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To Grow or Not to Grow: Belarus and Lithuania

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Abstract
We compare the economic growth performance of Belarus and Lithuania since the collapse of the Soviet Union in 1991. Our interest in this country pair is driven by the two countries' interwoven history as well as by the fact that Belarus remains autocratic and strongly tied to Russia, while Lithuania has reinvented herself as a democratic market economy fully integrated into the EU. Our aim is to understand better the extent to which the growth differential between the two countries can be traced to increased efficiency, i.e., total factor productivity, in the use of capital and other resources *via*, *inter alia*, better institutions (intensive growth) as opposed to sheer accumulation of capital (extensive growth), the hallmark of Soviet economic growth. To this end, we compare the development of some key determinants of growth in the two countries since the 1990s. Employing a simple growth accounting model we find that institutional reforms, open and transparent governance, and good education play a more important role for output and efficiency than crude capital accumulation. Hence Lithuania does better than Belarus, which remains marred by problems related to weak governance as well as autocratic rule. As in Estonia and Latvia we find that the EU perspective made a significant contribution to growth in Lithuania. The Russian connection has done less for Belarus. At last, we also touch upon the impact of the corona virus on the economies of the two countries.

Keywords Economic growth · Belarus · Lithuania · Governance · Transition economies · Education · Economic reforms · Exports · Inflation · Labor markets · Corona virus

JEL Classification O11 · O16 · O19

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Introduction

In a pair of earlier papers (Gylfason and Hochreiter 2009, 2011), we compared the economic growth trajectories of Estonia and Latvia with those of Georgia and Croatia to try to understand the extent to which the growth differentials observed could be traced to increased efficiency in the use of capital and other resources (intensive growth) rather than to brute accumulation of capital (extensive growth). We inferred that advances in education at all levels, good governance, and institutional reforms played a more significant role in raising economic output and efficiency in Estonia and Latvia than in Georgia and Croatia, emphasizing the importance of the EU perspective, that is, the need for timely, market-friendly economic and political reforms aimed at strengthening the candidacies of the Baltic countries for quick EU membership after their release from the Soviet Union.

Against the background of the literature on the transition from plan to market (see, e.g., Wachtel 2021 for a thoughtful retrospective, or Campos and Coricelli 2002), this paper aims to extend our comparative approach to the case of Lithuania vs. Belarus, a starker contrast than those offered in the earlier papers because, unlike Georgia and Croatia, Belarus remains under an autocratic ruler with strong ties to Russia and no interest in having anything to do with European integration or markets. Comparing Belarus and Lithuania is warranted by their long, intertwined history and, in some sense, their comparable starting positions when communism collapsed, even if Lithuania, unlike Belarus, was briefly democratic in the 1920s.

Whether the two countries ever were on an even keel depends on one´s point of view. Later, within the Soviet Union, both the Belarusian and Lithuanian SSRs enjoyed above average income, and both had a focus on industry. In addition, they declared independence in quick succession in 1990. Further, both countries, after declaring independence, had the opportunity to follow the same political and economic path or model. Both were in a formal position to do so. Insofar they enjoyed similar starting conditions. Belarus chose to remain integrated with Russia of her own independent political will just as Lithuania was determined to integrate with "the West" as far as possible. These opposing political decisions, which led to different endogenous economic processes, help to explain our choice of country pair for comparison.

We also want to assess the importance of institutional reform for economic growth. In contrast to Belarus, Lithuania joined the EU in 2004, Croatia joined in 2013, and Georgia expects to apply for EU membership in 2024.

History

After regaining independence in the wake of the Soviet Union´s demise in 1991, Belarus and Lithuania chose radically different paths. Lithuania, benefiting from its seaside location and the vicinity of rich neighbours, was an early and radical reformer, following the example of Estonia. While Lithuania rushed toward

integration into the EU and NATO in 2004 and, consequently, embarked on radical political, institutional, and economic reforms, Belarus, landlocked and surrounded by poor regions to the south and east,[1] after timidly starting some reforms in the first few years of independence, has remained stuck in a state of incomplete transition ever since 1994, the year of Alexander Lukashenko´s election as president. In this election, Lukashenko ran as a populist anticorruption candidate and won 80% of the vote against his opponent. Subsequently Belarus developed a model that has been described as 'state capitalism,' based on an implicit social contract in which the authorities guarantee law and order, employment opportunities, and a low Gini coefficient, i.e., a low dispersion of income (Dobrinsky 2016). In return, the population accepts the government/president, foregoing political freedom. Evidently, this contract has broken down in the last few years, decisively so after the rigged elections of August 2020.

In contrast, Lithuania, immediately after regaining independence, set in motion comprehensive reform programs to build the institutions and mechanisms of a market economy and the constitutional framework of a democratic state.[2] More recently, Lithuania has become one of the best performing countries in Central and Eastern Europe (CEE).

After reversing the initial output decline at the start of the transition from plan to market, the economies of Lithuania and Belarus grew broadly in tandem from 1995 onward. Starting out with a higher level of initial per capita gross domestic product (GDP), Lithuania grew a bit faster than Belarus from 1995 to 2019 and much faster from 2012 onward (Figs. 1 and 2).[3] Since 2012, the Belarus economy has been stagnant. These figures need to be taken with a grain of salt, however, because in Belarus many prices remain controlled. Figure 1 shows that Lithuania´s growth trajectory transcends that of CEE, while Belarus lags. Belarus charted its own heterodox path after 1991, while nearly all other countries in CEE adopted similar transition policies aimed at facilitating quick integration into the EU.

For a different perspective, Belarus did quite well in the period under review in terms of the overall growth of GDP in PPS (Fig. 3, left). This picture, however, masks the different growth trajectories on a per capita basis as Lithuania in the past 25 years lost about a quarter of her population to emigration. Even so, the share of Lithuania´s labor force with advanced education has remained stable at about 83% since 1997.[4] Meanwhile, Belarus´s population declined by about 8% (Fig. 3, right).[5] Many

[1] The respective geographic location may matter for productivity growth (Morys 2021). Moreover, in the Second World War, Belarus suffered by far the highest casualties of all Soviet Republics with heavy losses of educated urban population, losses that amounted to approx. double the share of Lithuania. Therefore, Belarus had a particularly bad starting point in terms of human capital. We owe these insights to Mario Holzner.

[2] See Vilpišauskas (2014).

[3] Using GNP/GNI series rather than GDP would not appreciably affect the results.

[4] Source: International Labor Organization, ILOSTAT database.

[5] The effects of emigration and the part of the population working abroad are reflected in remittances. As to be expected, this is much more important for Lithuania than Belarus. In Lithuania, remittances peaked at nearly 4.5% of GDP between 2013 and 2015, while in Belarus they remained more modest at just above 1% of GDP.

Lithuanians moved to the UK, the Nordic countries, Germany, and other EU countries (see Migracija skaičiais – EMN), while Belarusians were also attracted by the EU (Poland and Germany, in particular) and North America as well as Russia (Yeliseyeu 2014). Any assessment of the relative performances of the two economies ought to consider the colossal decline in Lithuania´s population.[6] While demography is outside the scope of this paper it might all the same have something to do with the transition path chosen. We will return to this issue below.

So how did Belarus manage to almost keep up with Lithuania in the early years, especially as the Belarus economy has been stagnant since 2012? One possible explanation involves the huge implicit energy subsidies from Russia that averaged a whopping 18% of GDP during 2001-2008[7] (IMF 2018). One would expect Lithuania´s advantage first of having an EU perspective and then as of 2004 being a full-fledged member of the EU to boost her per capita growth by much more than in Belarus, especially in the years up to, say, 2010–2012. That did not happen, however. Even so, evidence of the impact of the EU is supported by the increasing growth differential after 2010–2012 (Fig. 2, right).[8] More broadly, how can we explain the observed difference in per capita growth rates by the main determinants of economic growth in the two countries after 1995? Why did Belarus do as well as she did, at least until around 2012? And what are the reasons for her relative decline thereafter?

We seek to shed light on these questions along two paths. We first compare the development of some standard determinants of growth in the two countries since independence and then apply a simple growth accounting model to a comparison of their economic growth trajectories. Why is GDP per person so much higher in Lithuania than in Belarus and why does the income differential continue to grow (Fig. 4, left)?—from a 58% difference in 1995 to a nearly threefold difference in Lithuania´s favor in 2019 without adjustment for purchasing power parity, not less than twofold as in Figs. 1 and 2 with PPP adjustment. In view of extensive price controls and distortions in Belarus, the per capita GDP comparison without PPP adjustment in Fig. 4 may, we surmise, be more appropriate than the comparisons with PPP/PPS adjustments in Figs. 1–3.[9]

[6] Note that in 2019 net migration flows in Lithuania turned positive (see Key policy insights | OECD Economic Surveys: Lithuania 2020 | OECD iLibrary (oecd-ilibrary.org).

[7] These subsidies amounted to "only" 5% of GDP during 2010–2017 (IMF 2018).

[8] Zoega and Phelps (2019) report that, in a sample of 37 European countries during 1999–2014, the post-communist economies converged more rapidly than other countries to the German real per capita GDP level, and more so the closer they are integrated into the EU.

[9] Anderson and Swinnen (2008, 23) report that among all 15 FSU republics and 12 East and Central European countries, Belarus had the lowest score according to the World Bank´s price and market reform metric during 1997-2002, scoring 2 on a scale from 1 (centrally planned economy) to 10 (completed market reforms). While the absence of market reforms is not always closely correlated with economic distortions, the World Bank has documented a "phenomenal accumulation of distortions" in Belarus (see, e.g., World Bank 2018, 32) and so has the European Bank of Reconstruction and Development, stating that "Continued state interference in the economy – including through subsidies, price controls, and directed lending – has created economic distortions and suboptimal resource allocation" (EBRD 2016, 17).

