Structural Change and Economic Growth in Visegrad and South Caucasian Countries

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Abstract

This paper investigates the effect of the change in the economic structure on economic growth in Visegrad and South Caucasia. The Shift Share Analysis (SSA) method measures the direct effects of structural change on productivity growth. Fully Modified OLS (FMOLS) regressions evaluate the indirect effect of the advanced sectors on economic growth. SSA finds that within sector productivity is the main driver of economic growth in both regions and the manufacturing sector is the engine of within sector productivity growth in Visegrad countries. Expansion of the modern business services sector produced a positive reallocation effect in all countries but the lack of growth dynamism in the productivity of this sector undermined the positive reallocation effect in Hungary and Slovakia. The FMOLS regressions show that manufacturing export has a positive effect

on economic growth while business service production does not. The general structure of Visegrad economies is similar to advanced countries and they can achieve further development by upgrading their production within advanced sectors while South Caucasian countries can develop their economies by expanding the high-value sectors and channeling the excess labor in low-value sectors to relatively higher value activities. Both strategies require investment in human capital and upgrading their domestic capacity.

Keywords: structural change, Visegrad, South Caucasia, economic growth

JEL classification: P27, C4, O4

1 Introduction

This paper analyzes the effect of structural change on economic growth in the post-socialist Visegrad[1] and South Caucasian[2] countries. Both regions experienced an unprecedented level of change in their economic structure. They rejected the socialist economic system and embraced the market economy, and the pace of the shift was radical. The change from a socialist way of production to a market economy was accompanied by a change in the structure of their economies. The diversification of economic activity from low value-added to higher value-added sectors is one of the main drivers of economic growth (Syrquin, 1984; McMillan & Rodrik, 2011). In the reality of the substantial change of structure of economy in post-socialist countries, investigation of the structural change and its effect on economic growth can contribute to the knowledge on economic development in the post-socialist world, and this study aims to contribute to it by investigating the effect of structural change on economic growth in Visegrad and South Caucasia. Transition shock affected these regions differently. South Caucasian countries lost their main manufacturing production to transition shock while Visegrad

1 Visegrad countries are the Czech Republic, Hungary, Poland, and Slovakia.

2 South Caucasian countries are Armenia, Azerbaijan, and Georgia.

countries preserved it (Iradian, 2007). At the same time, integration to the European Union (EU) supported institutional development, accelerated inflow of foreign capital, and joining Global Value Chains (GVCs) in Visegrad countries. In short, different paths of transition produced distinct structural change in these regions. Visegrad countries upgraded the value of their economies by integration with GVCs and European production network via mainly MNCs while structural change in the form of expansion of higher value-added activities has not occurred in the South Caucasian countries (Szent-Ivanyi, 2017; Iradian, 2009). Expansion of the manufacturing production contributes economic growth in these regions. But the negative effect of the business services on growth could be explained by the lack of their technological development and R&D capacity and specialization in the less knowledge intensive routinized task in the producer services. Therefore, it is necessary to upgrade to more knowledge intensive activities in the producer services in order to benefit from their growth potential.

I assess both the direct and indirect effects of the structural change on economic growth. For direct effect, I employ a modified version of Shift Share Analysis (SSA) by Reinsdorf and Yuskavage (2010). Fully Modified OLS (FMOLS) and Dynamic OLS (DOLS) measure the overall effect of the structural change on economic development.

The next section gives a brief review of the literature on structural change and economic growth. The pattern of the structural change and its effect on economic growth in Visegrad and South Caucasian economies is introduced in Section 3. Section 4 provides an econometric evaluation of both direct and indirect effects of the structural change on economic growth. In the last section, some pertinent conclusions are drawn.

2 Literature Review

Structural change in the form of a change in the distribution of inputs and outputs across sectors is one of the decisive drivers of economic development.

Lewis' (1954) dual economy model distinguishes the low productivity traditional (subsistence) sector and the high productivity modern (capitalist) sectors. The manufacturing sector has remained a classic representative of the modern sector. Reallocation of resources from traditional to modern sectors is an important contributor to the productivity and economic growth (Kuznets, 1966; Syrquin, 1984; Maddison, 1987; McMillan & Rodrik, 2011). A higher rate of productivity growth (Kaldor, 1967; Cornwall, 1977; Timmer, de Vries, & de Vries, 2015; McMillan, Rodrik, & Verduzco-Gallo, 2014), a higher capital accumulation capacity, a higher capital intensity (Szirmai & Verspagen, 2015; Su & Yao, 2017), and a higher technological development potential and R&D intensity (Szirmai, 2012; Lavopa & Szirmai, 2014; Rodrik, 2016) are the main reasons why the modern sector is the main engine of economic growth. In addition to its direct effect, positive externalities of the modern sector can spur productivity and growth in the remaining sectors by diffusing technological enhancement on them via forward and backward linkages (Tregenna, 2011).

It has long been considered that the productivity growth in the service sector is limited and it was considered a non-tradable and secondary activity, therefore, it could not play the role of the driver of the economic growth (Baumol, Blackman, & Wolff, 1985). However, the ICT revolution challenged this paradigm and the role of the services in economic growth is viewed differently. ICT-led technological development spurred productivity growth in services and increased the international trade in services (Beerepoot, Lambregts, & Kleibert, 2017). Services can be classified into traditional (consumer) and modern (producer) services (Bryson, Daniels, & Warf, 2004). The modern services are the inputs for production, and they can be delivered over a distance. According to Ghani and O'Connell (2016), productivity growth, tradability, and good job creation potential in the service sector is the same as in the manufacturing sector, therefore, the service sector can lead the structural transformation and accommodate the economic development in the developing countries. However, other studies challenge the claim that the service sector can independently become the engine

of structural change and economic development. Di Meglio (2017) concludes that the sophisticated export-oriented manufacturing is the main driver of the development of the producer services in the Asian countries. Other studies on the source of the productivity growth in the producer services also come to the similar conclusion that knowledge intensive manufacturing sectors spur the productivity growth in the producer services (Guerrieri & Meliciani, 2005; Lundquist, Olander, & Henning, 2008).

Harberger (1998) tests the effect of the economic structure on the growth in USA and finds that the reallocation of resources from the lower productivity to higher productivity activities promotes economic growth. Peneder (2003) evaluates the effect of industrial structure on economic growth in 28 OECD countries by employing conventional Shift Share Analysis and Generalized Methods of Moments (GMM) and comes to conclusion that expansion of the higher value-added activities contributes positively to economic growth. Fan, Zhang, and Robinson (2003) find that structural change played a role in the economic growth in China. McMillan and Rodrik (2011) claim that expansion of the higher value-added modern sectors lies behind the economic success of the East Asian countries, while shrinkage of such sectors in Latin America and Africa is the reason for their sluggish performance. By investigating the impact of economic structure on economic growth in 39 countries, Fagerberg (2000) finds that the reallocation of the resources from low-value activities to relatively higher value-added activities has not been an important driver of the economic growth; rather the expansion of the technologically most progressive industry (electronics) is the main factor behind higher rate of economic growth. Timmer and Szirmai (2000) investigate the role of structural change on productivity growth in the manufacturing sector of four Asian countries in the 1963–1993 period and find that reallocation of resources has not played a significant role in their productivity growth.

