate where there is a large market, but also the market will be large where the manufactured production is concentrated.²²
- ✓ Environmental damage. Integration might induce excessive extraction of natural resources with consequent degradation of the resource base²³. Government subsidies to polluting and resource-depleting sectors such as agriculture, fishing, and energy would exacerbate the environmental consequences of trade.

¹⁷ Brown et al. (1995)

¹⁸ Kaldon (1966), Nunez (2008), etc.

¹⁹ Brown et al (1995), Eichengreen, etc.

²⁰ Calvo-Pardo, Freund & Ornelas, The ASEAN Free Trade Agreement: Impact on Trade Flows and External Trade Barriers, 2009

²¹ Mya Than, Myanmar in ASEAN: Regional Cooperation Experience, 2005

²² Kaldon (1966), Nunez (2008), etc.

²³ Reinert (2009)

✓ Macroeconomic vulnerability (bullwhip effect). Deeper economic integration can aggravate the macroeconomic vulnerabilities of member states. As production chains become more integrated, shocks to world trade permeate quickly through regional economic blocs. Producers of intermediary goods may be particularly badly affected as suppliers of final goods cut orders and run down their existing stocks of input materials. As a result, output contractions can be amplified through close trade linkages and so affect the strength of subsequent recovery²⁴.

As we can see countries face various challenges under the conditions of a tight international competition for markets on their way to join an existing economic union. It is important that governments and firms be aware of such economic hardships in order to effectively respond and mitigate them in timely manner.

The current study is devoted to assess the effect of economic integration on economic complexity of a latecomer country. I chose this indicator since recent research²⁵ reveal the importance of export complexity as a good indicator of trade and economic growth potential of a country. High levels of export complexity are associated with relatively high value added, competitive and rare production, that assure sustainable development of a country in the future.

The notion of product complexity was first introduced by Hidalgo²⁶ and Hausmann²⁷ in 2007. In order to gauge a country's economic complexity, they used as a proxy the number, variety, and rarity of goods that it exported²⁸. These measures are thought to be predictive of the complexity of country's

²⁴ Berglof et al. Transition report 2012: Integration across borders, EBRD report, 2012

²⁵ Hausmann & Hidalgo (2009, 2011), Felipe et al. (2010), Abdon et al. (2010), McMillan and Rodrick (2011), Lin (2012), etc.

²⁶ Cesar Hidalgo, CID research fellow, MIT Media Lab

²⁷ Ricardo Hausmann, Professor of the practice of economic development and director of Harvard's Center for International Development

²⁸ http://harvardmagazine.com/2010/03/complexity-and-wealth-of-nations

future exports, making a strong empirical case that the level of development is indeed associated to the complexity of a country's economy²⁹.

1	ГOP economic complexity ind	ex	LEAST economic complexity index			
Rank	Country	Index	Rank	Country	Index	
1	Cermets	2.40	1218	Cocoa beans	-2.88	
2	Halides	2.39	1217	Jute and other textile fibers	-2.85	
3	Developed exposed photo- material	2.21	1216	Tin Ores	-2.81	
4	Nickel Pipes	2.20	1215	Crude Petroleum	-2.75	
5	Photographic chemicals	2.19	1214	Coconuts, cashews	-2.61	

Table 3.	Тор	Five	products	with	high	and	least	economic	comp	lexity	indices	in	2014 ³⁰
			1						1	2			

Based on their study, an index of product complexity (PCI)³¹ was developed: the most complex products are sophisticated chemicals and machinery, whereas the world's least complex products are raw materials and simple agricultural products.

Table 4. Top	Five countries with	high and l	least economic	complexity	indices i	in 2014 ³²
				······································		

TOP economic complexity index			LEAST economic complexity index			
Rank	Country	Index	Rank	Country	Index	
1	Japan	2,25	139	Burma	-1,70	
2	Switzerland	2,10	140	Sudan	-1,75	
3	Germany	2,05	141	Iraq	-1,85	
4	Sweden	1,89	143	Chad	-2,11	
5	United States	1,80	144	South Sudan	-2,69	

According to Hausmann et. al, the index assigned to countries shows their capabilities of further development: the current set of products predefines the future set of possible products that a country could produce. They use method of reflections to identify the positive link between number, rarity and ubiquity of exports, and development capacity. The higher the overall ranking, the better prospects countries would have in the future. They make an important policy implication which implies that a

²⁹ Hidalgo, Hausmann, The Building Blocks of Economic Complexity, 2009

³⁰ Derived from The Observatory of Economic Complexity

³¹ The Atlas of Product Complexity, Harvard: <u>http://atlas.cid.harvard.edu/rankings/product/</u>

³² Derived from The Observatory of Economic Complexity

country's capacity to identify opportunities and obstacles and coordinate their resolution may be the determining factor in development³³.

1.3. Methodology of integration effect assessment

There is a limited set of approaches to assess the effect of becoming a member of economic integration union on its economic wellbeing. Many studies use fixed effects gravity equations³⁴ controlling for various possible factors to estimate the effects of such membership on bilateral trade. The basics of the model was developed and popularized by Walter Isard (1954), T.Tinbergen (1962), and Hans Linnemann (1966). Standard gravity model³⁵ has following structure:

$$PX_{ij} = \beta_0 (GDP_i)^{\beta_1} (GDP_j)^{\beta_2} (DIST)_{ij}^{\beta_3} e^{\beta_4 (LANGij)} e^{\beta_5 (ADJij)} e^{\beta_6 (FTAij)} \epsilon_{ij}, \text{ where }$$

- PX_{ij} is the value of trade from i to j,
- GDP_i and GDP_j is the level of GDP in country i and country j
- DIST_{ij} is the distance between country i and country j
- LANG_{ij} is a dummy variable assuming value 1 for sharing common language and 0 otherwise
- FTA_{ij} is a dummy variable assuming value 1 if i and j have free trade agreement(s) and 0 otherwise
- e is a natural logarithmic base
- ϵ is an error term.