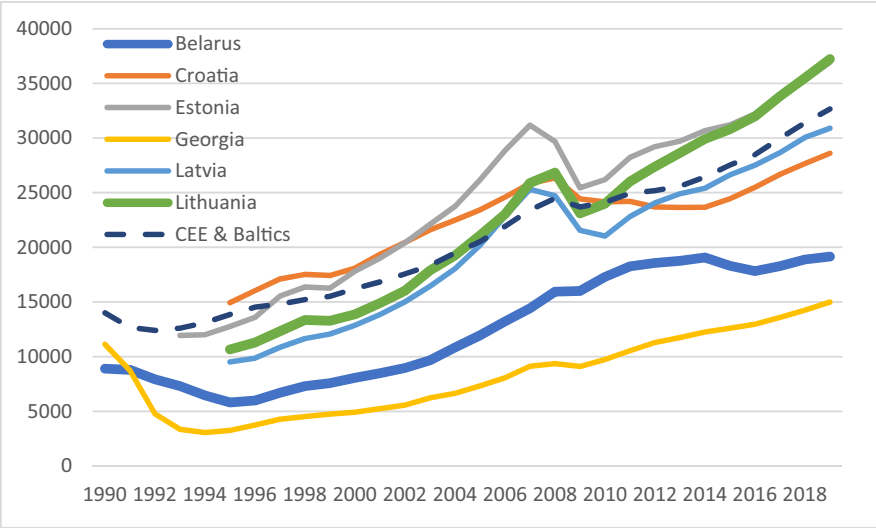

Fig. 1 GDP per capita 1990–2019 (constant international 2017 dollars, PPP) *Source*: World Bank, *World Development Indicators 2021*

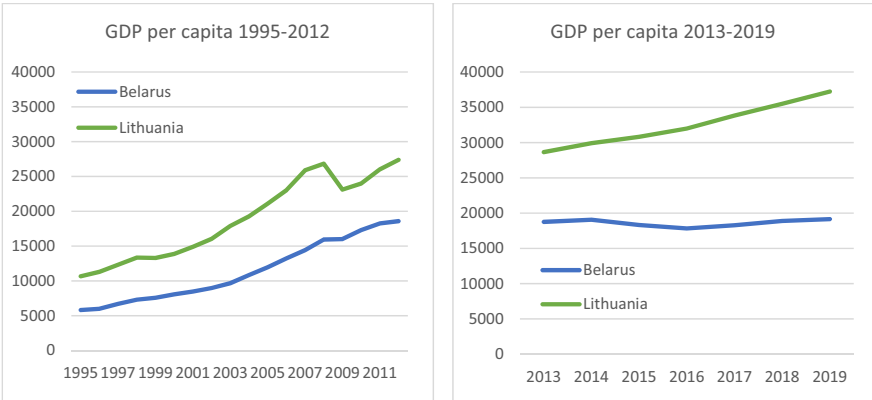

Fig. 2 GDP per capita 1995–2019 (constant international 2017 dollars, PPP) Source: World Bank, *World Development Indicators 2021*

And why have Lithuanians lived longer than Belarussians since 1995 (Fig. 4, right)? After 1990, life expectancy in Belarus fell by three years compared with a bit more than two years in Lithuania. The reversal in life expectancy began in 1994 in Lithuania but not until 2002 in Belarus. Since 1994, Belarus has added five years to

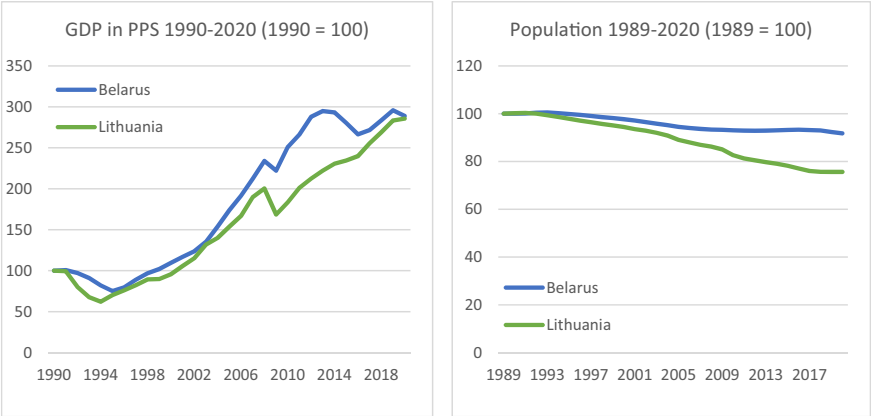

Fig. 3. GDP in PPS and population 1989-2020 (indices) Source: wiiw Annual Database 2021

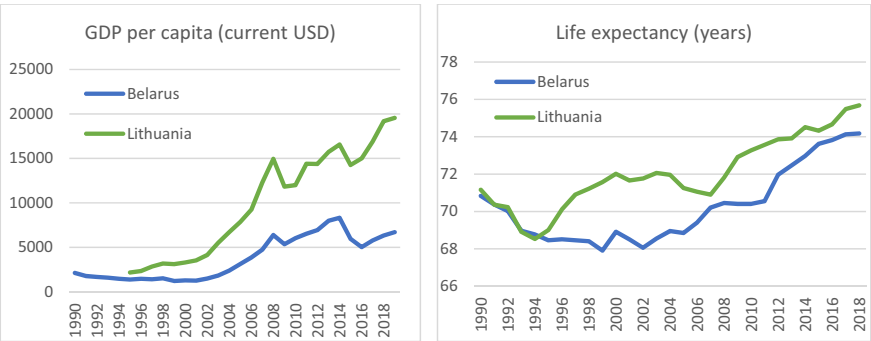

Fig. 4. GDP per capita and life expectancy 1990–2019 Source: World Bank, *World Development Indicators 2021*

average life expectancy while Lithuania has added seven years.[10] As Fig. 4 suggests, key economic and social indicators tend to go hand in hand.

As before, our choice of countries to compare reflects the fact that Lithuania, like Estonia and Latvia, decided at the outset of its transition from plan to market to apply for EU membership whereas Belarus, under its present leadership unchanged

[10] There is a difference between males and females. In Belarus, while male life expectancy at birth rose from 65 years in 1960 to 69 in 2019, female life expectancy rose from 70 years to 79. Hence, the gender gap in Belarus increased from five years to ten. Meanwhile, in Lithuania, male life expectancy at birth rose from 67 years to 72 and female life expectancy rose from 73 years to 81. The Lithuanian gender gap thus increased from six years to nine.

from 1994, opted for integration with Russia[11] and thus remains firmly ensconced in Russia´s orbit. Despite sharing 680 km (420 mi) of common border with Lithuania, compared with a 1240 km (770 mi) border with Russia, Belarus differs from Lithuania in fundamental respects. The Lithuanian language is quite different from Belarusian, which is similar enough to Russian for the two languages to be mutually intelligible in part like, for example, Danish and Swedish.[12] Their sense of nationhood is different in that Lithuania´s vibrant nationalism helped her turn her back on Russia, while Belarus had a weaker sense of nationhood. We aim to apply a broad brush to depict their growth performance since 1995 in view of recent growth literature.

Lithuania and Belarus are both small in terms of population (2.7 million and 9.4 million, respectively) but Belarus is about three and a half times larger than Lithuania (65,300 km^2 and 207,600 km^2—about the size of Great Britain—respectively).

They look back at a long joint history. However, its interpretation, if the two countries ever were on an even keel, critically depends on who wrote it: Belarusian, Polish, Russian, or Soviet historians.[13] Interestingly, just as Georgia enjoyed a "Golden Age,"[14] Belarus also had its own "Golden Age" in the 14th and 15th century, when Belarus was part of the Grand Duchy of Lithuania.[15] Regardless, their current territories were part of the Kingdom of Lithuania, Grand Duchy of Lithuania (and subsequently the Polish-Lithuanian Commonwealth), after 1795 part of the Russian Empire, and, ultimately, the Soviet Union into which Belarus was incorporated after World War I and Lithuania after World War II. It took until 1918 that, for the first time in history, Belarus, under the name of the Belarusian People´s Republic, emerged as a very short-lived (1918–1919) independent state under the name of Belarus.

As one of the 15 Soviet Socialist Republics, Lithuania relied on central planning for almost 50 years from 1945 to 1991. Prices were set by fiat, foreign transactions were monopolized, and markets and market institutions were nonexistent for the most part. By contrast, Belarus has lived like this for more than a hundred years, from 1928 to date with only a brief interlude 1991–1994, even if old-style central planning and rigid control of the allocation of resources are no longer the order of the day.[16]

[11] On 2 April 1997, the "Treaty on the Union between Belarus and Russia" was changed in name to "Union of Belarus and Russia." On 9 September 2021, presidents Putin and Lukashenko agreed on a potentially far-reaching implementation of this treaty drawing Belarus closer to integrating with Russia. No details were provided at the time of writing. On 29 May 2014, Belarus became a founding member of the Eurasian Economic Union (EAEU).

[12] Belarusians understand Russian more easily than the other way round.

[13] See Davies (2012, 231 ff., 239).

[14] See Gylfason and Hochreiter (2009).

[15] This is so because according to Belarusian history interpretation, the Grand Duchy of Lithuania in the 14th and 15th century, in effect, was a Belarusian entity. The Golden Age ended in 1569 when Lithuania merged with Poland under the Treaty of Lublin. Lithuania had been founded by Grand Duke Mindaugas, who was crowned king in 1253.

[16] The New Economic Policy in the 1920s had strong market economy features.