Landesmann (2000) can be considered a pioneer in studying the structural change in post-socialist Europe. However, he gives the description of the change

in structure of the employment and output and the role of the foreign capital in this process and does not evaluate the effect of the structural change on productivity growth. Havlik (2005) evaluates the effect of the structural change on productivity growth and does not find a noticeable effect. Alam, Anós Casero, Khan, and Udomsaph (2008) investigate the structural change and growth nexus in post-socialist countries and find that the effect of the sectoral productivity growth is more decisive than the effect of the structural change in Central and Eastern Europe (CEE), while the change from lower value-added activities to higher value-added sectors has been small in the CIS region. Kuusk, Staehr, and Verblane (2016) study ten countries in CEE and conclude that the effect of the reallocation of labor across sectors has been less important for productivity growth. Maris (2019) shows that the effect of the labor reallocation on the productivity growth in Czech Republic and Slovakia is miniscule. Stojčić and Aralica (2018) indicate that deindustrialization in the 1990s in CEE has been replaced by reindustrialization since the early 2000s. In some advanced CEE countries (Czech Republic, Hungary, Slovakia, and Romania) reindustrialization occurred via rise of the new medium and high-tech manufacturing sector, while expansion of the existing cost competitive low and medium-tech manufacturing production is the driver of the reindustrialization in the remaining countries in CEE.

3 Structural Change and Productivity Growth

3.1 Pattern of Structural Change

The big productivity gap among sectors is due to underdevelopment (McMillan & Rodrik, 2011). The Visegrad region has a lower productivity gap than South Caucasia (Table 1). With a higher rate of productivity gap, growth in overall productivity can be achieved by channeling resources from low productivity to higher productivity activities. Over time, the Visegrad countries reduced their productivity gap while, except for Armenia, the productivity gap increased in South Caucasia. The low productivity in the agricultural sector is the main reason for a high rate of productivity gap in South Caucasia.

Table 1: *Productivity Diagnosis*

	Highest productivity		Lowest productivity		Productivity gap	Coefficient of variation of log of sectoral productivity
	Sector	*Labor productivity*	*Sector*	*Labor productivity*		
Visegrad						
Czech Republic						
1995	Mining and energy	93,445	Manufacturing	22,189	4.2	0.049
2019	Business	117,110	Construction	42,909	2.73	0.026
Hungary						
1995	Business	11,4495	Agriculture	23,644	4.84	0.048
2019	Mining and energy	97,482	Construction	34,862	2.79	0.025
Poland						
1995	Mining and energy	72,366	Agriculture	8,862	8.16	0.097
2019	Business	119,444	Agriculture	15,141	7.89	0.077
Slovakia						
1995	Business	144,615	Agriculture	5,350	27.03	0.179
2019	Mining and energy	143,534	Agriculture	46,762	3.07	0.031
South Caucasia						
Armenia						
2000	Business	35,159	Agriculture	3,932	8.94	0.11
2019	Business	85,837	Agriculture	16,687	5.14	0.064
Azerbaijan						
1999	Mining and energy	96,815	Agriculture	3,387	28.58	0.191
2019	Mining and energy	495,654	Agriculture	5,992	82.72	0.314
Georgia						
1998	Construction	32,209	Agriculture	5,614	5.73	0.059
2019	Business	63,846	Agriculture	5,232	26.01	0.137

Source: Author's compilation.

Notable productivity growth in agriculture enabled Armenia to narrow its productivity gap while poor productivity growth in agriculture worsened it in Azerbaijan and Georgia. Among the Visegrad countries, Poland has a poor performance in agricultural productivity. Azerbaijan, Georgia, and Poland could achieve further productivity growth by increasing agricultural productivity and redirecting labor from agriculture to higher productivity sectors that have the capacity to absorb labor.

The socialist economic system preferred industry over services, therefore, at the time of change from socialism to capitalism, both regions inherited large inefficient industry and underdeveloped service sectors (Landesmann, 2000). As a part of transformation to the market economy, the service sector expanded, and the industrial sector contracted. Visegrad economies mainly specialized in relatively high-tech manufacturing within Comecon[3] and they had a limited cooperation of manufacturing production and trade with Western countries during the socialist era. This increased the efficiency of their production and enabled them to integrate their industry into Global Value Chains (GVS) and survive in the post-socialist era (Pula, 2018). South Caucasian countries that specialized mainly as commodity suppliers within Comecon and their industries were totally reliant on USSR for inputs, markets, and finance. This is why the transition shock destroyed industrial production and led to tremendous loss in output in these countries due to the breakup of economic ties with the socialist system (Table 2).

In both regions, rapid economic and productivity growth followed the transition shock. The Visegrad countries experienced a steady growth in productivity. Their productivity recovered following a temporary decline because of the Global Financial Crisis (GFC). However, the sluggish rate of productivity growth persisted in Hungary, and it turned the country into the worst performer for productivity among the Visegrad group (Figure 1). Until the late 1990s, the shedding of excess labor was an important driver of the productivity growth and it led to a significant job loss in the Visegrad countries. The modernization of production mainly via

3 The Council for Mutual Economic Assistance – the economic bloc of the socialist world which existed between 1949 and 1991.

foreign capital drove productivity growth and created employment in business service sectors from the late 1990s. The South Caucasian countries experienced a productivity growth at a higher rate. The recovery of colossal loss in output due to the transition shock is the primary reason for their higher rate of productivity growth.

Table 2: *GDP per Capita (Constant PPP 2017)*

	1990	1995	2000	2005	2010	2015	2019
Czech Republic	23,585	22,758	24,977	30,384	33,483	36,168	40,981
Hungary	16,432	16,617	19,415	24,420	24,486	27,532	32,554
Poland	11,315	12,460	16,258	18,937	23,996	27,797	33,185
Slovakia		13,255	15,667	20,080	25,529	28,720	31,928
Armenia	5,180	3,008	4,048	7,420	9,286	11,321	13,654
Azerbaijan	7,617	2,977	3,999	7,107	14,082	14,853	14,442
Georgia	11,135	3,244	4,919	7,315	9,737	12,605	14,989

Source: World Bank Development Indicators.

Accuracy of the statistical data for the early 1990s is questionable, but Table 2 shows the severity of loss in output in South Caucasian countries. On average, they lost more than half of their national output. The macroeconomic stability and the implementation of market reforms, although in limited form, enabled them to utilize their idle capacity and recover loss in output. Secondly, in line with convergence theory, the faster productivity growth of South Caucasian countries can be attributed to their lower level of economic development than that in Visegrad countries. Lastly, external factors such as easy access to finance, global technological development, and favorable terms of trade were factors behind the rapid economic and productivity growth in the Commonwealth of Independent States (CIS) along with South Caucasia (Iradian, 2009). Since the early 2010s, productivity growth has slowed down in Armenia and Georgia, which is partly due to the overall global economic conditions in general, and the CIS-related situation in particular. After oil-related currency crises, Azerbaijan not surprisingly experienced a sharp decline in productivity.