There is no convergence of views on the magnitude and direction of the effect of economic integration on countries' welfare. Some studies found statistically significant positive effects on trade. For example, Aitken (1973)³⁶ revealed a strong evidence for gross trade creation in case of the European Economic

³³ Progresso, 2015: Interview with Prof. Hausmann

 ³⁴ Brada and Mendez (1985), Anderson and van Wincoop (2003), Rose (2002), Baldwin, Skudelny and Taglioni (2005)
 ³⁵ Frankel et al., Trading Blocks and the Americas: the natural, the unnatural, and the super-natural, 1995

³⁶ Aitken Norman, The effect of the EEC and EFTA on European trade: a temporal cross-section analysis, 1973

Community and the European Free Trade Association. Brada and Mendez³⁷ apply the model and analyze six different integration schemes by income level of member states,. They obtained a statistically significant positive coefficient "indicating that integration does reduce the resistance to trade among member countries"³⁸. They also found that this effect is higher across communities with developed rather than developing economies.

In contrast, when Frankel et al. (1995) tested the effects of membership in ASEAN, EC, and North America, they found that "partial movement towards regionalization may be better than total one"³⁹. It implies that full liberalization of trade among member states of an integration community would worse off country's welfare unless initial existence of high transport costs. In their model, the high transport costs among members of regionalization blocks justify the rationale of formation of these blocks.

Baier and Berstein (2007) have analyzed the effectiveness of gravity model as the method to determine the effect of economic integration and reveal a number of its drawbacks. In particular, they argue that the assumption of gravity model of exogeneity of free trade agreements based on cross section data is false as "countries likely select endogenously into FTAs, perhaps for reasons unobservable to the econometrician and possibly correlated with the level of trade"⁴⁰. The potential endogeneity and unobservable heterogeneity bias estimates downward. The underestimation of the effect of FTAs is done by as much as 75-85 percent. According to the authors, the use of instrumental variables is "compromised by the lack of suitable instruments".

³⁷ J. Brada, J.Mendez, Economic Integration among developed, developing, and centrally planned economies: a comparative andlysis, 1985

³⁸ Ibid.

³⁹ Baier S, Bergstrand J, Do free trade agreements actually increase members' international trade?, 2007 ⁴⁰ Ibid.

Hornok (2012) specifies the drawback of gravity models by identifying the problem of collinearity which is peculiar to this type of estimation. "The fixed effects leave only the bilateral (time-varying bilateral) variation in the data, while the club membership [trade agreements, customs unions, currency unions] dummy has very little variation in this dimension. As a result, in several settings, only one parameter can be identified. The estimated effects under different identification assumptions differ in a non-intuitive way and heterogeneous club effects (e.g. joint versus one-sided membership) cannot be identified separately. Standard estimation methods do not necessarily report these problems."⁴¹

The standard gravity model does not address the issue of assessing an effect of economic integration on a latecomer country, rather the effect of being member of the union; also no distinction between levels of economic development within economic union is identified. Thus, I have reviewed the upto-date methods of determining causal relationship between two variables given the criteria of desired analysis and opted to the synthetic control method as a good alternative to estimate the effect of integration with the use of gravity (regression) analysis⁴². Importantly, I attempt to assess this effect on economic welfare of the acceding country, where I use economic complexity index as a proxy of sustainability of a country's development.

This method combines matching and diff-in-diff techniques⁴³.

$$Y_{it} = Y(0)_{it} + [Y(1)_{it} - Y(0)_{it}]W_{it} = Y(0)_{it} + \alpha_{it}W_{it},$$

given i=1...n units, i=1 is the treatment unit; t=1...T, treatment for unit i happens at T₀; t< T₀<T, we estimate: $\alpha_{1t} = Y(1)_{1t} - Y(0)_{1t} = Y_{1t} - Y(0)_{1t}$ for t>T₀;

 $Y(\widehat{0}_{1t} = \sum_{j=2}^{n} w_j^* \quad Y_{jt} \text{ for } t > T_0, \text{ where } w_j^* \text{ are optimal weights.}$

⁴¹ Hornok C., Gravity or Dummies? The Limits of Identification in Gravity Estimations, 2012

⁴² Abadie (2003), Abadie, Diamond, Hainmueller (2010)

⁴³ The description of the method derived from Impact Evaluation course by Prof. A.Diamond, and Program Evaluation course by Prof. Kezdi, CEU 2015

The essential part of the method is an estimation of optimal weights of pre-intervention outcome variables and potentially time-invariant variables.

Technically the estimation of weights is as follows:

- Vector X_1 for the treated unit (k rows for the variables)
- Matrix X_0 for untreated units (k rows; n-1 columns for units)
- Search for vector W (n-1 rows for untreated units)
- That minimizes $||X_1 X_0W|| v = \sqrt{(X_1 X_0W)'V(X_1 X_0W)}$

An unconfoundedness assumption implies that if there is a comparison with the same characteristics X_1 then its t>T₀ outcomes would be a good estimate of the counterfactual outcomes of unit 1 (Y(0)_{1t}). The method allows to construct a "synthetic" control of the unit in question from a pool of unaffected by treatment units that attains a perfect match of the outcome variable and the covariates before intervention. The subsequent comparison of the outcome variables of the actual unit and its synthetic counterfactual after treatment (accession to an economic union in this study) represents the effect of intervention. "The idea behind the synthetic control approach is that a combination of units often provides a better comparison for the unit exposed to the intervention than any single unit alone"⁴⁴.

Generally, the use of synthetic control method is predetermined by following: there is no clear natural experiment allowing to assess the effect of country's economic integration; there is no clear control countries; it is a powerful method in comparative case studies that analyze the effect of intervention in one unit; based on unconfoundedness assumption it can be generalized to multiple treated units.