After declaring independence in March 1990, the first Soviet republic to do so, followed by near-universal international recognition during 1991,[17] Lithuania quickly undertook bold political, institutional, and economic reforms. As in Estonia and Latvia, we surmise that the prospect of rapid EU integration, 'the EU perspective,' cemented the discipline needed for sustained reforms across the political spectrum. Further, Lithuania benefited from being a close neighbor to the rich Nordic countries as well as, figuratively, to Brussels. A few months behind Lithuania, Belarus declared sovereignty in July 1990 and then independence after the failed coup in Moscow in August 1991. Unlike Ukraine, which looked both ways, Belarus only looked east and chose integration with Russia and with the Eurasian Economic Union (EAEU) rather than integration with the EU and the West. Experience suggests that eastward trade in Eastern Partnership countries including Belarus does much less for them than trade with the EU (Gylfason, Martínez-Zarzoso, and Wijkman 2015).

Within less than 15 years of restored independence, Lithuania joined the EU as well as NATO, and continued to grow rather rapidly thereafter except for the deep downturn during the financial crash of 2008. Belarus also grew and, with weaker trade relations with the EU, took a much smaller hit during the financial crisis. Neither country has significant natural resources.[18]

The remainder of the paper proceeds as follows. Section III presents pairwise comparisons of selected economic, political, and social indicators for the two countries, indicators that matter for economic growth. Section 4 lays out a simple growth accounting framework that we use to try to quantify the contributions of investment, education, and efficiency to per capita income growth in the two countries and presents our main findings, with a brief discussion of the policy implications as well as suggestions for potential lessons for other countries that seek to catch up with their neighbors. Section V concludes our story.

Determinants of growth

We now ask how the standard determinants of per capita output and thereby also long-run growth identified in the growth literature have developed and what they can tell us about relative economic performance in Belarus and Lithuania since independence.

We begin with investment, trade, and education.

[17] Iceland was the first sovereign state to recognize, in February 1991, Lithuania´s reclaimed independence from the Soviet Union. Most other countries waited with their recognition until after the failed coup in Moscow in August 1991.

[18] Except for potash; Belarus commands about 21% of the world´s potash deposits. See Statista (2021).

Investment, trade, and education

Investment is a key determinant of the capital/labor ratio and of economic growth, with the important proviso that official investment data do not distinguish quantity from quality. There is a *prima facie* case for doubting the quality of investment in Belarus where investment decisions, in Soviet fashion, have been motivated more by politics than by profitability and where the state owns two thirds of the banking system (Gattini and Borysko 2018).[19] Two big state-owned banks were tasked with directing credit on preferential terms to state-owned enterprises, one bank to manufacturing, the other to agriculture, but such directed lending has been reduced significantly in recent years (IMF 2019). The booming IT-industry has been fully competitive in world markets.[20] The same applies to refined oil products and fertilizers with the proviso that Belarus has for a long time received "loyalty" rents from Russia. Belarus could import crude oil from Russia at subsidized prices, refine it, produce fertilizers, and sell the finished products at world market prices to "Western countries," especially the EU. More recently, and particularly with the new transshipment agreement with Russia of 2021, these rents have declined. Both countries saw a surge of gross investment in machinery and equipment from around 2000 onward. Thereafter, both saw a reversal leaving the investment ratio essentially unchanged from the mid-to-late 1990s until 2018. Even so, Belarus invested about 30% of its GDP on average during 1990-2019 compared with 21% in Lithuania (Fig. 5, left).

Net foreign direct investment rose sharply in Lithuania after 2002 only to plunge in 2009. Lithuania has been a bit more open toward the influx of foreign capital. Specifically, net FDI inflows in Lithuania amounted to 3% of GDP on average 1990–2019 compared with 2% in Belarus (Fig. 5, right). Currently, the stock of FDI in Lithuania is double that in Belarus (not shown). Here quality matters and the benefits of EU and NATO membership clearly show.[21] Net FDI inflows into Lithuania are received mostly from Germany and the rest of Europe whereas FDI inflows into Belarus arrive mostly from Russian firms with a weak record of exports to European markets. FDI from EU countries has been key to technology transfer supporting growth and economic efficiency in Lithuania. Even so, the ratio of FDI to GDP has been broadly similar in both countries since 2010 (Fig. 5, right). As far as the regional composition of FDI is concerned, FDI in Belarus is heavily tilted toward Russia, accounting for around 80% of total FDI (2016), including FDI inflows from

[19] Some observers may harbor similar doubts about Belarusian statistics more generally on the grounds that the data are not wholly immune from political interference (see Sect. 3.F), nor is Eurostat in a position to subject Belarusian data to the same quality control and standardization as is required of EU members.

[20] Since the rigged elections of August 2020, several Western firms have left Belarus, in particular in the IT sector. Moreover, many of the IT industry´s local founders have recently fled political crackdowns, which does not bode well for potential growth in Belarus.

[21] It can be argued that it is NATO that makes investment in Lithuania safe rather than local policies or the EU.

Cyprus, with Austria, at 3% of total FDI, a distant second.[22] Some would argue that Russia is buying up Belarus, while Western companies are investing in Lithuania.

The picture of foreign trade in the two countries is mixed. Exports of goods and services from Lithuania amounted to 57% of GDP on average 1990-2019, a bit less than the 61% in Belarus (Fig. 6, left). While the Belarusian export ratio has held steady since the mid-1990s, mostly reflecting stable trade relations with Russia, the Lithuanian ratio shot up from 40 to 80%, reflecting Lithuania´s integration into Western markets and, after EU accession, her participation in the EU Single Market. About half of Belarus´s overall external trade is with Russia. In this comparison, the direction of trade matters perhaps even more than its volume. About two-thirds of Lithuania´s trade was with the EU from the mid-1990s onward, while Belarus has more than a half of its foreign trade with Russia even today. The Free Trade Agreement with the EU proved fundamental for Lithuania.[23] Furthermore, trade is rather lopsided: Belarus imports crude oil, etc., from Russia at subsidized prices, while two thirds of exports, especially refined oil products (high quality and at world market prices) and IT hard- and software go to the West. Meanwhile, petroleum products and fertilizers account for two thirds of Belarusian exports to the West. The composition of exports also matters, as does their quality. Belarus exports relatively fewer manufactures than Lithuania as we will see in Section III.B. Belarusian exports to Russia are essentially the best Soviet manufacturers you ever saw, but they are still Soviet, such as stoves.

Since 2007, Lithuania has received about twice as many tourists from abroad as Belarus relative to local population (not shown). Nonetheless, tourism at 5.5% of GDP (2019)[24] remains limited in Lithuania. In Belarus it is nearly negligible (2.1% of GDP). For comparison, tourism accounts for 8% of GDP in Latvia, 11% in Austria, 12% in Estonia, 13% in Italy, 14% in Spain, 20% in Greece, and 24% in Croatia.

In preparation for EU membership, Lithuania embraced liberal trade policies from the mid-1990s onward. Import restrictions were phased out and eliminated from 2005 onward (Fig. 6, right). Therefore, exports surged (Fig. 6, left). Like Russia but unlike the rest of Europe, Belarus retains a rather restrictive import regime. Free trade can be good for growth provided that the gains from trade are shared fairly.

Belarus has maintained the good sides of Soviet education, especially in mathematics and science, but remains poor in languages. In both countries, nearly all youngsters attend secondary school, but Belarus has lagged behind Lithuania in recent years (Fig. 7, left, net enrolment). On the other hand, also reflecting the success of the IT-industry, Belarus has recently caught up with Lithuania in terms of individual use of the internet (Fig. 7, right). Likewise, Belarus has reached the EU average of 123 mobile cellular subscriptions per 100 inhabitants, but Lithuania, at 169, is nearly 40% above the EU average. In in the OECD Program for International Student Assessment (PISA), a path-breaking project intended to measure education attainment by output rather than by input, 15-year-olds in both countries performed

[22] Source: wiiw FDI Database; Balas et al. (2018, p. 15f).
[23] See Gylfason, Martínez-Zarzoso, and Wijkman (2015).
[24] See STATISTA at Travel and tourism: share of GDP by country EU 2019, Statista.

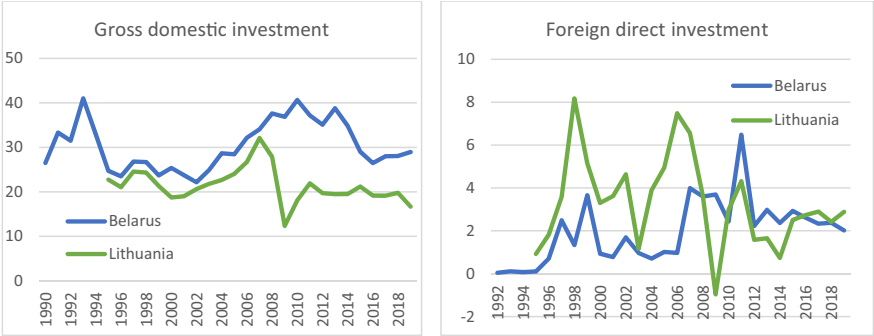

Fig. 5. Domestic and foreign investment 1990–2019 (% of GDP) Source: World Bank, *World Development Indicators 2021*

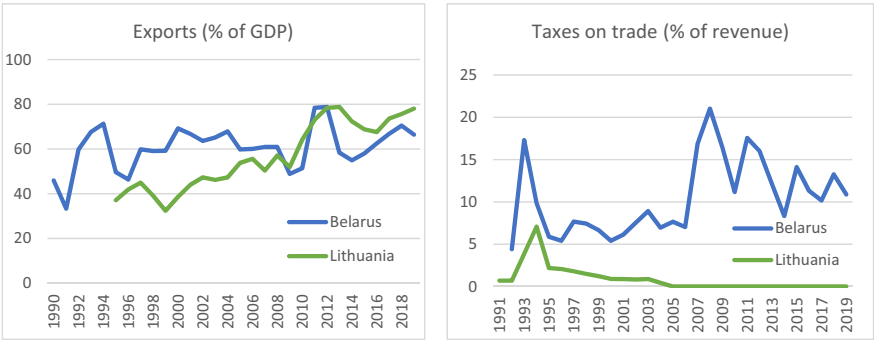

Fig. 6. Exports and taxes on trade 1990–2019 (% of GDP and tax revenue) Source: World Bank, *World Development Indicators 2021*

at broadly similar levels in reading/literacy, mathematics, and science in 2018, near or slightly below the OECD average.