Figure 1a: *Labor Productivity Growth (Visegrad)*

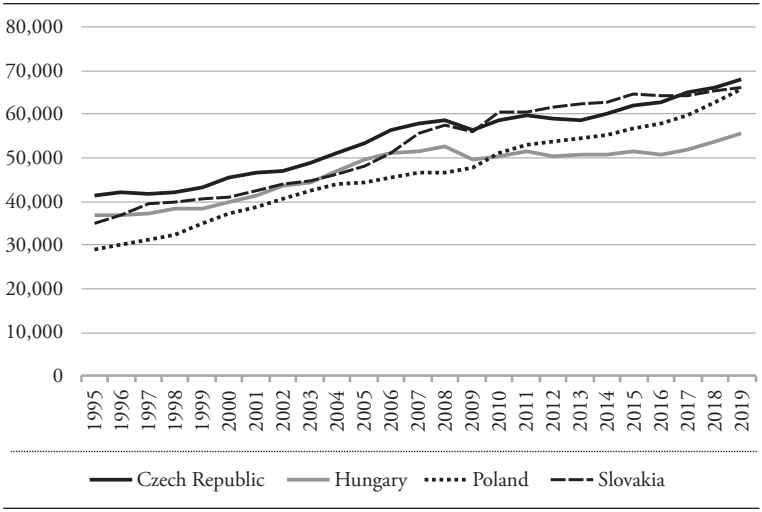
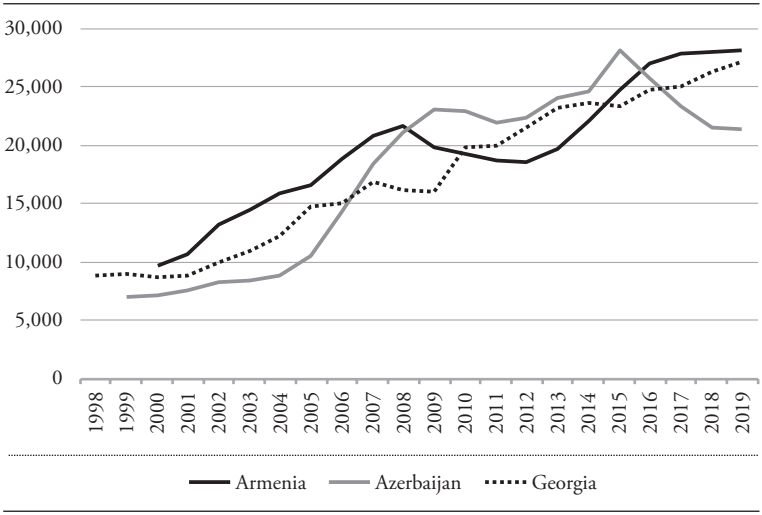


Figure 1b: *Labor Productivity Growth (South Caucasia)*



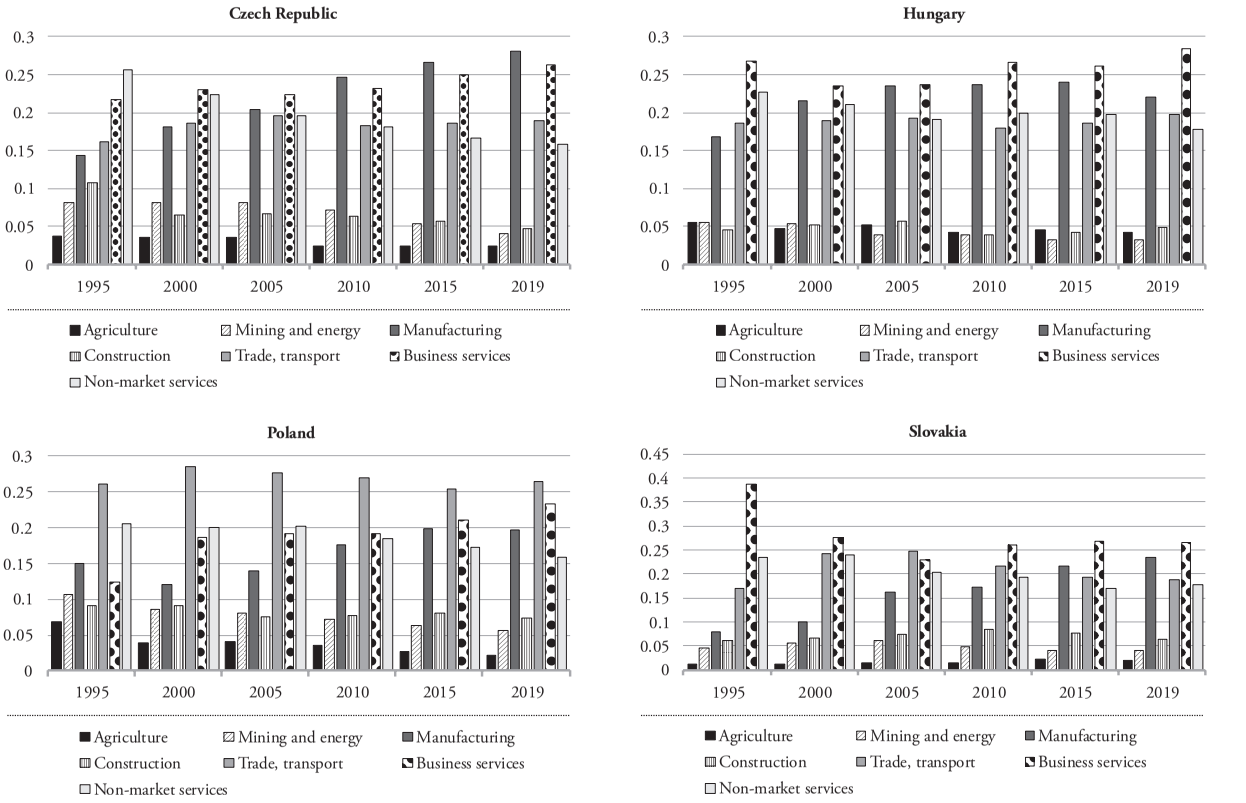
Source: Author's compilation.

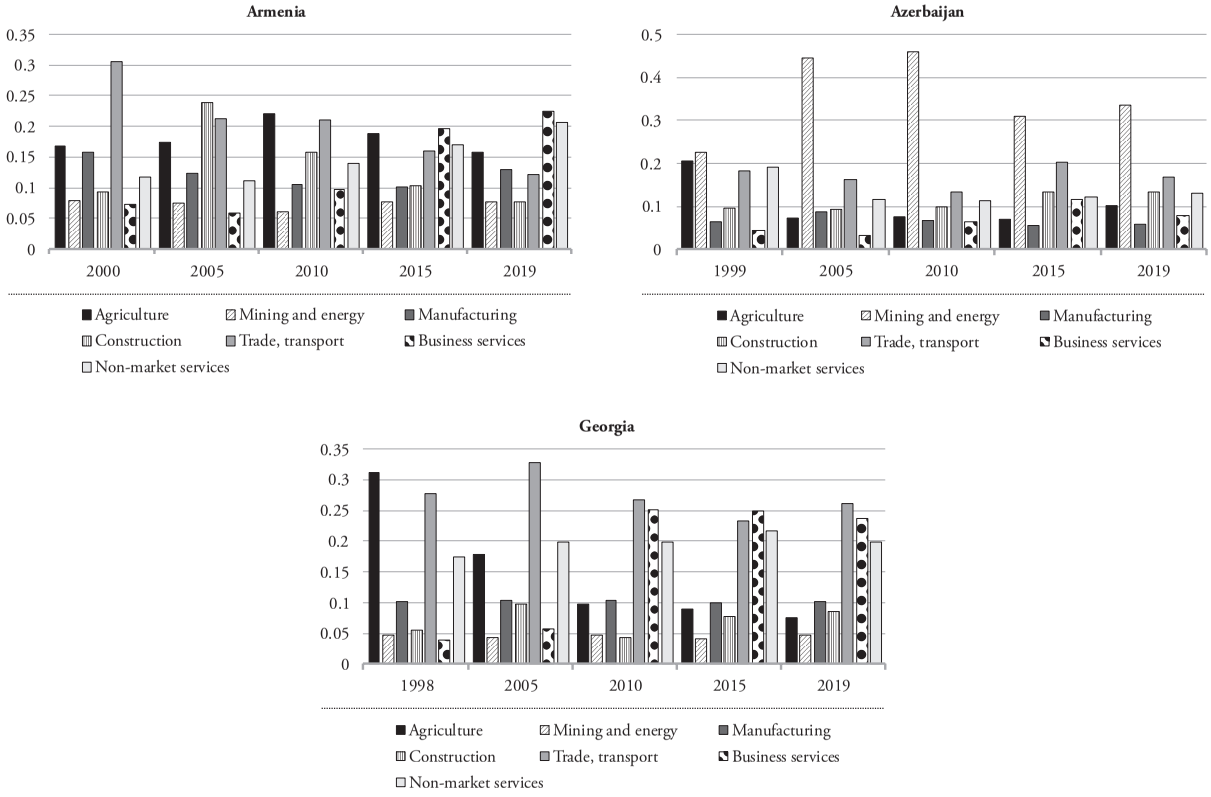
Apart from Armenia, the share of agricultural production decreased in all countries, but at a lower level in the Visegrad countries. The Visegrad region experienced a decline in the share of the Mining and Energy output while South Caucasia did not. This sector maintains the largest share of national output in oil-dependent Azerbaijan. Modern sectors – manufacturing and business services – expanded their share in the national output in the Visegrad countries, and the pace of Slovakia in manufacturing and Poland in the business services sector is remarkable. South Caucasian countries did not experience an expansion of manufacturing output and Azerbaijan is the lowest performer among them. The business service sector expanded rapidly in Armenia and reached 80 percent of the Visegrad average, but Azerbaijan performs worst.

