

Article

Labor Constraints and Sustainability of the Economic Growth in Croatia—An Input–Output Approach

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Abstract

After EU accession, Croatia has leveraged the advantages of EU membership, such as access to a large market and EU funds, to accelerate economic growth and reduce the development gap in comparison to advanced EU economies. Although EU membership has stimulated economic growth, it has also brought negative effects, such as labor emigration to more developed EU economies with higher wages and increased inflation due to price convergence and the adoption of the Euro. The weak growth of labor productivity in Croatia is a consequence of the slow transformation towards technology-intensive industries, the dominance of traditional labor-intensive sectors such as construction and hospitality, and the rapid growth of employment in the public sector. The novelty of the research lies in applying an input–output model to estimate direct and indirect labor requirements in Croatia, an example of a small, service-oriented economy that, after joining the EU, witnessed a significant increase in final demand. Research is based on the Eurostat FIGARO database. The increase in gross value added across industries during 2015–2024 is separated into price and real growth effects. Analysis indicates that the current Croatian growth model is unsustainable because of high labor requirements and slow productivity growth. Results imply that European Union membership brings many advantages, but if not coupled with an adequate industrial development strategy, economic growth based exclusively on increasing final demand could reach its limits. Labor constraints and continued demand growth without substantial structural changes could result in rising wages and prices rather than real GDP growth.

Keywords: input–output model; labor shortages; sustainability; Croatia

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1. Introduction

The labor shortage in Croatia, as well as across the entire European Union (EU), is a multidimensional problem that requires the formulation of appropriate policies to avoid jeopardizing economic stability, competitiveness, and further development. Long-term demographic trends indicate that this problem is structural rather than short-term. Across the EU, limited labor availability and mismatches between acquired knowledge and skills and companies' needs negatively affect labor productivity, technological progress, and innovation [1]. Limited labor supply, relatively low participation rates among certain age

and gender groups, and the aging of the European population represent potential constraints on further development. The EU population is aging rapidly, and currently, over 22% of the EU population is aged 65 and over, with a median age of 44.9 years. The demographic shift has decreased the share of the working-age population and raised the old-age dependency ratio to 34.5% in 2025 “https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Population_structure_and_ageing (accessed on 1 July 2026)”. The labor shortage is even more pronounced in less developed EU economies, where emigration of prime-age workers to more developed countries further exacerbates already unfavorable demographic trends [2]. The OECD [3] states that the Croatian economy’s economic convergence over the last ten years has been marked by an impressive labor market recovery, with Croatia moving from high unemployment to a labor shortage. Obstacles for further economic growth are unfavorable demographic trends, high emigration, especially of the young population, and the slow contribution of productivity to economic growth. After the 2008/2009 recession, which lasted significantly longer in Croatia compared to other countries, a period of dynamic growth followed, and unemployment fell to historically low levels. According to a World Bank study [4], the potential growth of the Croatian economy is among the lowest in the Central and Eastern European region, largely due to low productivity. According to the same study, total factor productivity in Croatia in 2021 was only about 10 percent above the level recorded in 2001, while in the same period, growth in other CEE countries was 30%. Such results suggest that the growth of real total economic activity in the Croatian case requires a significant increase in production inputs, including labor. In contrast to the previous period of high unemployment, Croatia’s historically low unemployment rate raises questions about the future sustainability of the convergence process.

The aim of the paper is to examine the effects of increased demand on the economic activity and labor requirements in Croatia in the post-accession period. Results provide an analytical assessment of labor constraints on future Croatian economic growth. The paper hypothesizes that the current Croatian growth model, based primarily on rising demand without structural transformation or labor productivity growth, is unsustainable due to high labor requirements. In the short term, labor shortages have been partially resolved by the immigration of foreign workers. However, because of the growing share of sectors with limited potential for real productivity growth, a further increase in demand could lead to price increases rather than real convergence toward more developed EU economies. Research results are supposed to provide an answer to the research question: Is Croatian growth sustainable in the long run regarding labor supply constraints?