From 1989 to 2018, tertiary school enrolment, i.e., university attendance, rose from 30% to more than 70% of each cohort in Lithuania compared with an increase from 50 to 90% in Belarus. With early reforms, Lithuania first sought to establish an educational system independent from the USSR and, subsequently, with EU accession in sight, moved to make education compatible with EU obligations, another benefit of the afore-mentioned early EU perspective.

As with trade, the composition of education also matters for growth (Natkhov and Polishchuk 2019). Belarus´s education system traditionally has offered high-quality education, especially in mathematics, which, at least in some part, accounts for the success of the IT-industry. Lithuania´s adaptation of its educational system started even before independence and has been an ongoing process. Quality is relatively high even if it remains below the OECD average. However, phase two of the

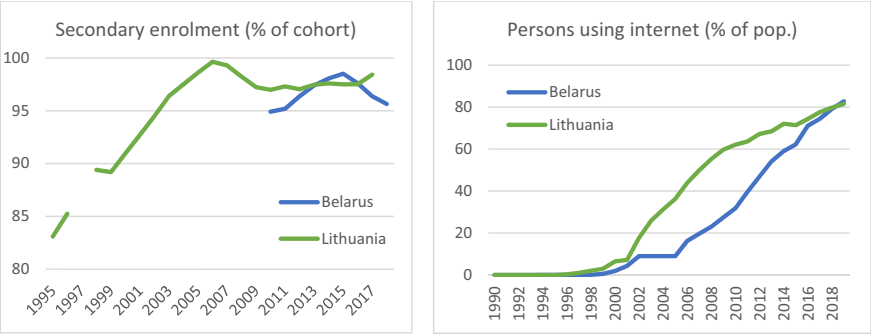

Fig. 7. Education and internet use 1990–2019 (%) Source: World Bank, *World Development Indicators 2021*

adaptation process that started in 1998 was directly related to the EU accession process with a view to standardization.

Nonetheless, the PISA results of 2018 for reading, mathematics, and science were just below the OECD average of 487 at 474 (Belarus) and 476 (Lithuania) and were also in sectoral performance very similar (77 and 71%-reading, 76 and 76%—mathematics, and 74 and 78%-science, attaining Level 2 or higher).[25]

In sum, the evolution of investment, trade, and education, sometimes viewed as the first three key determinants of growth, seems to suggest a slight advantage for Lithuania *vis-à-vis* Belarus, mainly in terms of freer and more diversified trade with more partners, more productive education, and more rapid spread of technology. Belarus´s much higher investment ratio hardly counts in Belarus´s favor in view of the experience of unproductive investments under central planning in Soviet times. Therefore, at first glance, we seem to have to look elsewhere for clear indications of differences in the determinants of growth in the two countries.

Organization and structure

We have already discussed the structure of trade, which Lithuania directs westward and Belarus directs eastward. Lithuania is part of the EU supply chain, while Belarus sells essentially Soviet-style merchandise to Russia in return for subsidized oil and gas that is used in the production of petroleum products and fertilizer for the EU. The next variables we look at concern economic organization, namely, indices of export concentration and export diversification as reported by UNCTAD. We have already said that Lithuania has more and more diverse trade partners than Belarus has. What do the numbers say?

The Herfindahl–Hirschman index (HHI) of market concentration, ranging from zero (no concentration) to one (extreme concentration), is a country-specific index, unrelated to market concentration in other countries. It is defined as the sum of the

[25] Source: OECD (2019).

squares of the shares of each sector of production in total output (or sometimes as the square root of the sum of squares). The HHI covers only merchandise exports. As a country´s markets become more concentrated—i.e., less dispersed, less diversified—the value of the HHI rises toward one.

The Finger–Kreinin index (FKI) of export diversification is a relative index, comparing the structure of exports across countries. The FKI shows how the structure of exports by product of a given country differs from the world average. The index ranges from zero (full diversification) to one (no diversification), with values closer to one indicating a bigger difference from the world average and thus a relatively less diversified export structure. Like the HHI, the FKI covers only merchandise exports, i.e., exports of goods, not services.

In sum, while a lower HHI means less market concentration, i.e., more market dispersion, a lower FKI means more export diversification, which is not quite the same thing as less concentration.

Figure 8 shows that the exports of Lithuania are less concentrated (left panel) and more diversified (right panel) than the exports of Belarus. While overall Belarusian trade is focused on Russia, both on the export and import side, refined oil products and fertilizers are predominantly exported to the West. Thus, Belarus becomes vulnerable. Less concentration signals more competition among exporters and more diversification signifies more pluralism among trade partners. Both factors are probably good for growth.

The share of agriculture in GDP has declined sharply in both countries, from a high share of 23% in Belarus in 1990 and 10% in Lithuania in 1994 (Fig. 9, left). The farm share of GDP remains twice as high in Belarus as in Lithuania, whose share of value added in agriculture in GDP of 3.2% in 2019 was double the EU average. Traditionally, Belarus´s economy had focused on (higher-end) industrial production and agricultural processing. Even today these two sectors remain more important than in other comparable countries. Again, volumes do not tell the whole story. Lithuania has a good agriculture with a lot of vegetable production, while Belarus still has collective farms with mostly low-quality produce. All of Belarusian agriculture remains in state ownership; there are no private farms. In addition to directed credits, the collective farms are the largest recipients of direct government budget subsidies and are forced to sell their output at prices below cost.

In industry, oil refining, chemical production, and construction stand out, as does food processing. The successful rise of the IT-sector,[26] which is state of the art as exemplified by Viber as well as various online games and security software, and the success of the increasing private business services sectors are especially noteworthy.

Meanwhile, the share of manufactures exports in total merchandise exports in Belarus declined from 80 to 50% from 1998 to 2019 (Fig. 9, right). In Lithuania, the share of manufactures in total exports has remained stable at 60% compared with 79% on average in the EU in 2019. Just as too much agriculture is a sign of social inefficiency and tends to slow down economic growth, a strong manufacturing sector is ordinarily an important font of growth through the buildup of human capital,

[26] In its heyday, there were more than 1000 start-ups alone.

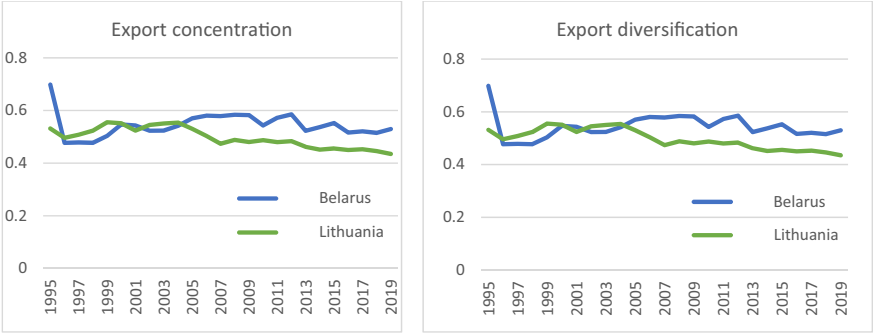

Fig. 8 Export concentration and diversification 1995–2019 (%) Source: UNCTAD

research, and technological progress far beyond what traditional agriculture can offer.

Both countries´ infrastructure has been modernized at a rapid pace. The World Bank´s Ease of Doing Business Index, which ranks 190 countries by how conducive the regulatory environment is to business operation, puts Lithuania in 11th place in 2020, far ahead of Belarus in 49th place (World Bank 2021). Even so, Belarus is ahead of EU member countries such as Croatia (51st), Hungary (52nd), and Italy (58th) in the ranking. The number of days it takes to start a business in Belarus fell from 80 in 2003 to nine in 2019 and in Lithuania from 26 days to six (not shown).

Democracy and governance

If economic diversity is good for growth, so is probably also democracy (Gylfason 2017). Since 1991, Lithuania has been an unfettered democracy, consistently scoring a top grade of plus ten on the Polity2 index awarded by the Polity5 Project (Marshall and Jaggers 2001) compared with a score of minus seven for Belarus (Fig. 10, left). Freedom House and The Heritage Foundation make similar assessments. Freedom House awards Lithuania a high democracy score of 90 out of 100 while Belarus was demoted from 15 in 2015 to 11 in 2021, a grisly score. The Heritage Foundation ranks economic freedom in Lithuania 15th among 178 countries compared with Belarus´s rank of 95th. In view of recent political developments in Belarus it is to be expected that she will fall farther behind. Small wonder then that according to Transparency International (Fig. 10, right)[27] Lithuania is considered much less corrupt than Belarus. Corruption is not good for growth (see Rose-Ackerman 2016, or Mauro 1995 and Bardhan 1997).

We already noted that part of the 'social contract' offered by the government implicitly undertook to look after social cohesion by keeping income dispersion in

[27] The corruption perceptions index is low in countries perceived to be corrupt, high otherwise. Rising curves in the right panel of Chart 10 indicate reduced corruption.