Agricultural employment was even lower in the Visegrad countries at the beginning of this period, and it contracted further in the subsequent period. Unlike the Visegrad countries, its share is quite higher and, on average, it accounts for one-third of the total employment in South Caucasia. These economies could not create new jobs for dismissed workers during mass unemployment in the early transition and their governments were unable to provide social assistance. As a result, a significant number of redundant workers ended up in subsistence agriculture.

Meanwhile, the share of agricultural employment halved and its productivity increased considerably in Armenia. But Azerbaijan and Georgia did not achieve any noticeable reduction in agricultural employment. Agricultural productivity is extremely low, which suggests the presence of hidden unemployment in agriculture. The influx of foreign capital in the manufacturing sector and its integration into GVCs preserved jobs in this sector in Visegrad countries, and its share is above the OECD average at a rate of 20 percent of total employment. Armenia has the highest level of manufacturing employment among South Caucasian countries at 10 percent, but its productivity is less than half of the Visegrad average, which can be attributed to the prevalence of low-tech level of the Armenian manufacturing sector.

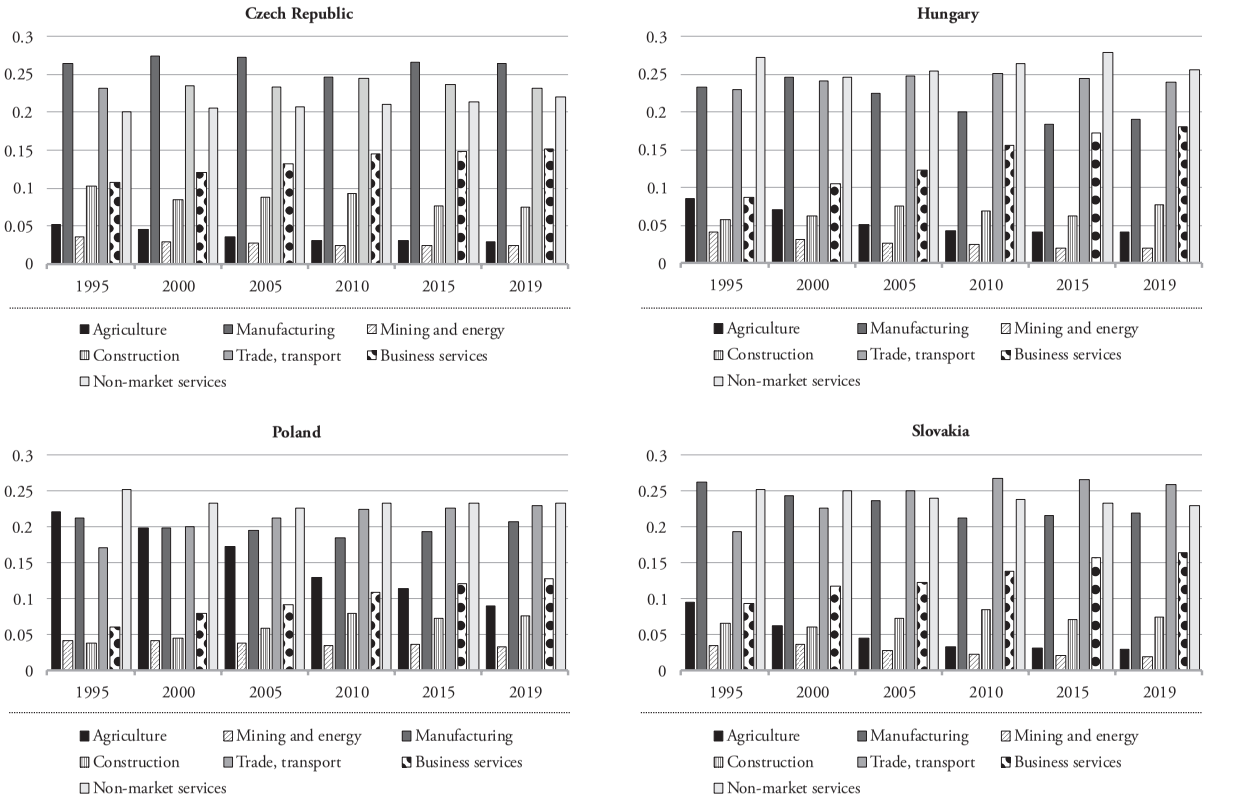
Figure 2: *Sectoral Distribution of Output*

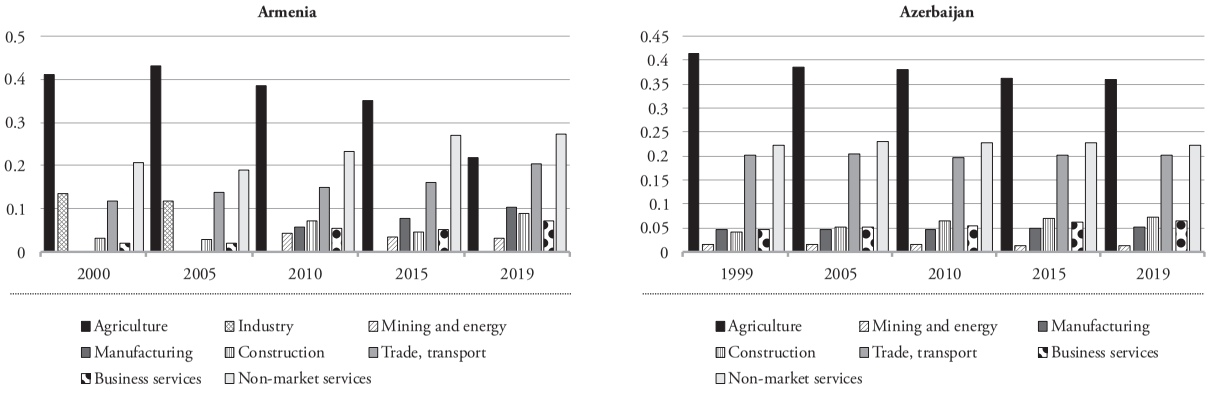




Source: Author's compilation.

Figure 3: *Sectoral Distribution of Employment*





Source: Author's compilation.

The share of manufacturing in the total employment share is still significantly low in Azerbaijan and Georgia (5 percent), which is not consistent with their industrial legacy and the level of economic development. The average share of business service employment rose from 10 percent to 15 percent in the Visegrad region. South Caucasia also experienced an expansion in share of employment in business services, but it is still lower than Visegrad (5–7 percent).