The novelty of the research lies in applying a well-established input–output model to estimate direct and indirect labor requirements, using Croatia as an example of a small, service-oriented economy that, after joining the EU, witnessed a significant increase in final demand. An increase in final demand boosted economic activity, but slow structural changes and weak productivity growth depleted the labor force reserves. Contrary to the experiences of more developed EU economies, which have partially attracted skilled labor from abroad, the jobs filled by immigrants in Croatia are limited to low-productivity positions paying minimum wages. It contributes to an empirical assessment of the convergence process in Croatia and provides an opportunity to link final demand, labor productivity, constraints, and migration policy.

The input–output model is used to explore the effects of increased demand on Croatian economic activity in real terms and prices. The input–output method is particularly useful for assessing how changes in final demand are reflected in labor demand and beyond, including the spreading out of initial effects to other industries and regions [5]. Identifying labor supply bottlenecks provides policymakers with analytical support for

determining which activities and regions require state intervention to ensure the smooth development of the economy.

After the introduction, a brief literature review that summarizes the conclusions of previous studies on potential sources of labor shortages is presented. The input–output model is explained in Section 3, followed by a section presenting empirical results for the Croatian economy. Results of this study are compared with previous findings in Section 5, while the final section presents conclusions, limitations, and policy implications.

2. Literature Review

The issue of a mismatch between labor supply and demand has been analyzed in numerous theoretical and empirical studies at the micro and macro levels. At the individual level, employability and the possibility of obtaining a high-quality job are limited not only by formal education and skills acquired over a lifetime, but also by macroeconomic trends that determine the volume and structure of in-demand jobs. The mismatch between supply and demand can result in permanent economic and social costs. It is therefore crucial to analyze the interaction between demand-side factors, which are often related to changes in consumer preferences, but also to technological changes in production, and factors such as population aging, readiness for lifelong learning, or propensity to migrate, which affect the overall supply and structure of the labor force [6].

Based on a multilevel panel regression analysis of firm data across the EU, it was found that structural factors are more important than business-cycle phases in explaining labor-shortage dynamics [7]. Therefore, the authors suggest designing national structural policies that not only increase labor supply by boosting participation rates or attracting foreign workers but also improve the quality of the labor force by enhancing knowledge and skills. If countries do not respond in a timely manner by adopting appropriate economic policies, labor shortages will become an increasing constraint on future development. An aging population and labor shortages may force more companies to raise wages to attract employees, with implications for overall wage growth, price increases, and the need to adjust other macroeconomic policies, including monetary policy [7].

One primary cause of labor shortages in recent years is the demographic shift driven by an aging population. As the baby boomer generation reached retirement age, the workforce began to shrink. This demographic process is particularly pronounced in countries like Germany and Italy, where birth rates have been consistently low for decades. In [8], it was concluded that attracting skilled migrants from outside the EU is crucial for Germany's future development. Attracting workers from EU countries has had a positive impact on the German economy in the past. However, such flows will slow as populations in EU countries that have traditionally been the source of emigration to Germany age. The general equilibrium model suggests that attracting labor from other EU countries may also have negative effects on Germany. Unlike rapidly transforming sectors that apply modern technologies, some labor-intensive traditional sectors face labor shortages due to poor working conditions and low wages. Typical sectors in which labor supply is limited due to poor working conditions are accommodation and food services, transport and warehousing, construction, and health and social care [9,10].

The COVID-19 pandemic has further exacerbated labor shortages in the EU. The labor shortage, especially in high-income countries, has become even more pronounced since the pandemic ended, amid rising demand and a growing number of vacancies [11]. The long-term trend of insufficient labor supply has become even more pronounced due to technological advances, the development of artificial intelligence, and the EU and other countries' efforts to improve the sustainability of economies through a green transition. These factors significantly affect the demand for labor and for employees with the appropriate knowledge and skills to implement the structural changes required [12,13]. In the

EU, unfavorable demographic trends require efforts to increase labor force participation rates, especially among groups with below-average participation rates (older people, women, and migrants). Accelerated technological progress, coupled with an aging population, increases the risk of a mismatch between required and offered knowledge and skills, which is further exacerbated by the emigration of young, educated populations from new EU member states (NMS) with lower levels of development.