⁴⁴ Abadie, Diamond, Hainmueller (2010)

Chapter II. Analysis of trade complexity upon country's accession to economic community

2.1. Comparative overview of EU, ASEAN, and MERCOSUR

The choice for regional integration communities was based on two perspectives: 1) high level of economic integration; 2) uneven formation of an economic community: existence of latecomers to be assessed. Based on these preconditions I came up with the economic communities of the European Union, the Association of East Asian countries and the Mercosur.

Let us consider commonalities and peculiarities of the integration communities according to selected trade characteristics including economic complexity, export diversification and quality indicators.

(a) Income and its variation level:





The GDP per capita of an economic union is calculated here as weighted average of GDP per capital by the share of population within an economic community in current US dollars. The average GDP per capita in EU is \$36 464USD, it is classified as high income per capita level according to the World Bank classification; Mercosur possesses more than three times less of the level of EU – \$11 855 USD; the average weighted GDP per capita in ASEAN member states is 9 times less of its level in EU– \$4 044USD.





The variation of GDP per capita level is the highest in ASEAN: the level of GDP per capita of the richest country of the union – Singapore is 47 times exceeds its level of its poorest country – Myanmar. In EU this difference between Luxembourg and Bulgaria is close to 15 times; Mercosur is a relatively egalitarian union, the difference between Uruguay and Paraguay is 3,5 times.

(b) Average GDP growth rates:

The GDP growth rates of economic unions are calculated as simple average for the period from 1990 to 2014. It is quite expected that lower income countries, on average, have higher GDP growth rates than high income countries. A possible explanation to this phenomena is in the fact that lower income

countries have lower economic activity, and they possess large amount of unused factors of production. That is why a dollar spent there has high returns. In contrast, due to a high market conjuncture and a close-to-potential level of GDP in high income countries the growth potential is limited there.

As expected, ASEAN has the highest GDP growth rates – 6% on average for the past 23 years as compared to EU and Mercosur. However, the richest country of ASEAN – Singapore – has high average growth rates ranging 4-6 percent on average. In contrast, the EU country members of similar GDP per capita rates GDP growth rates in Sweden, Ireland, and Netherlands accounts for 1-2 on average. Mercosur possesses even GDP growth rates across its member states: 3 percent on average.

(c) Intra- and foreign trade of integration union:

The degree of intra- trade among members of integration union is highest in EU - 62% to total exports of EU. In contrast, foreign trade plays more important role in ASEAN and Mercosur – 86% and 77% respectively.

Table 5. Selected key characteristics of EU, ASEAN and Mercosur

#	Parameter	EU	ASEAN	Mercosur
1	Economic complexity in 2015 (weighted average)	1,5 ⁴⁵	0,746	0,5
2	Export diversification ⁴⁷ in 2010 (weighted average)	1,7 ⁴⁸	2,5 ⁴⁹	2,9

(c) Export complexity:

Export complexity of integration union is calculated here as weighted average on export share of a country in total exports of the union of Economic Complexity Index (ECI) of countries derived from

⁴⁵ Not included data on: Luxembourg, Malta (due to absence of ECI index and ranking).

⁴⁶ Not included data on: Myanmar and Brunei (due to absence of ECI index and ranking).

⁴⁷ Own calculations based on: The Diversification Toolkit: Export Diversification and Quality Index (Spring 2014), IMF

⁴⁸ Luxembourg data is not included

⁴⁹ Brunei data is not included

the Observatory of Economic Complexity, MIT (2014 estimates). Higher indices indicate on high complexity of production. According to the estimates, export complexity is the highest in countrymembers of EU on average – 1,5; more than 2 times smaller index of economic complexity is in ASEAN - 0,7; the lowest index is in Mercosur - 0,5.

(d) Export diversification:

The proponents⁵⁰ of export diversification warn about economic drawbacks of export concentration and promote export restructuring from low- to high-productive sectors in less developed countries that would decreases vulnerability that arises from high export concentration.

The level for an integration union is calculated as weighted average on share of a country's exports to total exports of the union of Export Diversification Index (EDI) of its countries derived from IMF^{51} . Low indices show higher level of export diversification. The results are apparent: the highest level of export diversification is in EU country-members – 1,7; more than twice as little is in countries of ASEAN – 2,5; Mercosur - 2,9.

Figure 2. Top Five exported products (based on HS 2 digits) in 2015, as share to total cluster exports⁵²

#	EU		ASEAN		Mercosur	
1	Machinery, nuclear reactors, etc.	14%	Electrical, electronic equipment	26%	Mineral fuels, oils, dist. products	17%
2	Vehicles, tramway	12	Mineral fuels, oils, dit.products	12	Oil seed, oleagic fruits, grain, etc.	10
3	Electrical, electr. Equipment	9	Machinery, nuclear reactors, etc	12	Residues, wastes of food industry	6
4	Pharmaceutical products	6	Vehicles, tramway	3	Ores, slag and ash	6
5	Mineral fuels, oils, etc.	5	Plastics and articles	3	Meat and edible meat offal	6

The comparative overview of three integration unions shows that EU represents a relatively egalitarian

(by weighted GDP per capita) union with higher export complexity and diversification levels as

⁵⁰ Durlauf et al. (2008), Cadot et al. (2011)

⁵¹ Calculated based on Theil index, defines "traditional", "new", and "non-traded" products.

⁵² Trade Map, ITC

compared to ASEAN and Mercosur. Intra-trade among members of the union plays a crucial role. ASEAN faces sharply the problem of income differentiation among members of integration union, it has lower levels of export complexity and diversification. This union is highly dependent to exports with third countries. It has higher GDP growth rates. Mercosur has the highest rate of export concentration and the lowest rate of economic complexity among selected economic unions. This negative trade statistics on Mercosur should signal about the necessity of reforming of the production system of the union as a whole.