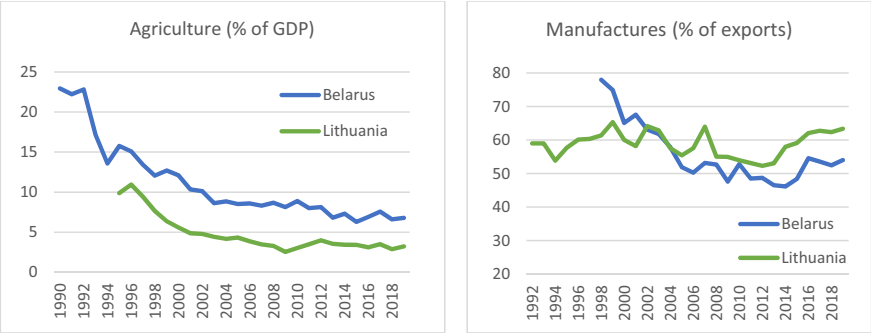

Fig. 9. Agriculture and manufactures 1990–2019 (% of GDP and exports) Source: World Bank, *World Development Indicators 2021*

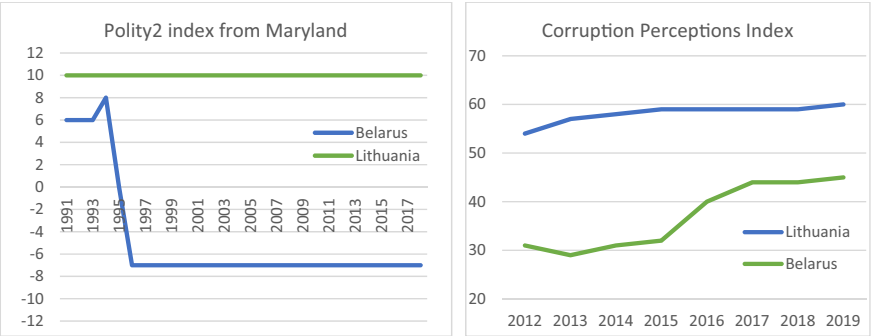

Fig. 10. Democracy and corruption 1991–2019 (%) Sources: Polity5 Project and Transparency International

check, i.e., by maintaining a low Gini coefficient. With a Gini index averaging 28 since 1998 and 25 since 2016 (Fig. 11, left), Belarus remains at par with Slovenia and Slovakia, being more egalitarian than the EU average of 31 (in 2017) and well below that of Lithuania with a Gini index of 36 in 2018.[28] The distribution of income is less equal in Lithuania than in most advanced economies.[29] As social cohesion is good for growth, we may infer that Belarus´s low Gini coefficient may contribute to growth.

And so, we presume, does trust. Belarus has been included in four of the seven waves of measurements taken by the World Values Survey since 1990, and Lithuania has been included in two waves. Among the questions asked in the surveys is whether respondents think that most people can be trusted or whether they think

[28] Source: World Bank *World Development Indicators* (2021).

[29] See Lithuania Economic Snapshot - OECD, May 2021.

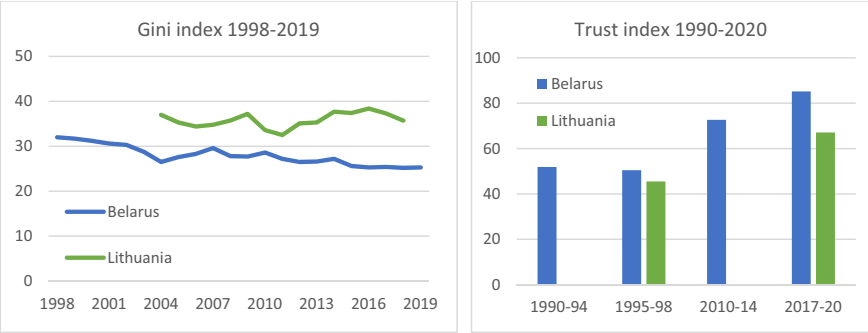

Fig. 11. Equality and trust 1990–2020 Sources: World Bank, *World Development Indicators* 2021 and World Values Survey 2021

they need to be careful in their dealings with others. From the answers we derive an index of interpersonal trust as follows:

$$TRUST\ INDEX\ =\ 100\ +\ (\%\ Most\ people\ can\ be\ trusted) - \left(\%\ Can't\ be\ too\ careful\right)$$

The index is above 100 in countries where trust outweighs distrust and less than 100 where the opposite holds. The right panel of Fig. 11 suggests that distrust outweighs trust in both countries, but less so in Belarus than in Lithuania.[30] The same applies to trust in institutions. The share of respondents answering "a lot" or "some" to the question "How much do you trust your national government?" in 2018 was 47% in Belarus and 40% in Lithuania.[31]

Governance is good for growth as Olson et al. (2000) and many others have argued. The World Bank has compiled cross-country data on various aspects of governance, assigning scores on a scale from minus 2.5 to plus 2.5. In Fig. 12, the World Bank´s indices for four categories of public governance in Belarus and Lithuania have been rescaled from 0 to 10. In each of four categories—government effectiveness, regulatory quality, rule of law, and voice and accountability—Lithuania was assigned higher scores than Belarus in 1996 and again in 2019 by a larger overall margin.

Monetary and fiscal policy

As noted above, Lithuania and Belarus opted for different transition paths, including different approaches to monetary and exchange rate policy. Lithuania, in April 1994, following Estonia and Latvia, was quick to adopt a currency board regime, which it

[30] Some observers regarded Belarusians as being the most honest Soviet people, noting that waiters in Belarus even refused to accept tips.

[31] Source: https://ourworldindata.org/trust.

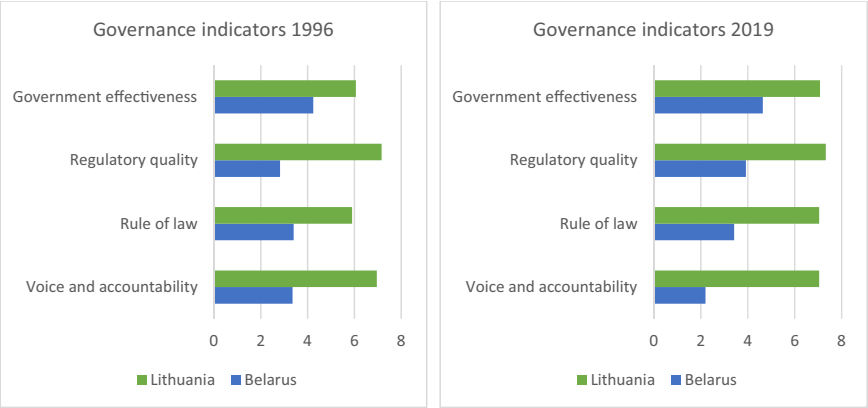

Fig. 12. Governance 1996 and 2019 (various indicators) Source: World Bank, https://info.worldbank.org/governance/wgi/Home/Reports

maintained at unchanged parity[32] until 1 January 2015, when Lithuania adopted the euro, again following Estonia and Latvia.[33]

Belarus initially also opted for a currency peg, choosing a USD (crawling) peg with frequent devaluations. Moreover, while formally maintaining the peg until 2010, Belarus had already moved to a *de facto* managed float arrangement much earlier (Slavov 2017). In this context monetary targeting was formally adopted in 2015, superseded by interest rate targeting in 2018 and, at present, Belarus is moving toward a fully-fledged inflation targeting regime (IMF 2019).

Despite banking crises and the need to find new products for new markets, Lithuania was able to maintain the peg, while Belarus, suffering several economic crises after the boom years of the 2000s, decided to change the exchange rate regime several times.

Economic theory explains why: if you choose a pegging arrangement, you need to adjust domestic economic policies to the requirements of the peg. As Hochreiter and Winckler (1994) demonstrate for Austria, a sufficient degree of real wage flexibility, factor mobility, and perseverance in times of crisis is needed to sustain the peg in hard times. If successful, such a peg can work as a "productivity whip" and encourage growth over the longer term.[34]

Lithuania managed to adjust the domestic economy to the peg, albeit at a high price. Factor mobility includes labor mobility. Thus, there might be a nexus between required real devaluations and migration to maintain a fixed peg/participation in a

[32] Note that the Litas was pegged to the USD at a rate of 4 to 1 from 1 April 1994. On 1 February 2002, the peg was switched to the Euro using the USD market rate.

[33] Estonia adopted the Euro on 1 January 2011, and Latvia on 1 January 2014.

[34] Over time the views on the "optimal" monetary regime changed substantially and currently a myriad of regimes co-exist. For a good summary, see Belhocine et al. (2016).

currency union. The reward of success is that Lithuania now has bright economic prospects.

In contrast, the Belarus economic model, as explained above, has been full of inconsistencies and is being implemented according to autocratic discretion. Accordingly, Belarus´s monetary regime has been frequently adjusted to the needs of the domestic economy and the decisions of her autocratic leader. As of now, her economic (and political) outlook appears bleak.

Price stability matters for growth. After an initial bout of hyperinflation to eliminate the monetary overhang, both countries succeeded in bringing inflation down, Lithuania to low single-digit figures 1998-2004 and again from 2009 onward. Belarus has had greater difficulties, with single-digit inflation recorded only in 2016, 2017, and 2019 (Fig. 13).

Inflation tends to hamper financial development, which helps to explain why the IMF´s financial development index for Lithuania surpasses that for Belarus (Fig. 14, left),[35] as well as why Lithuania has attained greater financial depth than Belarus as measured by liquidity relative to GDP (Fig. 14, right). In Lithuania, there were 141 credit cards in use per 1000 adults in 2019 compared with 41 cards in Belarus (not shown).

Belarus´s labor market has quite specific features. On the one hand, it is very flexible both in terms of contract lengths and conditions while, on the other hand, it is heavily regulated.[36] Moreover, wage targets for the large state-funded organizations are set by Presidential decree. For 2020, for example, the targeted wage increase was set at 8% and effectuated. Generally, such wage targets have not been set by economic but political considerations and necessities, including those contained in the implicit social contract. Such high increases, however, have led to inflation, persistent current account deficits, repeated devaluations, and bailouts.