The EU job vacancy rate has doubled in less than ten years [14]. The growing labor shortage in member states requires appropriate measures, including attracting foreign workers. The labor shortage in the EU is not limited to a particular segment but affects all skill levels across sectors. However, the labor shortage most affects the health and care, hospitality, construction, manufacturing, transport, and information and communication technology (ICT) sectors.

According to [15], there are several ways to address the worker shortage through economic migration. The first approach is based on the labor shortage test conducted by a government agency, which determines which sectors or occupations are eligible for the emigration of foreign workers. The second approach focuses on removing administrative barriers to labor migration, thereby making it easier for employers to attract potential workers from other countries by offering better working conditions.

The effects of foreign workers on the Croatian labor market were examined in [16] using macroeconomic data covering an eleven-year period. The findings indicate that foreign workers help alleviate labor shortages, particularly in the tourism and construction sectors, and that a positive relationship exists between the number of foreign workers and GDP growth. The authors conclude that immigration plays an increasingly important role in supporting Croatia's economic growth while emphasizing the need for effective integration policies to ensure the long-term sustainability of the labor market.

The characteristics of the Croatian labor market and contemporary external migration after the country's accession to the European Union are analyzed in [17]. The study found that Croatia has experienced a continuous decline in the working-age population, accompanied by increasing employment and decreasing unemployment. At the same time, the emigration of young, skilled workers has intensified, while the growing inflow of predominantly low-skilled foreign workers has helped compensate for labor shortages caused by structural imbalances in labor supply and demand.

Edo and Özgüzel [18] analyzed the regional effects of immigration on native employment in Europe using data from 2010 to 2019. Their findings suggest that immigration has only a limited overall impact on native employment. Although negative employment effects were observed in the short term, these effects diminished over time. Furthermore, the impact differed across worker groups, with low-educated natives experiencing employment losses, while highly educated workers were more likely to benefit. The authors also emphasized that labor market institutions and stronger regional economic performance contribute to the successful integration of immigrant workers.

The role of immigration policies in addressing labor and skill shortages is examined by comparing Japan and the United Kingdom in [19]. Although the two countries adopted different migration policies and labor-market practices, the study found similar patterns of labor and skill shortages. The author concluded that immigration policies alone are insufficient to resolve labor shortages unless they are accompanied by changes in employment practices, workforce training, and skills development.

Besides economic developments, migrations are changing the social, ethnic, and cultural structure of a population [20]. To ensure the smooth acceptance and integration of foreign workers, the government should develop a migration policy that balances labor

market needs with public expectations regarding social and cultural factors. If not accepted by the local population, experiences of discrimination or social exclusion faced by immigrants can become a significant obstacle to social cohesion [21].

3. Methodology

The assessment of the effect of increased demand on economic activity and labor demand in Croatia in this research is based on input–output analysis. Input–output analysis represents a standardized macroeconomic approach to analyze intersectoral relations within the national economy [22,23]. The founder of this analytical framework is Wassily Leontief, who contributed to the development of a theoretical and empirical model for quantifying the interdependence of the productive sectors [24].

The empirical basis of input–output analysis consists of input–output tables, which break down the economic system into productive sectors and show the flows of goods and services between them. The basis of the input–output model is a matrix equation

$$X = (I - A)^{-1} \cdot Y = L \cdot Y \quad (1)$$

where X is the vector of total output, A is the matrix of technical coefficients, and Y is the vector of final demand [23]. The matrix $L = (I - A)^{-1}$ is known as the Leontief inverse matrix, with each element reflecting the total level of output required in one sector to satisfy a unit change in final demand in another sector. The Leontief inverse matrix allows the analysis of the multiplicative effects of changes in final demand on total economic activity.

The key analytical advantage of the input–output model is the ability to analyze the direct and indirect effects of a particular sector on the entire economy. Direct effects refer to the production of goods and services intended for final consumption within the observed sector. Indirect effects encompass the production activities of sectors that supply the observed sector with intermediate products and include effects transmitted along the entire supply chain. The quantification of direct and indirect effects is based on the application of type I multipliers.