2.2. Evaluation model

I apply the synthetic control method to estimate the impact of integration on economic complexity of latecomers: Romania, Colombia and Cambodia. The donor pool consists of 16 unaffected by the treatment, i.e. integration into single economic union, countries: Australia, Azerbaijan, Bangladesh, China, Cuba, India, Israel, Japan, Korea, Sri Lanka, Moldova, Mongolia, Pakistan, Russia⁵³, Turkey, and Ukraine.

The predictors set for economic complexity index includes the following indicators: GDP per capita (constant 2005US\$, logs), exports and imports (as shares of GDP), gross capital formation (as share of GDP), land size (logs), unemployment rate, employed in industry, employed in agriculture, labour force (logs) ⁵⁴, economic diversification index (as the first special predictor), quality of exports index ⁵⁵ (as the second special predictor). The majority of the indicators cover the period from 1991 to 2014 with minor imputations ⁵⁶. Special predictors, i.e. export quality and diversification indices, cover the

 ⁵³ Russian Federation along with Kazakhstan, Belarus, Armenia, and Kyrgyzstan founded the Eurasian Economic Union, however, the foundation of the Union was in 2014, i.e. after the treatment period of countries under the current study.
 ⁵⁴ The following set of indicators are derived from the World Bank database: GDP per capita (constant 2005US\$),

exports and imports (as shares of GDP), land size, unemployment rate, employed in industry and agriculture, labor force ⁵⁵ The following set of indicators is derived from the IMF database: export diversification and quality

⁵⁶ I used average values between the two periods, and TREND function in Excel

period from 1993 to 2010. The dependent variable is economic complexity index derived from the Observatory of Economic Complexity of MIT⁵⁷.

2.2.1. Synthetic control method for Romania

Tables below show the composition of synthetic Romania which is represented by weighted average of Moldova, Turkey, Japan, Russia, Israel, Cuba, Korea, and Ukraine. All other countries in the donor pool obtain zero weights.

	Synthetic		Synthetic
Country	control weight	Country	control weight
Australia	0.000	Korea	0.005
Azerbaijan	0.000	Sri Lanka	0.000
Bangladesh	0.000	Moldova	0.307
China	0.000	Mongolia	0.000
Cuba	0.014	Pakistan	0.000
India	0.000	Russia	0.147
Israel	0.046	Turkey	0.303
Japan	0.177	Ukraine	0.001

Table 6. Synthetic weights for Romania

All of the chosen predictors from the donor pool participate in the final synthetic Romania. The most important predictors are: imports (27%), labour force (22%), exports (15%), GDP per capita (10%), export quality (7%), and gross capital formation (6%).

Table 7. Economic complexity predictor means l	before economic	integration
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	Weights of predictors	Romania	Synthetic Romania	Average of donor pool
Exports (as % to GDP)	0.154	29.059	29.643	28.170
Gross capital formation (as % to GDP)	0.059	24.271	25.112	25.280
Unemployment rate	0.061	7.194	7.281	6.453
Employed in industry	0.02	32.265	24.251	22.096
Employed in agriculture	0.01	34.724	27.987	29.968
Imports	0.269	36.348	35.865	31.207
Ln(GDP per capita, const. 2005US\$)	0.092	8.212	8.360	7.840
Ln(labour force)	0.218	16.203	16.343	16.722
Special predictor: export diversification 1993-2007	0.051	2.254	2.482	2.889
Special predictor: export quality 1993-2007	0.065	0.878	0.879	0.844

⁵⁷ For the robustness check I applied the synthetic control method with the use of economic complexity index derived from the Atlas of Economic Complexity of Harvard, the results of the effect are very similar.

Figure 4 displays the trajectory of economic complexity index of Romania vs. synthetic Romania for t he 1991-2014 period. We may observe that the synthetic Romania is quite accurately represents the d ynamics of economic complexity index of Romania for substantial pretreatment period of time – 16 y ears.



Figure 3. The Effect of Integration on Economic Complexity in Romania

The estimate of the effect of integration on export complexity in Romania is the difference between economic complexity indices of Romania and of its synthetic version after the time of integration in 2007. A positive jump in the index of economic complexity of Romania at the onset of her accession and the prevailing dominance over its trend in synthetic Romania suggests that this effect was due to her accession into the EU.

The figure below displace the results for the place placebo test. The gray lines represent the gap associated with each of the control countries in the donor pool. The gray lines shows the difference in

economic complexity indices between each country in the donor pool and its respective synthetic version. The black line denotes the gap for Romania.



Figure 4. Economic complexity gaps for Romania and placebo gaps in control countries

Fisher test showed a low significance result -0.1875^{58} for the first two years after the accession and not significant results for the rest of the period. So we cannot reject the hypothesis that the positive 4 year difference between economic complexity indices of Romania vs. synthetic Romania at the onset of Romania's accession to the EU is by chance.

2.2.2. Synthetic control method for Colombia

The synthetic Colombia is represented by 89 percent by Turkey, 7 percent by Sri Lanka, and 4 percent by Australia. All other countries from the donor pool do not participate in the final synthetic Romania (see Table 1A in Appendices for details).

⁵⁸ Japan is excluded from calculation

The table below shows that the weights of control variables in the final synthetic Colombia. The most important predictors are: share of exports in GDP, unemployment rate, labor force, land size, gross capital formation, and the indices of export quality and diversification.