3.2 Shift Share Analysis

SSA is a growth accounting approach, and it decomposes productivity growth into *within sectors* and *labor reallocation* across sectors. The within-sector effect captures productivity growth if it is a result of accumulation of physical and human capital, and technological and organizational progress within the boundaries of a sector. The reallocation effect means productivity growth due to a shift of labor from low to high value-added activities. Havlik (2005, 2014) and Kuusk et al. (2016) employ traditional SSA (static and dynamic) to evaluate the impact of labor reallocation on productivity growth in CEE. The traditional method allows assessing the aggregated effect of labor reallocation on productivity, but it does not give a precise estimate of the contributions of the reallocation effect of each sector to productivity growth. To better understand the inadequacy of traditional SSA methods and provide an accurate picture of the role of each sector in the reallocation effect, I present the formula of convenient SSAs and explain their inadequacy.

Static Shift Share Analysis:

$$L_p = \sum S_{t-k,i} \Delta L_{p,i} + \sum L_{p,i} \Delta S_{i,t} \quad (1)$$

Dynamic Shift Share Analysis:

$$L_p = \sum S_{t-k,i} \Delta L_{p,i} + \sum L_{p,i} \Delta S_{i,t} + \sum \Delta S_{i,t} \Delta L_{p,i} \quad (2)$$

Here, L_p and L_{pi} stand for the total and sectoral productivity. S_i represents the employment share of sector i in the total employment and Δ is the change in the labor productivity and employment share between time t-k and t. The first term in both equations represents *within sector* effect while the second term stands for static shift effect. The third term in Equation 2 is the dynamic shift effect which stands for contribution of simultaneous change in productivity and employment of each sector to total productivity growth. The main logic of static SSA is that any sector experiencing expansion of its employment share has a positive reallocation effect, and a negative effect in the case of contraction of its employment share. For instance, static SSA considers the reallocation effect of the expansion of agricultural employment as positive, which is theoretically meaningless. The expansion of any sector with a positive productivity growth is accepted as a positive reallocation effect in dynamic SSA. Again, in the same example, for productivity growth, dynamic SSA denotes expansion of the lowest value sector, agricultural employment, as a positive structural change, which is opposite to theory. The reference point of productivity change is a sector itself in traditional SSA and the contribution of change in an individual sector to the reallocation effect is not estimated with comparison to productivity in other sectors. In order to overcome the above-mentioned deficiencies of traditional SSA, Reinsdorf and Yuskavage (2010) introduce the CSLS[4] method. CSLS evaluates the labor reallocation effect of each industry in relation with their productivity to average productivity and productivity growth to average productivity growth. The following formula defines this method:

$$L_p = \sum S_{t-k,i} \Delta L_{p,i} + \sum (L_{i,t} - L_{a,t})\ \Delta S_{i,t} + \sum ((L_{i,t} - L_{i,t-k}) - (L_{a,t} - L_{a,t-k}))\ \Delta S_{i,t} \quad (3)$$

There is no difference in the *within sector* effect between CSLS and traditional SSA. In the static reallocation effect term, the labor productivity difference between sector i and the average labor productivity replaced labor productivity in sector i. The difference between the change in labor productivity in sector i and the change

4 The authors named this method after the Center for Study of Living Standards (CSLS) at the conference held by this organization in 2014.

in the average productivity has replaced the change in labor productivity in sector *i* in the dynamic reallocation effect.

The database covers the sectoral and aggregate labor productivity and the sectoral distribution of employment in Visegrad and South Caucasian countries. The available dataset for productivity in the Visegrad countries is from 1995. The data are from International Labor Organization (ILO) National Statistical Offices for South Caucasian countries. CSLS analysis covers the 1995–2019 period for Visegrad, and the 1999–2019 period for South Caucasia. Table 3 shows the disaggregation of the total productivity into seven sectors. In order to have comparable data, I converted value added in domestic currency at the 2015 price into the 2015 PPP exchange rate.

Table 3: *Sector Coverage*

Sectors	**Sectors**	**ISIC REV 3**
Agriculture	Agriculture	A + B
Energy and mining	Public utilities (electricity, gas, and water) and mining and quarrying	C + E
Manufacturing	Manufacturing	D
Construction	Construction	F
Trade, food, accommodation	Wholesale and retail trade, hotels and restaurants, transport, storage and communications	G + H + I
Business services	Finance, insurance, real estate and business services	J + K
Non-market services	Community, social, personal and government services	O + P + Q + L + M + N

Source: Author's compilation.

In general, the *within sector* effect is the main driver of productivity in all analyzed countries. However, the reallocation effect is not homogeneous, it being the highest in Poland in Visegrad and Georgia in South Caucasia. The static and dynamic shift effects together account for 28.9 percent of the total productivity growth in Poland and 24.4 percent in Georgia, which is twice that of McMillan and Rodrik's (2011) estimate for emerging Asian countries in the 1990–2005 period.

Productivity growth in modern sectors in tandem with the expansion of these sectors explains the higher contribution of labor reallocation to the productivity growth in Poland and Georgia. The higher and positive *static shift effect* shows that expansion of higher value sectors has a noteworthy effect on productivity in Hungary, Slovakia, and Armenia, while the stagnation of the productivity growth in these sectors produces a negative *dynamic shift effect* on productivity growth. The small reallocation effect in Czech Republic accounts for the smallness of its productivity gap. But the tiny level of the reallocation effect in Azerbaijan seems contradictory to the level of its economic development and existence of high productivity gap. The Azerbaijan government did not feel pressure to carry out in-depth economic development policy due to the relaxation effect of the high oil revenues. What is more, the inflow of oil money apparently created the Dutch disease in the Azerbaijan economy (Hasanov, 2013; Niftiyev, 2021). The low-value non-tradable services flourished at the expense of high-value tradable goods and services.

Table 4: *CSLS Shift Share Analysis*

Countries	Period	Within sector	Static shift	Dynamic shift	Total
Czech Republic	1995–2019	2.35	0.16	0.06	2.57
Hungary	1995–2019	1.85	0.85	-0.70	2.00
Poland	1995–2019	3.62	0.92	0.55	5.09
Slovakia	1995–2019	3.36	1.19	-0.97	3.58
Armenia	2000–2019	8.02	2.36	-0.88	9.5
Azerbaijan	1999–2019	9.46	0.27	0.23	9.96
Georgia	1998–2019	7.21	1.24	1.09	9.54

Source: Author's compilation.

In both regions, the manufacturing sector had a negligible reallocation effect. The manufacturing sector in the Visegrad countries had already matured in the 1980s, and it had exhausted its potential to expand its employment further. Integration into GVCs and access to the EU markets preserved the level of employment in

this sector. At the beginning of the transition, the level of employment in the manufacturing sector was already low in South Caucasian countries. Despite having a pool of cheap labor in the agricultural sector, they could not develop the manufacturing sector and expand employment in this sector. South Caucasian countries could not integrate their production into GVCs, which may explain the small share of employment in the manufacturing sector in these small economies. Nevertheless, the manufacturing sector experienced the highest productivity growth and is leading in the *within sector* productivity growth in the Visegrad countries (Table 5a). These countries had an inherited industrial complex and a pool of qualified workers, and their governments provided a favorable business environment and various incentives that were decisive in attracting MNCs into the manufacturing sector.

Technological and organizational modernization and huge capital investments by MNCs were decisive factors for a high rate of productivity growth in the manufacturing sector of the Visegrad economies. In contrast, the within-sector productivity growth effect of the manufacturing sector is not remarkable in South Caucasia. The productivity in the manufacturing sector is lower than overall productivity in Armenia and Azerbaijan. Integration into GVCs may facilitate development of the manufacturing industry in South Caucasia via investment in capital and modern technology. In accordance with other CIS countries, FDIs mainly concentrate in commodity, metallurgy, and energy sectors (Iradian, 2007). In spite of the popularity of Armenia for its liberal trade policy, it cannot attract FDIs outside of the energy and utility sectors (Mitra et al., 2007) and Azerbaijan only in the oil sector. Georgia is still pursuing its FDI attraction and EU integration policy since the Rose Revolution, but provision of a liberal business environment, tax concessions, and EU associate membership can attract FDIs only into communication, construction, real estate, and transport sectors. To attract FDIs into high-value sectors along with manufacturing and integrate into GVCs requires more comprehensive government policy than tax concessions and business liberalization.