Once the effects on total output have been estimated, it is possible to estimate the effects on gross value added (GVA) and employment. GVA measures the total value of goods and services produced in an economy, minus the cost of raw materials and intermediate inputs used to create them [23]. The total effects (direct and indirect) on GVA are expressed as:

$$VA = V \cdot L \cdot Y \quad (2)$$

where V is a diagonal matrix of value-added coefficients that show the share of value-added in the output of each productive sector [23]. Similarly, the total effects on employment are determined by the expression:

$$EM = E \cdot L \cdot Y \quad (3)$$

where E is a diagonal matrix of employment coefficients, which reflects the ratio of the number of employees to the value of output of the individual sector [24].

Direct employment effects are the initial number of jobs created in the sector that produces and delivers goods and services demanded by final users. Indirect employment effects include the number of jobs created across the supply chain of the sector delivering final products. To produce the final product, a firm acquires materials and services from other businesses and thereby indirectly stimulates economic activity throughout the supply chain.

The technical coefficient matrix (matrix A) and the diagonal matrices V and E were constructed based on the Eurostat input–output database “<https://ec.europa.eu/eurostat/web/esa-supply-use-input-tables/database> (accessed on 10 February 2026)”. Eurostat, in cooperation with the OECD and the UN, developed the FIGARO (full international and global accounts for research in input–output analysis). Besides domestic flows of goods and services, which are at the center of this study, FIGARO global input–output tables show deliveries of intermediate inputs and final products across all economies [25]. The advantages of this database over national input–output tables include greater data availability and improved quality, supported by various data reliability tests and consistent testing. To maintain consistency, data for each year are compared against previous period releases. Significant differences in the technological requirements or international trade patterns are double-checked to exclude eventual statistical errors or omissions. The detailed methodology for compilation, data analysis quality, and limitations is broadly discussed in the official Eurostat publication [25]. The latest 2023 data are published and use the Statistical Classification of Products by Activity (CPA, version 2.1), which comprises 64 economic sectors.

Although the input–output model is a suitable tool for assessing the total effects of a particular economic sector on the entire economy, its results should be interpreted with the following methodological assumptions and limitations in mind. It is assumed that industries require proportional combinations of inputs to produce a given output, and there are no economies of scale [23]. First, the input–output model assumes fixed technical coefficients, i.e., unchanged production technology and input structure, regardless of changes in demand levels. Second, it assumes limited possibilities for substituting among inputs, meaning that producers cannot significantly adjust the mix of resources used in response to changes in the prices or availability of production factors. Third, it is a static model that does not account for dynamic adjustments over time, such as technological progress, productivity changes, or structural shifts in the economy.

The breakdown of trends in current prices (nominal growth) into price effects (inflation) and real growth effects (volume changes) is based on separating the total value of an economic aggregate into its volume and price increase.

The real growth can be calculated as [26]:

$$[1 + (\text{Growth rate of GDP in volume}/100)] = \frac{[1 + (\text{Growth rate of GDP at current prices}/100)]}{1 + (\text{Growth rate of the GDP deflator}/100)} \quad (4)$$

For small, stable inflation and growth rates, the real growth rate can be estimated as the difference between the nominal growth rate and the inflation rate, rather than the more complex expression as presented above.

An increase in GVA volume can be further decomposed into effects on labor input and labor productivity. Labor productivity is, in its simplest form, a single-factor productivity measure calculated by dividing real GVA at the sectoral level or GDP at the total economy level by labor inputs, such as total hours worked or total persons employed [27].

4. Results

4.1. Trends in the Main Macroeconomic Indicators in the 2015–2024 Period

Croatia joined the EU in 2013, almost a decade after other former socialist Central and Eastern European states. The Croatian economy has leveraged the availability of EU funds and other advantages of EU membership to accelerate economic growth and convergence. Economic growth was accompanied by certain negative trends, especially the emigration of the Croatian population in the prime-age labor force to more developed EU economies offering better working conditions and higher wages. Macroeconomic indicators for the post-accession period suggest that NMS status has successfully accelerated

economic growth and raised living standards. In addition to removing administrative barriers to free trade and the movement of people and capital, the inflow of European structural funds has also played a significant role in accelerating economic growth. The main macroeconomic trends for the Croatian economy in the period after accession are shown in Table 1.