Table 8. Economic complexit	v predictor means	before economic integration	on for Colombia
	,		

	Weights of	Colombia	Synthetic	Average of
	predictors		Colombia	donor pool
Exports (as % to GDP)	0.481	16.277	21.535	27.169
Gross capital formation (as % to GDP)	0.077	19.091	21.843	24.874
Ln (Land size)	0.099	6.045	5.853	5.658
Unemployment rate	0.133	13.564	8.462	7.780
Employed in industry	0.006	26.193	22.698	21.905
Employed in agriculture	0.002	6.671	38.674	31.220
Imports	0.001	18.791	23.836	30.447
Ln(GDP per capita, const. 2005US\$)	0.003	8.016	8.595	6.611
Ln(labour force)	0.119	16.576	16.763	16.703
Special predictor: export diversification 1991-2004	0.011	3.017	2.151	8.848
Special predictor: export quality 1993-2004	0.068	0.842	0.900	0.842

The construction of the dynamics of export complexity indices of Colombia vs. synthetic Colombia

shows quite satisfying convergence of pre-treatment economic complexity indices and a consistent

negative gap between them at the onset of integration and beyond. The discrepancy gap between the two lines suggests a large negative effect of integration on economic complexity of Colombia.



Figure 5. The effect of economic integration on economic complexity in Colombia

Figure 6. Economic complexity gaps for Colombia and placebo gaps in control countries



The place between the countries in the donor pool for synthetic Colombia show low significance estimates, i.e. p-value 0.14, for 2005, 2010 and 2011 and not significant results for the rest of the period. We can cannot reject the hypothesis that this negative difference of economic complexity

indices between Colombia and synthetic Colombia upon Colombia's accession to the Mercosur in

2004 is by chance.

2.2.3. Synthetic Control for Cambodia

Cambodia has joined the ASEAN in 1999. The pre-treatment dynamics of economic complexity of

Cambodia is represented by Bangladesh by 100 percent (see Table 2A in the Appendices).

			0	
	Weights of predictors	Cambodia	Synthetic Cambodia	Average of donor pool
Exports (as % to GDP)	0.001	28.410	9.653	25.515
Gross capital formation (as % to GDP)	0.102	13.666	19.673	25.138
Ln (Land size)	0	5.247	5.115	5.658
Unemployment rate	0.187	1.433	3.011	6.520
Employed in industry	0.206	5.259	9.605	22.314
Employed in agriculture	0.067	77.866	63.909	32.360
Imports	0	43.348	14.979	28.989
Ln(GDP per capita, const. 2005US\$)	0.071	5.467	5.890	7.720
Ln(labour force)	0.001	15.352	17.771	16.673
Special predictor: export diversification 1991-1999	0.156	4.395	4.275	2.785
Special predictor: export quality 1993-1999	0.109	0.764	0.724	0.846

Table 9. Economic	complexity	predictor means	for (Cambodia	before	economic integration
	complexity	predictor means	101	Gainooana	Deloie	continue micgration

The most important predictors for economic complexity of Cambodia are: the share of employed in industry to total level of employment, unemployment rate, export diversification and quality rates.



Table 10. The effect of economic integration on economic complexity in Cambodia

The figure above shows an uneven effect from integration for Cambodia: at first it is negative and then turns to be positive.

Table 11. Economic complexity gaps for Cambodia and placebo gaps in control countries



The place placebo tests for all the countries in the donor pool for synthetic Cambodia show significant estimates for the fourth and fifth years after the accession with the p-value of 0.0625, and not significant results for the rest of the period.

2.2.4. Statistical significance test and validity of results

In order to assess the robustness of the results I applied synthetic control method for the treated countries on economic complexity indices derived from both - The Atlas of Observatory of Economic Complexity at Harvard University and the Observatory of Economic Complexity at MIT. While running the synthetic control for countries I also added additional predictors as well as reduced the initial set of predictors for the treated countries. The produced results turned to be quite robust to these manipulations.

In order to gauge the statistical significance of the results and the existence of the effect of integration on economic complexity in general, I apply stationary block bootstrap⁵⁹ analysis for each of the cases of the post-treatment effects. This method of statistical inference is based on resampling scheme from a stationary, yearly dependent time series that generates asymptotically independent copies of the data (see Lecture notes of the algorithm stationary block bootstrap in the Appendix).

I apply stationary block bootstrap with the intention to test the hypothesis of no effect of economic integration on country's economic complexity and test the post-treatment period. The results of the significance test is shown in Figure 7. As it can be seen the bootstrapped mean values of the effect of integration on economic complexity of treated countries have small confidence interval and do not intersect with zero, so that we can firmly reject the hypothesis of no effect.

⁵⁹ The description of the stationary block bootstrap algorithm is derived from the lecture notes of Prof. R.Lieli, CEU 2016.



Figure 7. Stationary Block Bootstrap (R=300) for Romania, Colombia and Cambodia

The internal validity of the results of the study is quite high. This method produces a perfect pretreatment match of the treated unit and its synthetic control, and maximizes covariate balance, so that it gives the opportunity to assess the effect of the event by analyzing the behavior of dependent variable after the event for treated vs. its perfect (synthetic) control. The countries have sufficient number of pre-treatment observations for synthetic control method (which is suggested to be no less than 7 periods). This method of analysis does not imply multiple outcome issues, since there is only one variable of interest.

There are though several issues regarding the analysis:

- the number of post-treatment observations seems to be small for stationary block bootstrap significance test. Increasing the number of observations would help to attain more confidence in the results of the test and might attain closer to treatment effect;
- it is suggested to conduct stationary block bootstrap significance test for the weights of synthetic control as well (since the significance test above uses the initial set of weights of synthetic control).

Since there is no similarity of the effect of integration on economic complexity of treated countries, the effect turns to be conditional on other factors that predetermine a success and effectiveness of integration processes. So the effect of integration on economic complexity of a country is case specific. The following concluding chapter tries to investigate and to summarize these conditions.

Chapter III. Key findings of the study and policy related recommendations

3.1. Findings of the study and discussion

The aim of economic communities are common across integration unions, with certain specifications they generally target: (a) acceleration of economic growth and development of their regions, and (b) strengthening foundations for prosperity, integrity, peace and stability of communities. The current study investigated the effectiveness of integration processes for a less developed country at the onset of its accession, and discusses whether such countries benefit or become worse off in terms of national economic welfare and their prospects of sustainable development.