Table 5a: *Detailed Decomposition of Labor Productivity Growth in Visegrad*

Czech Republic			
Sectors	***Within sector***	***Static shift***	***Dynamic shift***
Agriculture	1995–2019	0.06	2.57
Mining and energy	1995–2019	-0.70	2.00
Manufacturing	1995–2019	0.55	5.09
Construction	1995–2019	-0.97	3.58
Trade, transport, food	2000–2019	-0.88	9.5
Business services	1999–2019	0.23	9.96
Non-market services	1998–2019	1.09	9.54

Hungary			
Sectors	***Within sector***	***Static shift***	***Dynamic shift***
Agriculture	0.168	0.074	-0.107
Mining and energy	0.109	-0.036	-0.093
Manufacturing	0.509	0.054	-0.124
Construction	0.017	-0.018	-0.04
Trade, transport, food	0.209	-0.01	-0.005
Business services	-0.134	0.922	-0.659
Non-market services	0.122	0.013	-0.027

Poland			
Sectors	***Within sector***	***Static shift***	***Dynamic shift***
Agriculture	0.053	0.393	0.991
Mining and energy	0.056	-0.053	0.004
Manufacturing	0.341	0.007	-0.007
Construction	-0.008	0.228	-0.405
Trade, transport, food	0.21	0.128	-0.071
Business services	0.147	0.281	0.414
Non-market services	0.201	0.015	0.074

Slovakia			
Sectors	***Within sector***	***Static shift***	***Dynamic shift***
Agriculture	0.135	0.189	-0.079
Mining and energy	0.118	-0.017	-0.124
Manufacturing	0.535	0.098	-0.142
Construction	0.051	-0.001	-0.009
Trade, transport, food	0.116	-0.026	-0.105
Business services	-0.119	0.751	-0.573
Non-market services	0.163	0.005	0.032

Source: Author's compilation.

Table 5b: *Detailed Decomposition of Labor Productivity Growth in South Caucasia*

Armenia			
Sectors	***Within sector***	***Static shift***	***Dynamic shift***
Agriculture	0.489	0.292	0.263
Mining and energy	0.154	-0.026	-0.27
Manufacturing	0.122	0.009	-0.001
Construction	-0.006	0.21	-0.68
Trade, transport, food	-0.069	0.264	-1.242
Business services	0.074	0.299	1.013
Non-market services	0.235	-0.048	-0.083
Azerbaijan			
Sectors	***Within sector***	***Static shift***	***Dynamic shift***
Agriculture	0.078	0.614	1.969
Mining and energy	0.464	-0.487	-1.998
Manufacturing	0.05	0.028	-0.005
Construction	0.068	0.887	0.801
Trade, transport, food	0.166	-0.001	-0.003
Business services	0.067	-0.038	0.253
Non-market services	0.106	-0.002	-0.016
Georgia			
Sectors	***Within sector***	***Static shift***	***Dynamic shift***
Agriculture	-0.016	0.16	1.091
Mining and energy	0.070	0.003	0.007
Manufacturing	0.178	-0.009	-0.026
Construction	0.008	0.555	-0.341
Trade, transport, food	0.224	0.253	-0.031
Business services	0.153	0.013	0.301
Non-market services	0.384	0.025	0.001

Source: Author's compilation.

The expansion of employment in the high productivity business services sector has a remarkable effect on total productivity growth in Visegrad economies. Although it is slightly weaker in Poland, expansion of business service employment is a driver of static shift effect in Visegrad. Nonetheless, dynamic shift effect is not positive in all Visegrad countries. In spite of its expansion in overall employment,

lack of productivity growth in business services resulted in a negative dynamic shift effect in Hungary and Slovakia (Table 5a). Productivity growth in business services accompanied its expansion in Czech Republic and Poland, which produced a positive dynamic shift effect. The positive reallocation effect of business services on productivity growth is remarkable in Armenia. Armenia could increase productivity of business services close to the Visegrad level, but productivity of business services is quite small in Azerbaijan. Overall, business service employment in South Caucasia is lower than one-third of the Visegrad level.

Services were overlooked and a considerable part of business service activities did not exist in the socialist period. Business services grew in these countries by adapting to market economy. In the Visegrad countries, the role of FDIs is important in the development of business services too. Due to the underdevelopment of this sector during the socialist era, market opportunities arose in the 1990s and the inflow of FDIs increased. Starting from the early 2000s, MNCs targeted the business sector in the Visegrad countries as outsourcing destinations (Sass & Fifekova, 2011). Outsourcing played an important role in the integration of business services of the Visegrad economies into GVCs and the EU countries are the main destinations for business service exports from the Visegrad region. Business service development enabled them to increase service exports and replace a significant part of imported business services with domestic ones. For instance, Poland and Slovakia increased their business service exports while Czech Republic and Hungary reduced the import content of business services (Melikhova, Bazo, Holubcova, & Camacho, 2015; Klimek, 2018). South Caucasia also experienced an expansion of business service employment, but its share is still small. It might be claimed that the manufacturing industry played a triggering role in the development of the business services in the Visegrad countries. In this regard, the absence of a competitive manufacturing sector that demands advanced business services may be the main barrier to the development and expansion of business services in South Caucasia. Experience in computer technology in the socialist

period enabled Armenia to have the highest share of ICT service exports among the countries in both regions. ICT outsourcing to some of the CIS countries has increased recently, and it has also benefited Georgia. Nevertheless, the transport service export is large in Georgia as its geographical position connects Asia with the Black Sea and the transit of oil and gas from the Caspian basin can explain it. Although the lower value content ICT exports increased in Georgia and Armenia, the remaining business services are underdeveloped and stay outside of trade. The fact that South Caucasia is outside of GVCs in services is another obstacle in the development of the business services.

If the expansion of higher value modern sectors is one side of structural change, another side is the shrinkage of low-value sectors, and the agriculture sector is a classic example of a low-value activity. Land reforms started in the early 1990s in the Visegrad countries. Social assistance did not allow the emergence of massive subsistence employment in the agricultural sector and created large-scale farming in tandem with land privatization, and this reduced agricultural employment and increased its productivity (Swinnen & Vranken, 2010). A considerable part of the reduction in agricultural employment in the Visegrad countries occurred in the early 1990s, but the starting date of this analysis is 1995, therefore, this study is unable to catch the full reallocation effect of agriculture on overall productivity. Poland is the exception in the Visegrad region and both the static and dynamic shift effects of agriculture are considerable. The exceptionally low-value agricultural sector accounted for more than one-fifth of total employment in Poland in 1995. Meanwhile, the movement of half of the agricultural workers to relatively higher value sectors contributed to the overall productivity growth. Poland still has the highest share of employment in agriculture in the Visegrad region and could further improve overall productivity by increasing employment in relatively higher value sectors at the cost of employment in agriculture. The share of agricultural employment in other Visegrad countries is quite small as it is in developed countries, so there is no productivity growth promise by a possible tiny reduction in agricultural employment. South Caucasia already had

overemployment in agriculture in the Soviet period, and it persisted for a longer time in the post-socialist period. As a result of privatization, kolkhoz workers became owners of small pieces of land that were not suitable for commercial farming. In addition, the absence of social protection did not enable the massive numbers of subsistence workers with small pieces of land to leave agriculture. Altogether, the inability of non-agricultural sectors to create jobs has been another impeding factor of decline of employment in agriculture. Despite this, a rapid economic growth since the late 1990s created non-agricultural jobs in trade and personal services sectors. This enabled an overall modest decline in agricultural employment and Armenia's achievement of halving agricultural employment is remarkable. Surprisingly, Azerbaijan experienced the biggest contribution of agriculture to the reallocation effect. In Azerbaijan, modern sectors such as manufacturing and business services did not develop and expand, which is why a modest decline in lowest value agricultural employment became the driver of the reallocation effect. Agricultural productivity is also extremely low in Georgia and contraction of employment in this sector has a significant positive reallocation effect. Overall contraction of agricultural employment in South Caucasia is slight but agricultural employment is considerably high. These countries could boost their overall productivity by creating activities with higher productivity and moving excess labor in agriculture to sectors with higher productivity than that in agriculture.