Table 1. Main macroeconomic indicators for the Croatian economy in the post-accession period.

	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	Index, 2024/2015
GDP per capita, in % of EU27	39.4	40.7	41.9	43.4	44.6	42.5	45.3	48.5	53.5	55.6	141.1
GDP per capita in PPS, in % of EU27	61.5	63.0	64.6	66.0	67.9	66.2	70.9	72.0	77.8	77.7	126.3
GDP per capita, 2015 = 100	100.0	104.8	109.8	114.5	119.2	110.4	125.4	135.2	140.2	145.2	145.2
GDP growth rate	3.4	4.8	4.8	4.3	4.1	−7.4	13.6	7.8	3.7	3.5	
Population, in 000	4150	4098	4039	3986	3947	3908	3874	3855	3858	3869	93.2
Employment, in 000	1559	1551	1570	1582	1610	1588	1613	1643	1671	1764	113.1
Average full-time salary, in EUR	13,907	14,363	14,788	15,779	16,061	16,102	17,008	19,108	21,662	23,446	168.6
Wages, in % of EU wages	46.5	47.3	47.5	49.6	49.0	49.5	50.1	53.6	57.2	58.9	126.6
Unemployment rate, population 15–74	16.2	13.0	11.1	8.3	6.6	7.4	7.5	6.8	6.1	5.0	30.9

Source: Eurostat database, “<https://ec.europa.eu/eurostat/data> (accessed on 12 February 2026)”.

The Croatian economy reduced the development gap and increased GDP per capita in purchasing power standards (PPS) in the analyzed period from 61.5 percent in 2015 to 77.7 percent of the EU27 in 2024. Macroeconomic trends in the post-accession period can be divided into two different phases: before and after the COVID-19 outbreak. GDP recorded relatively stable annual growth rates of 3.4–4.8 before the 2020 recession. In the same period, employment and wages increased moderately. At the same time, a substantial decrease in the unemployment rate was driven by the job-related outflow of Croatian citizens into more developed EU countries, following the removal of barriers to the free movement of labor with EU accession. As a result of migrations, the total Croatian population decreased by approximately 250 thousand persons by 2020. In the post-COVID period, the availability of abundant EU structural funds and the growth in tourist arrivals led to a strong increase in demand. While total employment in the period 2015–2020 increased by only 21 thousand people, an increase in demand induced a need for an additional 176 thousand jobs by 2024. Unemployment has fallen to 5 percent, the lowest level in Croatian history. Having in mind that a certain percentage of registered unemployment is related to the availability of social transfers for long-term unemployed persons, it could be concluded that the potential for future increase in employment of Croatian citizens is highly limited. Strong labor demand led to wage and salary growth. In 2022 and 2023, annual increases in relative wages, measured as a % of the EU 27 average, were equal to the cumulative 5-year growth before the 2020 recession.

Different patterns in macroeconomic trends are visible in Figure 1. While GDP growth and wages increased moderately but steadily in the pre-COVID period, trends over the last few years have been more volatile. The significant increase in GDP per capita in PPP terms (as a percentage of the EU average) in only one year (2023) was equal to the cumulative increase over the 2015–2019 period, but it remained at the same level in 2024.

While wages were slowly catching up to the EU average before 2020, the increase over the last few years is impressive.