Before proceeding to the summary of results of the study, it is worth to underline a peculiar difference among these unions in the levels of integration of economic communities: the European Union has much deeper level of integration. As opposed to the EU, the ASEAN at the moment does not have as its target free movement of people, except skilful labor force; neither ASEAN nor Mercosur aims to introduce common currencies, or supranational governing institutions. In spite of these differences the choice of the selected unions for this study was predetermined on two factors: high levels of integration processes and existence of latecomer countries acceding the union.

The analysis of the three economic communities uncovers a decisive association among export diversification, its complexity and income per capita variation among member states and the overall economic wellbeing of the integration union in general. It shows that the European Union, given the highest level of average weighted income per capita as a union, is characterised by higher export diversification and economic complexity indices and lower levels of income per capita variation. In contrast, the ASEAN given the lowest, among selected, weighted average income per capita level, has less complex and less diversified exports rates and the highest level of income per capita variation.

The problem of income variation and existence of challenges associated with integration processes for a less developed country within an economic union is quite topical in recent research. There are studies that define a possible exacerbation of regional inequality due to integration processes, so that high income countries would become richer and prosper further, while less developed countries might expect retrogradation of their economies. The reasons for this include low product trap, trade diversion, circular causation effect, environmental damage, and increasing macroeconomic vulnerability of a less developed member state of a union. The basic idea from these studies is that they point to potential threat from preservation and exacerbation of economic backwardness of such countries due to integration processes.

The task of the current study was to find an evidence for or argument against such a challenge. For this purpose I chose economic complexity index that represents not only a good measurement of economic situation within a country, but also a good proxy for sustainability of its future growth. The choice of treated countries was predetermined by following conditions: (1) they should be latecomers of an economic integration union, (2) have less favorable economic conditions as compared with other member states of the union, (3) the maturity of economic stances based on export complexity and diversification indices is vague there. With the use of synthetic control method a positive significant effect was found for Romania, a negative effect for Colombia and a less obvious negative effect for Cambodia followed by a short term increasing rate of economic complexity in three years after the country's accession.

In order to reveal possible reasons of such varied effects on latecomer countries it is necessary to investigate major differences among them. Table 12 provides with a comparative overview of Romania, Colombia and Cambodia according to selected economic/trade indicators.

#	Indicator	Romania / ranking within EU	Colombia / ranking within Mercosur ⁶¹	Cambodia / ranking within ASEAN
1	GDP per capita, current \$US	10 000	7 904	1 095
	Rank	26/28	5/(5+1)	10(10)
	Share of average weighted of a union	0,27	0,66	0,27
2	Economic complexity index	0,72	0,28	-1,52
	Rank	21/25	4/(5+1)	9/962
3	Export diversification, 2010	2,0	3,4	4,7
	Rank	21/27	4/(5+1)	9/9
4	GDP growth rate, percent	2,8	4,6	7
	Rank	9/28	2/(5+1)	2/10
5	Exports as share to GDP, percent	41	16	62
	Rank	20/28	3/(5+1)	7/10

Table 12. Comparative economic overview of Romania, Colombia and Cambodia, 201460

The quantitative and qualitative analysis of the effect of integration on economic complexity of a latecomer country based on economic conditions of the unions and economic stances of the latecomers allow to make the following conclusions:

- (a) there is a statistically significant effect from economic integration on economic complexity of a less developed country at the onset of its accession;
- (b) this effect may vary from country to country and might have negative or positive direction;
- (c) positive effect on a country's economic complexity is expected in case of a relative maturity of economies at the onset of accession to a union: the richer and more export diversified the economy, the more likely a positive effect on export complexity.

3.2. Policy implications

Evidence supports the hypothesis that the accession of countries with less favorable economic conditions to existing integration communities might create negative threats to their development

⁶⁰ Derived from World Bank, OECD stats, The Atlas of Economic Complexity databases

⁶¹ Colombia represents an associate member of the Mercosur; it is counted in this study as the 6 member of Mercosur

⁶² No information on export complexity for Brunei

potential due to forced specialization of less complex products afterwards. But this does not mean a denial of integration processes as a whole. Rather this should be considered as possible development scenarios upon a country's integration that need to be addressed carefully in order to build a preventing framework before the accession.

The policy measures need to be oriented to the overwhelming support of development of high value added and sophisticated (complex) production which is indispensable in these countries since this provides better development prospects and effective membership in an economic union. Otherwise the countries might be stuck at a lower stage of the technological ladder – low product trap. Thus, one of the principles of any integration union should cover the convergence of economies by improving production system of the union with a special attention to less developed member states. A proactive state support of priority sectors of countries conditional on innovative and complex production is required.

The problem of high income diversity within ASEAN is being addressed and constantly monitored through the ASEAN Framework on Equitable Economic Development, Greater Mekong Sub-region Economic Cooperation Program (GMS-ECP, \$50 billion investment fund), the Initiative for ASEAN integration (IAI). For example, the IAI serves as a platform for technical support and other programs supporting the less developed countries of the region, such as Cambodia, Laos, Myanmar and Vietnam (CLMV) aimed at development gap narrowing. There were 134 investment programs funded by other members of ASEAN and dialogue partners during the IAI Work Plan I for the period from 2002 till 2008⁶³. Much research reports the progress on narrowing gaps within ASEAN, however, as we can see from the study the situation is still far from its desired state.