Such wage increases put an additional strain on the state budget at a time when fiscal policy is already under pressure by the needs of the state-owned enterprises, declining subsidies from Russia, and a weak economy. As a result, public debt has steadily risen and now stands at 48% of GDP (wiiw Belarus (wiiw.ac.at)).

There are stark fiscal policy differences between the two countries. In Lithuania, fiscal policy is embedded in the EU fiscal policy architecture and thus governed and constrained by EU rules.[37] The focus is on fiscal discipline and sustainability. In this respect, Lithuania has a remarkable track record, especially since 2009 when, hit by the financial crisis, other EU countries drifted away. As a result, Lithuania´s public debt at around 50% of GDP remains well below the (currently inactive) 60% threshold, providing Lithuania with ample space to support economic growth following the COVID pandemic. Lithuania experienced the mildest real GDP contraction in

[35] The IMF´s financial development index is an aggregate of nine indices that summarize how developed financial institutions and markets are in terms of their depth, access, and efficiency (see Svirydzenka 2016).

[36] For a useful summary, see wiiw 2016.

[37] Europe´s fiscal policy architecture includes the Stability and Growth Pact (SGP) as amended in 2011 and the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union (TSCG).

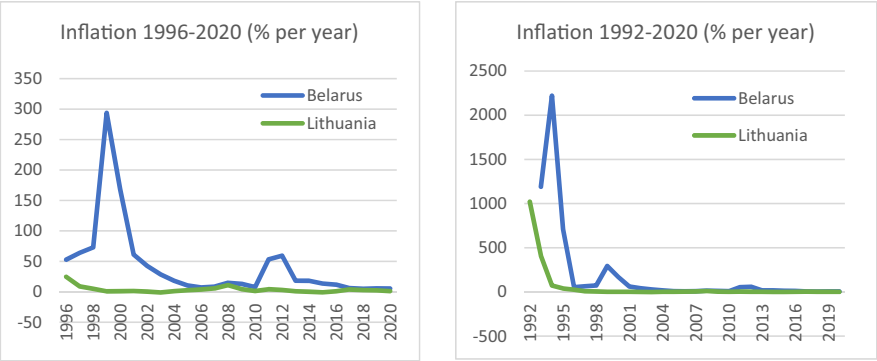

Fig. 13. Inflation 1991–2019 (Consumer prices, % per year) Source: World Bank, *World Development Indicators 2021*

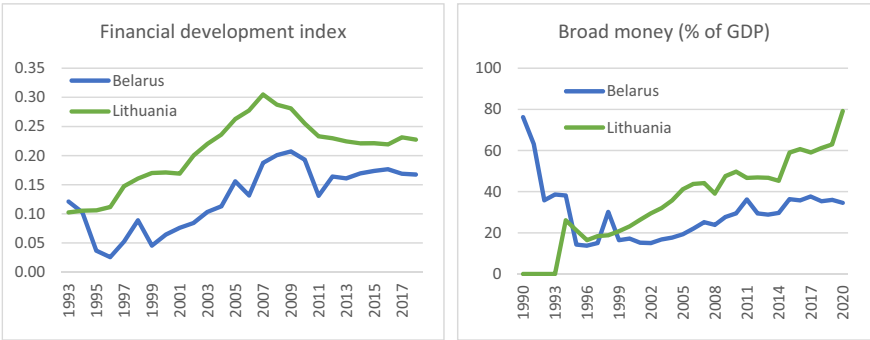

Fig. 14. Financial development 1993-2020 Source: IMF and wiiw *Annual Database*

the EU during the 2020 pandemic. The IMF projects real growth of around 4½% for 2021 with GDP surpassing its pre-COVID level already during 2021.[38]

In Belarus, fiscal policy is essentially set by the president and executed by the ministers without parliamentary involvement. An important aim of the fiscal policy part of the "implicit contract" is the redistribution of income from rich to poor, "equalizing and pro-poor." In this respect, fiscal policy has been successful as seen in the low Gini coefficient. Further, Belarus has followed quite prudent budgetary policies over the years. The budget deficit in 2020 amounted to around 2.2% of GDP. Public debt is on the rise but, at 48% of GDP, is still a touch lower than in Lithuania. In 2020, the Belarus economy contracted by 2.2%, which is more than in Lithuania but much less than in most other countries. Policy is constrained by the

[38] See IMF 2021 Article IV Consultation with the Republic of Lithuania, 1 September; https://www.imf.org/en/News/Articles/2021/08/30/pr21252-lithuania-imf-exec-board-concludes-2021-art-iv-consultation-with-the-republic-of-lithuania.

availability of funds, more than 90% being raised externally.[39] With Belarus under sanctions, financing on international capital markets and by international financial institutions has become impossible. Hence, Russia remains as the sole provider of external funds.[40,41] Internally, substantial funds can only be found by reducing the financing of State-Owned Enterprises, which, traditionally, have operated under a soft budget constraint. To repeat, in stark contrast to Lithuania, the economic outlook for Belarus is bleak. Political repression, severe structural problems, and lopsided trade relations account for that.

Labor

Labor market institutions can be an independent potential determinant of growth (Forteza and Rama 2006). More work lifts output per person, but the need for hard work may also signal inefficiency. Hours worked per person reflect labor force participation, hours of work per employee, and unemployment all of which, in turn, depend on prevailing labor market conditions and institutions, among other things. Labor market rigidities tend to increase wage costs and unemployment.

Labor force participation among 15–64–year-olds has increased modestly in Belarus since independence, but in Lithuania the sharp decline in labor force participation from 1990 to 2006 was subsequently reversed (Fig. 15, left). Under the weight of past mismanagement unemployment shot up in both countries after independence as both undertook economic reforms, but unemployment declined thereafter. Lithuania suffered a jump in joblessness after the financial crisis of 2008, a crisis that passed Belarus by (Fig. 15, right). Weekly hours of work per employee during 2010–2020 were 36.8 in Belarus and 39.2 in Lithuania.[42]

Figure 15 demonstrates the workings of the implicit 'social contract' described above. In return for foregoing political freedoms, the government promised, *inter alia*, a high level of employment always. As state-owned and public enterprises currently, albeit to a decreasing extent, provide around a half of all employment people could, if they lost their job, always get employment there. The chart shows that, in this respect, the government did deliver.

COVID response

The pandemic shock of 2020 rocked both the demand and the supply side of national economies around the globe, requiring countermeasures in support of both sides. Thus, government support was needed to prevent bankruptcies to maintain

[39] Public Debt of the Republic of Belarus - Ministry of finance of the Republic of Belarus (minfin.gov.by).

[40] The agreement between Presidents Putin and Lukashenko of 9 September 2021 reportedly maintains Russia´s oil and gas subsidies to Belarus plus fresh Russian money.

[41] The Eurasian Development Bank (EDB) provides project financing in Belarus, but on a very limited scale.

[42] Source: ILO, https://ilostat.ilo.org/.

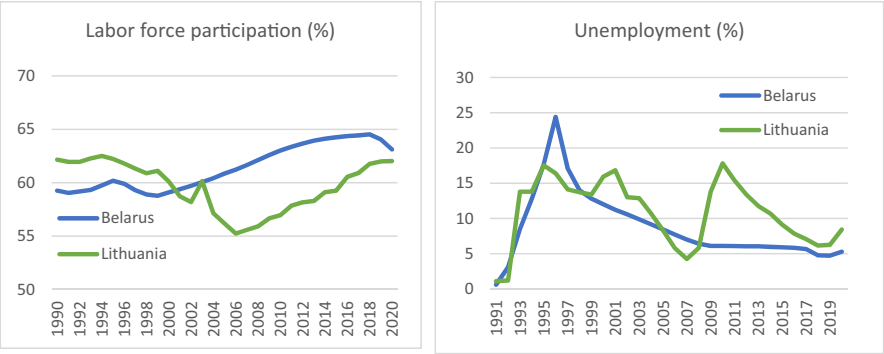

Fig. 15. Labor force participation and unemployment 1990–2020 (%) Source: ILO

production facilities impacted by the pandemic and subsidies to protect jobs, and to maintain the incomes of households to ease the demand shock.

Looking at the relative growth performance of Lithuania and Belarus in 2020 we could think that their policy reactions were comparable. Both experienced mild recessions with GDP in Lithuania contracting by a mere 0.8% and in Belarus by 0.9%. Belarus benefited from attracting few tourists because, in a pandemic, minimal tourism means minimal damage. Yet, their responses could not have been more different. Belarus was one of the very few countries that never resorted to lockdowns to contain the crisis. On top of that the leadership defied expert advice and took only very few and mild countermeasures. President Lukashenko advocated driving tractors and drinking vodka as effective remedies against the corona virus.[43]

In stark contrast, Lithuania´s government took strong measures against the pandemic, including lockdowns and quarantines. At the time of writing, 70, 67, and 32% of the Lithuanian population have been vaccinated once, twice, or thrice, respectively, compared with less than 57, 45, and 3% in Belarus.[44] While Lithuania reports that 3.0% of its people have lost their lives to the corona virus, Belarus reports only 0.7% loss of life, a figure that is hard to believe in view of the lax countermeasures undertaken.[45]

Looking ahead, Lithuania is expected to grow rapidly in the years ahead (IMF 2021). In contrast, in view of huge political uncertainties, the imposition of sanctions against Belarus, the cut-off from external finance except from Russia, and deep structural weaknesses of the Belarus economy, the economic outlook for Belarus is bleak (wiiw 2021).

[43] Source: Times of London, https://www.thetimes.co.uk/article/tractors-and-vodka-will-cure-belarus-of-the-coronavirus-says-leader-t6b9xvc55.