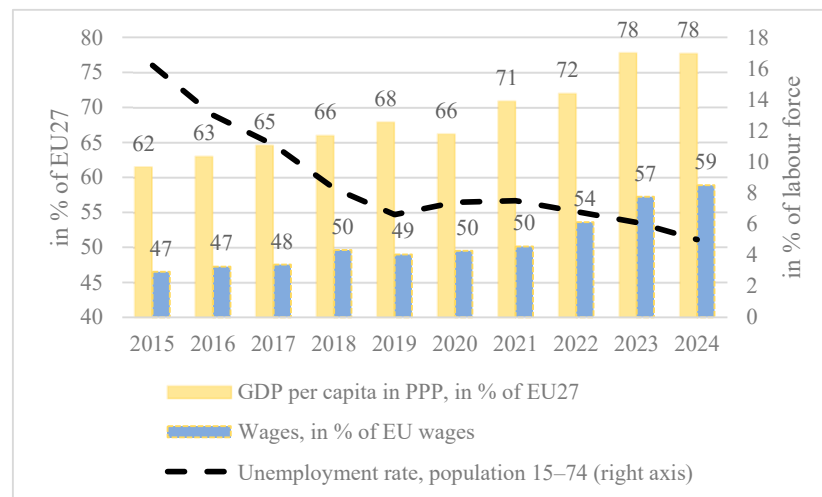


Figure 1. Trends in GDP, wages, and unemployment in the Croatian post-accession period. **Source:** Eurostat database, “<https://ec.europa.eu/eurostat/data> (accessed on 19 February 2026)”.

The analyses in the continuation will examine whether the strong growth in GDP and wages is sustainable, especially given the availability of the labor force required to meet increasing demand.

4.2. Decomposition of Nominal Gross Value-Added Growth

In the post-accession period, the Croatian economy recorded strong economic growth and reduced the gap with more developed EU economies. Croatia recorded GDP growth in current prices over the 2015–2024 period, at 7.4%, compared to the EU’s nominal annual growth rate of 4.4% (Figure 2). In the period before the COVID-19 outbreak, convergence was mainly driven by labor productivity growth (2.2% annually, compared to 0.8% in the EU). At the same time, employment grows at an average annual rate of 0.8%, below the EU rate. Annual inflation rates in Croatia before the COVID-19 outbreak were slightly above the EU average. The convergence process was moderate but stable, primarily driven by labor productivity growth.

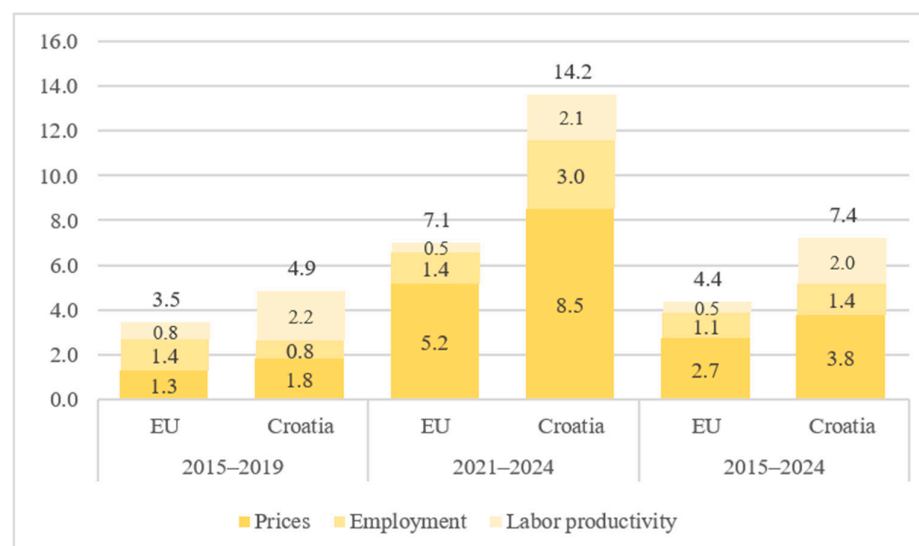


Figure 2. Decomposition of the nominal economic growth in the EU27 and Croatia in the 2015–2024 period, in terms of average annual growth rates. **Source:** Authors’ calculations based on Eurostat database. Note: Total nominal growth is close but not equal to the sum of price changes and real economic growth, as explained in the methodological part of the paper.

Dynamics of economic growth in the post-COVID period changed significantly. While nominal growth in the pre-COVID period in Croatia was only 1.4% percentage points above the EU average, in the 2021–2024 period, Croatia recorded an average nominal annual growth rate of 14.2%, which is twice the EU average (7.1%). The increase in prices (on average 8.5%) accounted for almost two-thirds of total nominal GDP growth and was 3.3 percentage points above the EU average. Real economic growth was driven more by employment than by labor productivity growth.