⁶³ Initiative for ASEAN Integration (IAI) Strategic Framework and IAI Work Plan 2 (2009-2015)

It is necessary to stay also focused on other side effects of integration. Trade diversion issue might arise due to higher tariff imposition for third countries and when domestic production is suppressed by more competitive products from other members of the union. The ASEAN, unlike the EU and the Mercosur, does not stipulate for single external tariff, i.e. members of the union possess the right to regulate external tariffs and conduct independent foreign policy and thus this problem concerns them to a lesser degree. In case of accession to a customs union or a single market it is suggested to provide with a transition period for a latecomer country to ease the adaptation period and avoid trade diversion effect.

The issue of export diversification might promote an establishment or enhancement of export promotion agencies (EPAs). Recent studies reveal the effectiveness of EPAs, suggesting that on average they have a strong and statistically significant impact on exports. According to Lederman et al. (2009)⁶⁴, for each \$1 of export promotion, they estimate a \$40 increase in exports for the median EPA. The authors justify the principles of EPA's effectiveness: "small [size] is beautiful" due to strong diminishing returns; focus on non-traditional exports, or have some broad sector focus (e.g., agriculture, manufacturing, tourism, high-tech, etc.); focus activities on large firms (which can take advantage of EPAs services), but which are not yet exporters. These principles of export promotion agencies might become an essential part of overall country's export strategy that would promote not only an increase in exports, but also its diversification.

Another side effect from integration that was addressed previously is the environmental issues, in particularly environmental pollution. An intense industrialization, large scale specialization on natural resource mining or even complex production would eventually create environmental damage. A thoughtful approach to specialization should be developed in this sense. One of the solutions that

⁶⁴ Lederman et al., Export Promotion Agencies: What Works and What Doesn't, 2009

addresses and mitigates this issue is the creation of eco-industrial parks that process their production waste. For example, the Kalundborg eco-park in Denmark⁶⁵ is well renowned for having important environmental and economic outcomes through distribution of processed materials among different enterprises of the park⁶⁶. The return on investment in infrastructure is above 200% there.

We may now generalize important principles of formation of integration unions that target equitable sustainable development regionally: (a) ensuring high economic complexity of member states; (b) promoting export diversification; (c) promoting environmentally friendly production; (d) providing adequate flexibility on tariff and non-tariff requirements for newcomer countries; and (e) addressing the issue of inequality.

3.3. Case study: Kyrgyzstan and the EAEU

Last year Kyrgyzstan entered the Eurasian Economic Union (EAEU)⁶⁷, which has been designed as a reunion of former collaborative economic relationships of several post-Soviet republics to promote trade and other socio-economic relations among member states and competitiveness of national economies. The idea behind the creation of such a union was to increase economic welfare of member states. The difference between the former and current economic basis of the union is in the fact that the market forces would drive such collaborative relationships instead of command prescriptions. Let us examine the performance of the EAEC towards selected macroeconomic and trade indicators. The average weighted GDP per capita of the Union is \$11 954 US dollars as of 2014, which is

⁶⁵ Sources: Lowe (2000), Saikkuu (2006). Derived from: Economic Zones in the ASEAN, Industrial Parks, Special Economic Zones, Eco Industrial Parks, Innovation Districts As Strategies For Industrial Competitiveness, 2015
⁶⁶ Ibid. Environmental outcomes: waste exchange comprises some 2.9 million tons of materials each year, collective water consumption has been reduced by 25% and the power station has reduced its water use by 60% through recycling. Economic outcomes: it is estimated that by early 2001, the industries had gained a US\$160 million return on an investment of \$75 million in infrastructure for conveying by-products from one plant to another. It is estimated that annual savings for the industries located on Kalundborg are around \$15 million. Other benefits for industries include, sharing of personnel, equipment, and information.

⁶⁷ Member States: Russian Federation, Kazakhstan, Belorussia, Kyrgyzstan, Armenia

considered as high middle income level according to the World Bank classification. GDP per capita level of the richest country of the Union – Russia is 10 times exceeds its level of Kyrgyzstan. The degree of intra trade is 12% of total exports of the EAEU member states. The average weighted complexity index of the union is 0,89 which is higher than of the Mercosur and the ASEAN levels in 2014 and about 2 times less of the EU level. The weighted average diversification index is 3,6 which is the lowest level of diversification as compared to other three economic communities of interest.

The major impact in the union wide macroeconomic and trade indices belongs to Russia and Kazakhstan which make 80% and 12% of total exports, and 80% and 10% of total population of the Union respectively. High export concentration (or low export diversification) is explained by a high share of mineral fuels of their exports – over 70% in 2014. Besides, we can observe a stable growing dynamics of mineral fuels exports for the past 15 years in these countries (see Figure 8) followed by a drop in 2015 that is associated with the huge fall in world oil prices and the recent economic blockade of Russia.

The tendency of growing exports in mineral resources is dangerous due to two reasons: (1) this category of products is included in the list of 100 least complex products⁶⁸; (2) economies of these countries become extremely vulnerable and dependent to price fluctuations in the world market.

⁶⁸ See Abdon et al. (2010)



Figure 8. Dynamics of exports of mineral fuel of Russia and Kazakhstan, % to total exports 69

Kyrgyzstan's exports make less than 0,5 percent of total exports of the EAEU; the level of GDP per capita makes only 10 percent of its weighted average of the Union. The complexity of Kyrgyz exports is negative -0,5. The diversification level of exports is 3.0. The member states of the Union, both Russia and Kazakhstan, make one of the largest share in final destinations of exports and imports of Kyrgyzstan. However, Chinese imports, which make 2nd largest Kyrgyz destinations, became under the common external tariff conditions upon country's accession to the EAEU.

The given macroeconomic and trade conditions of Kyrgyzstan within the EAEU relate the country to the group of latecomers that would eventually worse off from integration with respect to economic complexity status. The initial conditions of Kyrgyzstan, such as its negative economic complexity index, high export specialization level, least income per capita share and high income variation level of the EAEU make the country far from the initial starting position of the "successful" Romania and more likely to fall into the low complexity trap.