Productivity growth in agriculture has been above average in the Visegrad region and, except Poland and Slovakia, it has an annual 31 percent productivity growth. Despite the higher rate of productivity growth, the analysis indicates that the contribution of agriculture is not significant in overall within sector effect and this can be explained by the small share of agricultural employment in the Visegrad countries. Armenia achieved a notable rate of productivity growth in agriculture, and it accounts for half of overall *within sector* productivity growth. In contrast, productivity growth in agriculture is extremely sluggish in Azerbaijan and Georgia.

4 Econometric Analysis of Structural Change and Economic Growth

CSLS is an accounting method, and it can only evaluate the direct effect of labor reallocation across sectors with a different level of productivity. Nevertheless, the positive effect of advanced sectors on the overall economic growth is not limited to the direct reallocation effect. Technological spillovers and other forms of efficiency improving effects of advanced sectors are indirect and SSAs are unable to evaluate them. In order to measure the indirect effect of progressive sectors on economic development in these regions, I apply an econometric approach.

Two explanatory variables represent producer services and manufacturing, respectively. The business services output ratio represents the producer services variable and the ratio of manufacturing exports to total exports represents the manufacturing sector. Chemical products, transport, vehicles and their parts, and machinery and equipment together represent the manufacturing exports.

$$BSO_i = \frac{Output^{business\ services}}{Output^{total}} \quad MEx_i = \frac{HTM_{exports}}{Total_{exports}}$$

The following formulas describe the models.

Model 1:

$$\Delta Y = \alpha + \beta_1 INV + \beta_2 RENT_{i,t} + \beta_3 \frac{Y_{i,t}}{Y_{USA}} + \beta_4 BSO_{i,t} + \beta_5 EDU_{i,t} + \beta_6 INST_{i,t} + \mu_{i,t} \quad (4)$$

Model 2:

$$\Delta Y = \alpha + \beta_1 INV + \beta_2 RENT_{i,t} + \beta_3 \frac{Y_{i,t}}{Y_{USA}} + \beta_4 MEx_{i,t} + \beta_5 EDU_{i,t} + \beta_6 INST_{i,t} + \mu_{i,t} \quad (5)$$

ΔY is the dependent variable and stands for the growth rate of per capita GDP. *INV* is the gross fixed capital formation expressed as a percentage of the GDP. Oil exports in Azerbaijan and remittances in Armenia and Georgia are important sources of foreign currency and they played a significant role in their economic growth (Ahmadov, 2022). Therefore, I add the *RENT* variable as a sum of share of

remittance and oil revenue in GDP. $Y_{i,t}/Y_{USA}$ is the ratio of the GDP per capita of country *i* to the USA GDP per capita. Convergence theory states that countries at the lower level of economic development experience faster economic growth. The Visegrad countries are at a higher stage of development than Caucasian countries and this variable seeks to capture this effect. *EDU* is the tertiary enrollment as a share of the total enrollment. Countries in both regions have achieved close to 100 percent literacy rate in the socialist period and there has not been a visible change in the level of literacy in the last five decades. Therefore, statistically, literacy rate would not explain a change in the growth rate. Additionally, these economies are in the middle (South Caucasia) and high-income level (Visegrad), and tertiary education plays a more important role at that level of development. *INST* stands for the level of institutional quality. It is argued that high-quality institutions have a positive effect on economic growth (Rodrik, Subramanian, & Trebbi, 2004). As the variable for institutional quality, I use the Contract-Intensive Money (*CIM*) as suggested by Clague, Keefer, Knack, and Olson (1999). According to *CIM*, a larger share of cash outside of the banking institutions indicates a lack of trust in protection of property rights and contract enforcement within a country. This index is calculated as the ratio of the non-cash money to broad money. A higher ratio indicates a higher level of trust in economic institutions. *BSO* and *MEx* are the main explanatory variables. GDP per capita and *INV*, remittances, oil rent, and tertiary enrollment are taken from World Bank Development Indicators, manufacturing export data from World Bank World Integrated Trade Solution (WITS), and business service output data from Eurostat (in the Visegrad case) and the National Statistics Office. Cash and broad money indicators are taken from Eurostat and central banks of the South Caucasian countries. Except for the relative income variable, the expected signs of the effect of all variables are positive.

I employ Panel FMOLS and DOLS. These models are more suitable for small sample panel series, especially when the number of cross-sections is smaller than the number of the time period (N < T). In the panel dataset of this study, the

number of cross-sections (N = 7) is smaller than the number of the time period (T = 20). In contrast to OLS, FMOLS and DOLS allow for a degree of cross-sectional heterogeneity, and this enables less biasedness of estimators. As a static model, OLS cannot deal with the endogeneity problem that can produce biased estimators. However, as a dynamic model, FMOLS and DOLS can minimize the biased estimates caused by the endogeneity problem (Pedroni, 2001).

Before presenting estimate results, I apply Panel Unit Root Tests for assessing the stationarity of the panel data series. I select Im, Pesaran, and Shin (2003) and Breitung (1999) tests. A better estimation power with the heterogeneous panel data with a small sample is their main strong point. Null hypothesis of both tests is that data are non-stationary. The result of the Panel Unit Test shows that except for the GDP growth variable, all the series are non-stationary at level and stationary at first difference.

I extend the data analysis to investigate cointegration among the variables in Models 1 and 2. I use Pedroni residuals cointegration test (Pedroni, 1999). Four panel statistics in the Pedroni residuals cointegration test examine cointegration among variables by assuming sections to be homogeneous while three group statistics test cointegration assumes the sections are heterogeneous. The null hypothesis is that there is no cointegration among the variables. In both models, four out of seven cointegration tests reject the null hypothesis of no cointegration, so it can be said that overall, there is indeed cointegration among the variables in both models.

After demonstrating the presence of cointegration in both models, I examine long-run relations among economic growth and other explanatory variables. In both models, investment has a positive and significant effect on the rate of economic growth. *RENT* as a sum of remittances and resource income, has a positive causal association with rate of economic growth. Faster economic growth in South Caucasia has been accommodated with inflow of rent revenues. Therefore, it has a positive effect on economic growth. The result for the effect of the relative income

variable on growth is not unanimous. Its effect is negative and significant in the FMOLS regression in Model 1. It is either positive or negative but insignificant in the DOLS regression of both models. Therefore, it is impossible to conclude that there is an unconditional convergence between Visegrad and South Caucasia. Contrary to expectation, the result shows that the effect of the tertiary education on economic growth is negative. Higher education is opened to marketization in the post-socialist period in these regions and it resulted in massive expansion of the tertiary education. On the one hand, expansion of higher education would be accompanied with deterioration in the quality of the higher education. On the other hand, the capacity of these economies, especially South Caucasian countries, to utilize educated workforce in productive activity may reach its peak. The marginal effect of the educated workforce would diminish and turn negative at a lower point. Institutional development contributes positively to economic growth.