[44] Source: Data from local governments via Our World in Data, https://ourworldindata.org/covid-vaccinations.

[45] Source: https://ourworldindata.org/covid-deaths.

Summary

To recapitulate, of the growth determinants we have reviewed in this section, most but not all seem to have worked in Lithuania´s favor. Lithuania has had more external trade than Belarus (Fig. 6) as well as more diversified exports (Fig. 8), more and better education (Fig. 7), less agriculture and more manufacturing (Fig. 9), more democracy and less corruption (Fig. 10), better governance (Fig. 12), less inflation (Fig. 13), and more financial development (Fig. 14). Against this, Belarus has had more investment (Fig. 5), more equality and less distrust (Fig. 11), and less unemployment (Fig. 15), besides starting from a lower level of income after 1990. At any rate, we are aware that the economic, political, and social indicators we have reported do not provide an all-inclusive comparison without a parallel accounting of historical, structural, and systemic factors, which are hard to quantify.

Accounting for the income gap

We now proceed to consider whether we can say something about the relative contributions of different growth determinants to the income gap observed in Sect. 2, Figs. 1-4. To do this, we need to distinguish between extensive economic growth, which is driven forward by capital accumulation, and intensive growth, which stems from more efficient use of existing capital and other resources. Thus, living standards can be lifted by building up the quantity of capital as well as by increasing the quality of existing capital through more efficient use by, for example, building up human as well as social capital through education, on-the-job training, and health care provision as well as through freer trade and better governance, organization, and institutions.

Good governance based on efficient economic organization, institutions, and policy is conducive to sustained growth (Olson et al. 2000; Acemoglu and Johnson 2005; World Bank 2017). We want to see if the output growth differential between Belarus and Lithuania since 1991 can be traced mostly to efficiency (i.e., intensive growth), as we surmise, rather than accumulation (i.e., extensive growth).

To this end, we make a simple growth accounting computation to suggest the contributions of investment, education, labor markets, institution building, and overall efficiency to the relative incomes of the two countries.[46] We include the model here to underline the continuity in our trilogy so as to be able to try to answer the same basic questions about the three Baltic countries and their erstwhile peers with the same method. A more ambitious growth accounting exercise in which output growth could be traced in quantifiable proportions to all underlying inputs and to different aspects of the efficiency with which they were used as well as to different initial conditions and transition dynamics is beyond the scope of the paper.

[46] The model is the same as in Gylfason and Hochreiter (2009, 2011).

Output, education, and investment

Imagine that real GDP, denoted by Y, depends on its underlying supply-side determinants as follows:

$$Y = AH^a K^b N^c L^{1-a-b-c} \tag{1}$$

Here A represents total factor productivity (TFP) or efficiency, H is human capital, K is real capital, N is natural capital, including land, and L is raw labor. The four exponents sum to one in keeping with constant returns to scale. Real GDP per person depends on efficiency, human capital per person, the capital/labor ratio, and natural capital per person as follows:

$$\frac{Y}{L} = A\left(\frac{H}{L}\right)^a \left(\frac{K}{L}\right)^b \left(\frac{N}{L}\right)^c \tag{2}$$

If human capital, real capital, and natural capital all happened to grow at the same rate as labor, the progress of efficiency would be the sole source of growth of output per person like in the simplest Solow model. But different types of capital grow at different rates. While the capital/output ratio may remain roughly constant over long periods, human capital can easily grow more rapidly than real capital, while natural capital—notably nonrenewable natural resources, but also some renewable natural resources such as fish and timber—tends to grow less rapidly than real capital. For this reason, increased population growth tends to retard per capita GDP growth. As will be shown below, population will on further manipulation of the model appear only as the denominator of the ratio of human capital to population, which may or may not have been affected by the dramatic decline in population in Lithuania relative to Belarus. So, if more skilled labor (H) emigrates than unskilled labor (L) per capita GDP falls, but otherwise it rises, as shown by Eq. (3) below.

The rate of per capita output growth is a weighted average of the growth rates of the inputs. As natural capital is insignificant in the two countries under review, we set $c = 0$ in the production function. If we assume $a = b = 1/3$, the sum of the exponents of H and L—that is, of total labor—is 2/3 while the exponent of K is 1/3, a familiar constellation of parameters (Mankiw, Romer, and Weil 1992). Further, if the capital/output ratio is constant, the production function boils down to

$$\frac{Y}{L} = A^{\frac{1}{1-b}} \left(\frac{H}{L}\right)^{\frac{a}{1-b}} \left(\frac{K}{Y}\right)^{\frac{b}{1-b}} = A^{1.5}\sqrt{\left(\frac{H}{L}\right)\left(\frac{K}{Y}\right)} \tag{3}$$

Our comparison of Belarus and Lithuania focuses on their per capita output levels in 2019 (the final year in our sample), taken to roughly reflect their growth since 1991 even if Lithuania started out with higher per capita output (Fig. 1). Accordingly, other things equal, Belarus could be expected to grow more rapidly than Lithuania since 1991 through catchup and convergence.

The evolution of the efficiency parameter A reflects many different factors and phenomena: technological progress as well as efficiency gains from trade, institutions, policies, and governance, including managerial, fiscal, monetary, financial,

and external governance (see Williamson 2005 and Marsiliani and Renström 2007). In comparing Belarus and Lithuania, we want to look at some quantifiable aspects of governance, in particular the role of institution building, etc., as well as human capital per person in the two countries as well as their capital/output ratios.

Human capital per person varies directly with the number of years u at school, our measure of education in the spirit of Mincer (1974):

$$\frac{H}{L} = e^{vu} \tag{4}$$

Accordingly,

$$\frac{dlogH}{du} = v \tag{5}$$

Thus, v is the proportional increase in human capital resulting from each additional year at school, a number like 0.1 according to several labor market and growth studies of advanced economies (see, e.g., Bils and Klenow 2000).

The capital/output ratio is taken to be proportional to the investment rate I/Y as in standard capital theory where $K_t = I_t + (1 - \delta)K_{t-1}$, I_t is gross investment in year t, is the depreciation rate, and g is the rate of growth of output and capital:

$$\frac{K}{Y} = \left(\frac{1+g}{g+\delta}\right)\frac{I}{Y} \tag{6}$$

Substitution of Eqs. (4) and (6) into Eq. (3) yields

$$\frac{Y}{L} = A^{1.5}\sqrt{e^{vu}\left(\frac{1+g}{g+\delta}\right)s} \tag{7}$$

where s represents the investment rate I/Y. If we allow efficiency A, years of schooling u, and investment rates s to differ between Belarus and Lithuania while the productivity of schooling v, the growth of the capital stock g, and depreciation are assumed to be the same in both countries, we can write the relative per capita output $y = Y/L$ in the two countries as follows:

$$\frac{y_B}{y_L} = \left(\frac{A_B}{A_L}\right)^{1.5}\sqrt{e^{u_B - u_L}\left(\frac{s_B}{s_L}\right)} \tag{8}$$

Hours worked

Output per capita differs from output per hour worked, a better measure because it takes explicitly into consideration the work effort behind the output produced. By definition,

$$\frac{Y}{L} = \frac{Y}{Q}\frac{Q}{L} \tag{9}$$

where Q is hours worked. Hours of work per person, Q/L, can be written as

$$\frac{Q}{L} = \left(\frac{N+U}{L}\right)\left(\frac{Q}{N}\right)\left(1 - \frac{U}{N+U}\right) \tag{10}$$

where N is employment, U is unemployment, $(N+U)/L$ is the labor force participation rate, Q/N is hours of work per employed person, and $U/(N+U)$ is the unemployment rate. Replacing labor (i.e., population) L by hours worked Q in Eq. (3) yields

$$\frac{Y}{Q} = A^{\frac{1}{1-b}}\left(\frac{H}{Q}\right)^{\frac{a}{1-b}}\left(\frac{K}{Y}\right)^{\frac{b}{1-b}} = A^{1.5}\sqrt{\left(\frac{H}{Q}\right)\left(\frac{K}{Y}\right)} \tag{11}$$

Accordingly,

$$\frac{Y}{L} = A^{1.5}\sqrt{\left(\frac{H}{Q}\right)\left(\frac{K}{Y}\right)} \cdot \frac{Q}{L} = A^{1.5}\sqrt{\frac{\left(\frac{H}{L}\right)\left(\frac{K}{Y}\right)}{\frac{Q}{L}}} \cdot \frac{Q}{L} = A^{1.5}\sqrt{\left(\frac{H}{L}\right)\left(\frac{K}{Y}\right)\left(\frac{Q}{L}\right)} \tag{12}$$

This shows how hours worked per person, Q/L—and thus, by Eq. (10), labor force participation, hours worked per employee, and unemployment—affect per capita output.

Arithmetic

We now proceed to provide a simple quantitative assessment of the impact of education, investment, and labor market institutions on the relative per capita incomes of Belarus and Lithuania by first computing the two expressions under the square root in Eq. (8). Apart from the convergence effect, which we ignore, our aim is to attribute the remainder of the income differential between the two countries to differences in efficiency, the term outside the square root on the right-hand side of Eq. (8); this is the term that Solow famously called "the measure of our ignorance." Our strategy requires a comparative review of several economic, political, and social indicators, to which we now turn.

We know the extent of the income differential that we want to understand, the left-hand side of Eq. (8). Due to rigid price controls in Belarus, we use per capita GDP estimates without PPP adjustment. In 2019, Lithuania´s GDP per capita was nearly three times (specifically, 2.92) as high as that of Belarus (recall Fig. 4, left).

We have reported the average investment ratios we need for the second term under the square root in Eq. (12), 0.30 in Belarus and 0.21 in Lithuania. We reiterate our caveats regarding the efficiency of Belarus´s large share of investments of state-owned enterprises.