⁶⁹ Source: calculations are made based on statistical database of Trade Map, Trade Statistics for International Business Development, ITC, 2015

The case of Kyrgyzstan is much closer to the case of Cambodia that experienced a positive temporal jump in export complexity, though still have its negative range. The Cambodia's experience demonstrates the importance of the ASEAN projects aimed at strengthening the least developed economies of the region. The measures of tackling development gap are aimed at the country specific needs, they include: infrastructure development, technical aid, capacity building and human resource development.

The empirical results of the study suggest under the given economic conditions Kyrgyzstan would eventually face the problem of low economic complexity trap so that the country's economic prospects would eventually retrograde. It is apparent that Kyrgyzstan should address these issues and make the necessary preventive measures. First of all, the discussion of the above challenges should be brought up to public discussion with attraction of academia, government and business representatives in order be aware and find better solutions to them. Second, priority sectors of the country's specialization conditional on innovative, complex and environmental friendly production should be identified and further be promoted by the required temporal protection within the EAEU. Third, the EAEU wide attention to overall income differentiation challenge and its accompanied problem of the low complexity trap should be focused in order to support these countries in their undertakings.

CONCLUSIONS

In this thesis I investigated the effect of integration on economic complexity of latecomer countries. The main research question was whether the process of economic integration has a positive statistically significant effect on a country's welfare. My research was motivated by the accession of my country, Kyrgyzstan, to the Eurasian Economic Union in 2015, and the lack of studies on possible side effects of such an accession by local academic circles preceded to this decision.

The literature review has not provided a consensus on the effect of integration on economic wellbeing of less developed countries acceding integration unions. A number of studies suggests that liberalization benefits might be offset by potential side effects from integration processes. These challenges include but not limited to: growing regional inequality, threat of low income trap, trade diversion, environmental damage, and macroeconomic vulnerability.

To find the evidence for or the argument against the damaging effect of integration on a country's economic welfare, I analyzed three cases of integration of latecomer countries being less developed at the onset of integration as compared to the founding members of the union: the Romanian case (member of the EU since 2007), the Colombian case (associate member of the Mercosur since 2004), and the Cambodian case (member of the ASEAN since 1999). These latecomer countries, as well as the integration unions which they represent, vary by the stages of integration and income diversity levels.

The synthetic control method allowed to reveal the existence of statistically significant effect from economic integration on economic complexity of latecomer countries. This effect turned to be different for the acceding countries and conditional on the level of economic complexity and export diversification at the onset of country's accession. A positive effect on a country's economic complexity is expected in case of a relative maturity of economies at the onset of accession to a union:

the richer and more export diversified the economy, the more likely a positive effect on export complexity.

The internal validity of the findings is high: the synthetic control method maximizes the pre-treatment covariate balance, so that it gives the opportunity to assess the effect of the event by analyzing the behavior of dependent variable after the event for treated vs. its perfect (synthetic) control. The external validity of the findings are case specific and conditional on the starting maturity of economies. The countries have sufficient number of pre-treatment observations for synthetic control method. The method does not imply multiple outcome issues. Statistical significance tests were conducted for each of the cases and allowed to reject the null hypothesis of no effect.

Several limitations are worth mentioning: first, the number of post treatment observations is small for the purpose of stationary block bootstrap test. The short timeframe of treatment period set the limits of observed time periods to 16 years. Second, as more treatment periods are become available, it is suggested to conduct a modified stationary block bootstrap of the weights of synthetic control.

Based on the obtained results several principles of formation of integration unions targeting equitable sustainable development regionally may be generalized: (a) ensure high economic complexity of member states; (b) promote export diversification; (c) promote innovative and environmentally friendly industries; (d) provide adequate flexibility of requirements for newcomer countries, including the requirements on common external tariff; and (e) address the issue of regional inequality.

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APPENDICES



Figure 1A. Trends in GDP per capita of Romania vs. average of the control pool

Table 1A. Synthetic weights for Colombia

	Synthetic		Synthetic
Country	control weight	Country	control weight
Australia	0.040	Korea	0.000
Azerbaijan	0.000	Sri Lanka	0.067
Bangladesh	0.000	Moldova	0.000
China	0.000	Mongolia	0.000
Cuba	0.000	Pakistan	0.000
India	0.000	Russia	0.000
Israel	0.000	Turkey	0.893
Japan	0.000	Ukraine	0.000

Table 2A.	Synthetic	weights	for	Cambodia
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	Synthetic		Synthetic
Country	control weight	Country	control weight
Australia	0	Korea	0
Azerbaijan	0	Sri Lanka	0
Bangladesh	1	Moldova	0
China	0	Mongolia	0
Cuba	0	Pakistan	0

India	0	Russia	0
Israel	0	Turkey	0
Japan	0	Ukraine	0

Equation: Lecture notes on stationary block bootstrap, Prof. R.Lieli at CEU (2016)

Detour: the stationary bootstrap
A resampling scheme from a stationary, weakly dependent time series $\{y_t\}_{t=1}^n$ that generates (asymptotically) independent copies of the data. Generate random dates τ_1, \ldots, τ_n by the following algorithm:
(i) Fix $q \in [0, 1]$, q fairly small, e.g. $q = 0.1-0.25$.
(ii) $\tau_1 =$ random draw from $\{1, \ldots, n\}$. For $t = 2, \ldots, n$, repeat the following steps:
(iii) Draw uniform [0,1] random variable U . If $U \ge q$, set $\tau_t = \tau_{t-1} + 1$; if $\tau_t > n$, reset to $\tau_t = 1$. If $U < q$, set $\tau_t =$ random draw from $\{1, \ldots, n\}$.
(iv) Increase t , repeat (iii) until $ au_n$ is computed.
(v) Generate the pseudo time-series $\{y^*_{ au_1}, y^*_{ au_2}, \dots, y^*_{ au_n}\}$.

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