Table 6: *Panel Unit Root Tests*

Variables		Breitung *t*-stat	Im, Pesaran, and Shin *T*-stat
Level	GROWTH	-4.16***	-1.66**
	ME	-0.24	-2.98**
	BSO	1.45	0.49
	INVESTMENT	-0.59	-0.93
	RENT	-0.75	-0.23
	Y_i/Y_{USA}	-0.86	0.94
	EDU	-0.13	1.18
	INST	-1.29	-1.67**
First difference	ΔGROWTH	-7.03***	-5.22***
	ΔHTEX	-2.78***	-3.80***
	ΔBSO	-2.26**	-2.69***
	ΔINVESTMENT	-3.71***	-3.16***
	ΔRENT	-2.81***	-1.43*
	$\Delta Y_i/Y_{USA}$	-2.86***	-1.97**
	EDU	-2.97***	-2.90***
	INST	-1.78**	-3.19***

Note: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.
Source: Author's calculations.

Table 7: *Panel Cointegration Test*

Methods	**Within dimension (panel statistics) (homogeneous)**		**Between dimension (heterogeneous)**		
	Test Statistics Probability		***Test Statistics Probability***		
Pedroni Residual Cointegration					
Panel v-Statistic	-0.81	0.7919	Group rho-Statistic	3.69	0.9999
Panel rho-Statistic	2.94	0.9744	Group PP-Statistic	-10.30	0.0000
Panel PP-Statistic	-2.42	0.0014	Group ADF-Statistic	-4.35	0.0000
Panel ADF-Statistic	-3,37	0.0004			

Methods	**Within dimension (panel statistics) (homogeneous)**		**Between dimension (heterogeneous)**		
	Test Statistics Probability		***Test Statistics Probability***		
Pedroni Residual Cointegration					
Panel v-Statistic	-0.74	0.7715	Group rho-Statistic	3.45	0.9997
Panel rho-Statistic	2.92	0.9983	Group PP-Statistic	-10.05	0.0000
Panel PP-Statistic	-1.92	0.0272	Group ADF-Statistic	-4.37	0.0000
Panel ADF-Statistic	-3.32	0.0004			

Source: Author's calculations.

As expected, the export of manufacturing products contributes positively to economic growth, which confirms the importance of the manufacturing sector for economic growth in these regions. Contrary to expectation, there is a negative association between business service output and economic growth rate which requires a careful analysis. Firstly, the higher rate of the economic growth in South Caucasia was spurred by favorable external conditions including remittance and oil rent rather than expansion of the modern business services, which can partially explain the lack of positive association between business services and economic growth. Secondly, it might be assumed that the business service sector in these regions still does not have a high capital intensity, technological development, and R&D capacity. They are stuck in the lower knowledge intensive, routinized tasks of the producer services (Szalavetz, 2017). Therefore, business service activities cannot spur growth.

Table 8a: *Model 1*

	FMOLS		DOLS	
	Coefficient	***T-statistics***	***Coefficient***	***T-statistics***
MEX	0.44***	3.76	0.36**	2.11
INVESTMENT	0.71***	8.17	0.71***	5.09
RENT	1.70***	6.37	1.71***	4.24
YI/Y_{USA}	-0.27**	-2.26	-0.22	-1.02
EDU	-0.37***	-5.4	-0.41***	-3.44
INST	16.46***	3.55	16.43**	2.26

Note: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.
Source: Author's calculations.

Table 8b: *Model 2*

	FMOLS		DOLS	
	Coefficient	***T-statistics***	***Coefficient***	***T-statistics***
BSO	-0.29***	-19.16	-1.50***	3.16
INVESTMENT	0.11***	9.21	0.48***	3.75
RENT	0.22***	-19.01	1.91***	4.79
YI/Y_{USA}	-0.28	-14.56	0.33	1.14
EDU	-0.03***	-7.03	-0.42***	-3.35
INST	9.32***	2721	37.70***	4.97

Note: *** $p < 0.01$, ** $p < 0.05$, and * $p < 0.1$.
Source: Author's calculations.

5 Conclusion

In this paper, the effect of structural change on economic growth in Visegrad and South Caucasian countries is examined. Firstly, SSA measures the direct contribution of structural change to labor productivity. The result shows that *within sector* productivity is a main driver of productivity growth in both regions. The reallocation effect is remarkable in Poland and Georgia and the contraction of the low-value agricultural employment together with the expansion of the high-value business services employment (bigger in Poland) are the reasons for

it. The expansion of business services also produced a positive static reallocation effect in Hungary and Slovakia but the lack of productivity dynamism in this sector cancelled out this effect. Despite having a high productivity gap and the prevalence of a low-value agricultural employment, Azerbaijan did not benefit from expanding higher value activities. Manufacturing employment reached its maximum and it was already higher than the OECD average in the Visegrad countries and did not experience any expansion. Therefore, its reallocation effect is negligible. However, manufacturing employment is still low in South Caucasia, and it did not experience any expansion in the post-socialist period. Hence, it did not contribute to the reallocation effect in South Caucasia either.

I use FMOLS and DOLS for measuring the overall effect of advanced sectors on economic growth. The manufacturing export has a positive effect on economic growth while the effect of the business service production is negative. These findings can support the idea that manufacturing sectors are still the engine of growth, but service sectors have not become that yet.

The Visegrad economies upgraded the value structure of their economies, especially manufacturing production, by integrating with GVCs, mainly via the MNCs in the manufacturing sector. The inherited industrial complex, a pool of qualified workers, supportive government policies, and EU integration are the main factors behind attracting foreign capital and integrating their domestic economies into GVCs in the Visegrad countries. By integrating into GVCs, at a general level, these economies now have an economic structure similar to developed countries. Nonetheless, further economic development requires value upgrading within advanced sectors (Srholec, 2007). As the Visegrad economies are mainly specialized in the production stage, it is necessary to increase their specialization in knowledge intensive pre- and post-production stages such as design, R&D, logistics, and marketing (Szalavetz, 2017; Farkas, 2020). In order to upgrade the value structure within the advanced sectors, it is necessary to transit to knowledge economy and this requires the creation of knowledge rather than usage of already created knowledge elsewhere. Transition to knowledge-based economy requires increasing

the investment in human capital and public investment and strengthening the connection between the holy trinity of national innovation systems – firms, public, and universities (Correia, Bilbao-Osorio, Kollar, Gereben, & Weiss, 2018).

The elimination of the inherited inefficiencies of the Soviet economic system and favorable external environment produced a high rate of economic growth in South Caucasian countries. This growth was not accompanied by upgrading the value structure of their economies since it had achieved its full economic growth potential. Integration into GVCs, including attracting MNCs, may be one of the viable options for these small economies to increase technological capacity and the value structure of their economies. At the same time, a closer integration with the EU in the context of EU neighborhood policy may increase their chance to attract FDIs from the EU. The low wage and the low tax regime should not be the only policies to attract foreign capital because MNCs in the higher value activities require more than these incentives. Increasing domestic capacities, investment in human capital, and provision of appropriate institutional environment are the main requisites for attracting FDIs and encouraging domestic companies in high-value activities.

A considerable part of change in sectoral distribution of employment and production occurred in the early years of transition and lack of data for that period is the main limiting factor of this study to have a full picture of the effect of structural change on economic growth in the post-socialist period in these regions.

Further studies on value upgrading within advanced sectors in the Visegrad economies and the connections between capacity building and the development of higher value sectors in South Caucasia may increase the knowledge on the economic structure and economic growth in these regions.

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