Next, we need to count years of schooling. To this end, we add the number of years of primary, secondary, and tertiary education (four, seven, and five in Belarus and four, eight, and six in Lithuania), weighted by average enrollment rates over the period. For Belarus, the imputed years of schooling are $4 \bullet 0.92 + 7 \bullet 0.97 + 5 \bullet 0.65 = 13.7$ and for Lithuania, $4 \bullet 0.96 + 8 \bullet 0.95 + 6 \bullet 0.59 = 15.0$.[47,48] We now have the information we need to assess the two terms under the square root in Eq. (8). Equivalently, this is the information we need to evaluate the first two terms under the square root in Eq. (12).

At last, we need to quantify the third and last term under the square root in Eq. (12), hours of work per person, $q = Q/L$, defined in Eq. (10) as a multiple of the labor force participation rate, hours of work per employed person, and one less the unemployment rate. Using averages from Fig. 15 as well as the number of hours worked per week given in Section III.E, 36.8 hours in in Belarus and 39.2 hours in Lithuania, we get $0.614 \bullet 36.8 \bullet (1 - 0.087) = 20.6$ hours of work per person in Belarus and $0.596 \bullet 39.2 \bullet (1 - 0.109) = 20.8$ for Lithuania. The effects of more hours of work per employed person and more unemployment in Lithuania than in Belarus cancel each other out (recall Eq. (10)).

Now that we have the numbers we need, let us plug them into Eq. (12) and solve for the implicit efficiency differential as a residual:

$$\begin{aligned}
\frac{A_B}{A_L} &= \left(\frac{y_B}{y_L}\right)^{\frac{2}{3}} \left(e^{u_L - u_B}\right)^{\frac{1}{3}} \left(\frac{s_L}{s_B}\right)^{\frac{1}{3}} \left(\frac{q_L}{q_B}\right)^{\frac{1}{3}} \\
&= \left(\frac{6,698}{19,551}\right)^{\frac{2}{3}} \left(e^{15.0-13.7}\right)^{\frac{1}{3}} \left(\frac{0.214}{0.304}\right)^{\frac{1}{3}} \left(\frac{20.8}{20.6}\right)^{\frac{1}{3}} \\
&= 0.489 \cdot 1.542 \cdot 0.890 \cdot 1.003 \\
&= 0.674
\end{aligned} \tag{13}$$

This suggests that Belarussian efficiency amounts to 67% of Lithuanian efficiency.

To finish the arithmetic, we substitute the solution for the efficiency differential in Eq. (13) back into Eq. (12):

[47] The primary and secondary school-enrolment rates are net and refer to the ratio of children of official school age who are enrolled in school to the population of the corresponding official school age. The tertiary rates are gross and refer to the ratio of total enrollment, regardless of age, to the population of the age group that officially corresponds to the level of education in question. Source: World Bank, *World Development Indicators* 2021.

[48] The figures for school life expectancy reported by UNESCO are quite similar: 15.4 years for Belarus and 16.6 for Lithuania. See http://data.uis.unesco.org/.

$$\begin{aligned}\frac{y_B}{y_L} &= \left(\frac{A_B}{A_L}\right)^{1.5}\sqrt{e^{u_B-u_L}\left(\frac{s_B}{s_L}\right)\left(\frac{q_B}{q_L}\right)} \\ &= 0.674^{1.5}\sqrt{e^{13.7-15.0}}\sqrt{\frac{0.304}{0.214}}\sqrt{\frac{20.6}{20.8}} \\ &= 0.553 \cdot 0.522 \cdot 1.192 \cdot 0.995 \\ &= 0.342\end{aligned} \tag{14}$$

This confirms the nearly threefold difference between per capita incomes in Lithuania´s favor. With hours of work per person nearly the same in the two countries ($q_B \approx q_L$), Eq. (14) boils down to Eq. (8).

This simple factor decomposition suggests that if the 1.3-year difference in education in terms of years of schooling were the sole difference between the two countries, education could by itself account for a 92% (i.e., 1/0.522 – 1) difference in per capita output between Lithuania and Belarus, in Lithuania´s favor, less than a third of the total. Hence, education has a powerful impact on economic performance in this computation. By themselves, and subject to our earlier proviso, different investment rates suffice to explain no more than a 16% income differential (i.e., 1/1.192 – 1). By the same token, the labor market variables would on their own suffice to account for merely a 0.5% percent income differential (i.e., 1/0.995 – 1). In our simple model, education makes a much larger contribution to the income differential than investment and labor market institutions.

As shown in Eq. (13), this arithmetic leaves a 33% efficiency difference between Lithuania and Belarus as a residual explanation for the fact that we set out with, namely, the nearly threefold per capita income differential between the two countries in Eq. (14), in Lithuania´s favor, despite Belarus's apparent advantage on the investment front.

Though sizable, this is admittedly a smaller efficiency gap than we expected to find based on our comparisons in Section 3, for several reasons. First and foremost, the consequences of the presumed low quality of government-directed if not Soviet-style investment, domestic and foreign, as well as of non-market-oriented macroeconomic policy plus the absence of real, enforceable property rights in Belarus may be masked by overestimated output. Further, a more elaborate model than ours would be needed to have a second go at the question of intensive vs. extensive growth we posed at the outset. Presumably, to repeat, Lithuania´s efficiency advantage *vis-à-vis* Belarus benefits from a more liberal and diversified trade regime (Figs. 6 and 8), more manufactures and less agriculture (Fig. 9), more democracy and less corruption (Fig. 10), better governance (Fig. 12), less inflation and more financial development (Figs. 13 and 14), and better public health as demonstrated by longer lives (Fig. 4). Even so, the aggregate efficiency gains from these factors appear to be similar in size as the gains from education (Fig. 7) as can be seen from Eq. (14).

In brief, our exercise suggests that, in roughly equal proportions, overall efficiency and education outweigh investment as explanations for the income differential

between Lithuania and Belarus in 2019 and that labor market arrangements play a minor role. Intensive growth is what counts.

As stated before, our method does not permit us to assess the contribution of different initial conditions to the two countries´ income differential. Perhaps that is not important, however, because initial conditions were quite similar in both countries in terms of life expectancy if not per capita output (recall Figs. 1-4). The comparison of Lithuania´s actual economic trajectory since independence and Belarus´s road not taken could no doubt result in a different decomposition of the income differential between the two countries than the one that we have presented (see, e.g., Senhadji 2000). This is a matter for further research.

Table 1 summarizes our findings by showing the average values of the four sets of determinants of the income differential in Eq. (14) as well as the international dollar values of per capita GDP in 2019 in the last column.

Conclusion

Like our earlier comparisons of Estonia and Latvia with Georgia and Croatia, our comparison of Lithuania and Belarus since 1991 suggests policy implications that may be of general interest to other countries as well, especially those that aspire to catch up with their neighbors. In essence, as we concluded from our earlier comparisons, rapid growth calls for

(i) Public policies that encourage education and training, free trade, and domestic as well as foreign investment in a business-friendly environment.
(ii) Economic policies that support stable prices and sound banking practices, sustainable fiscal positions, and international, consumer-friendly competition.
(iii) Sound and transparent societal institutions and infrastructures to support the rule of law.
(iv) Good governance, public and private.

Further, in countries such as the two under review here, the prospect of EU membership may create catalytic conditions for good economic policy making, rapid structural change, and institution building. As it did also in Estonia and Latvia, the EU perspective may also have helped Lithuania to forge a broad-based political consensus on the policy actions required for change as well as to strengthen education. Experience suggests that eastward trade in Eastern Partnership countries including Belarus does less for them than trade with the EU (Gylfason, Martínez-Zarzoso, and Wijkman 2015). Belarus, coming out of the pandemic, we fear, will demonstrate that healthy, sustainable growth rates are not possible without economic and political reforms. Under the present political circumstances, it seems likely that they will not be forthcoming.

Returning to our classification of the sources of growth based on the aggregate production function presented in Sect. 4, we can summarize our main findings as follows:

Table 1 Parameter values in Eq. (14)

	Investment (% of GDP)	School life expectancy (Years)	Hours of work per person per week	Efficiency (Lithuania = 100)	Per capita GDP 2019 (Current USD)
Lithuania	21	15.0	20.8	100	19,551
Belarus	30	13.7	20.6	67.4	6,698

Source: Author's computations.

First, while Belarus has invested 50% more than Lithuania in machinery and equipment relative to GDP since 1991, Lithuania has invested more in human capital at all levels. The buildup of human capital in Lithuania relative to Belarus manifests itself in 1.3 extra years of schooling and is reinforced by more rapid adoption of personal computers and of the internet. Both support rapid human capital accumulation.

Second, as shown by the longer and deeper post-independence decline in life expectancy and the larger spike in inflation, Belarus started more slowly and less aggressively and then fell under authoritarian rule again after a brief respite for a few years after 1991. Thus, Belarus missed an opportunity to boost economic efficiency, that is, total factor productivity, and thereby provide a basis for rapid long-run growth. By contrast, Lithuania was driven by its EU integration process from 1998 onward.. To prepare for EU membership, Lithuania liberalized trade, restructured the economy, *inter alia* by a broad privatization of state assets, and built market-friendly institutions to EU specifications. By the time of EU accession, Lithuania, along with the other Baltic countries, had built up a flexible market economy and was catching up.

Belarus, in stark contrast, still suffers from rigidities, even if some progress has been made in the economic sphere. Corruption, despite modest progress, remains a significant problem as does poor governance. The absence of democracy and disrespect for human rights is another serious concern with economic ramifications that are already clearly visible (wiiw 2021). Lithuania, on the other hand, may now harvest the fruits of decades of often painful reforms and hard work (IMF 2021) and thus enjoy more economic and political freedoms and longer lives.

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