Changes in growth patterns and price dynamics were driven by several factors: the abundant inflow of EU structural funds in the more recent period, boosting tourists’ demand, post-earthquake reconstruction in Zagreb (Zagreb was hit by an earthquake on 22 March 2020, measuring 5.5 on the Richter scale), Euro adoption [28,29] (On 1 January 2023, Croatia adopted the Euro) and expansionary fiscal policy financed by increased government revenues. The EU funds available to Croatia for the financial period 2021–2027 were approximately EUR 26 billion, or an average of EUR 3.7 billion per year, or nearly 5% of Croatian GDP. Although the availability of those funds supports the implementation of important development projects, increased demand, especially with limited access to production resources, drives up prices. Unlike other NMS, where economic growth has been based on increased international competitiveness and export growth, the Croatian economy has been driven by investments in the non-tradable sector and government expenditures. In contrast, the tradable sector has been marked by deindustrialization and technological downgrading [30].

Structural changes in the Croatian economy were more pronounced than in the EU. While the nominal growth of GVA across EU economic sectors was relatively narrow, 4.0 to 5.7, the structure of the Croatian economy changed significantly during the analyzed period (Table 2). While Croatian industry recorded 4.2% nominal average annual growth, close to the EU’s average, the share of construction and accommodation services in Croatia increased substantially, driven by double-digit annual growth in the analyzed period. It is interesting to note that, in construction, increased demand in Croatia is met more by increased labor productivity than by price adjustment. In contrast, labor productivity growth in accommodation and restaurants was humble, and an increase in tourism arrivals led to higher prices and employment. Agriculture’s importance declined in both the EU and Croatia, while the decline in agricultural employment was offset by increased productivity. Productivity growth across public and private services is limited, and nominal GVA growth is driven by rising employment and wages in the public sector. It is worth noting that the public services sector ranks second in terms of price increases in Croatia in the analyzed period. Labor productivity in Other services declined by 0.1 annually on average in the period 2015–2024.

Table 2. Decomposition of the economic growth in the EU 27 and Croatia in the 2015–2024 period, in terms of average annual growth rates, at the sectoral level.

CPA code	Industry	Nominal GVA	Prices	Real GVA	Employment	Labor Productivity
						EU27
	Total economy	4.4	2.7	1.6	1.1	0.5
A	Agriculture, forestry, and fishing	4.4	4.4	−0.1	−2.0	2.0
B, C, D, E	Industry	4.0	2.9	1.1	0.5	0.6

F	Construction	5.6	4.9	0.7	1.9	−1.2
G, H	Trade and transport	4.1	2.6	1.5	0.8	0.7
I	Accommodation and food services	5.7	3.7	1.9	2.0	−0.2
O, P, Q	Public services	4.2	3.0	1.2	1.4	−0.2
J, K, L, M, N, R, S	Other services	4.6	2.1	2.4	1.8	0.7
Croatia						
	Total economy	7.4i	3.8	3.4	1.4	2.0
A	Agriculture, forestry, and fishing	7.0	4.4	2.5	−6.4	9.6
B, C, D, E	Industry	4.2	2.8	1.4	1.0	0.4
F	Construction	14.1	4.0	9.7	3.2	6.3
G, H	Trade and transport	7.6	2.4	5.1	1.2	3.9
I	Accommodation and food services	10.1	6.0	3.9	2.9	0.9
O, P, Q	Public services	7.6	5.1	2.3	1.5	0.8
J, K, L, M, N, R, S	Other services	7.2	3.8	3.2	3.3	−0.1

Source: Authors' calculation based on Eurostat database. Note: Total nominal growth is close but not equal to the sum of price changes and real economic growth, as explained in the methodological part of the paper.

4.3. Nominal Productivity at the Sectoral Level in the EU and Croatia

EU accession removes all barriers for the free movement of products, capital, and labor, and economic theory predicts a tendency toward nominal and real convergence. Factors behind expected convergence in labor productivity include capital inflows into less developed areas with lower wages and lower prices for intermediary inputs, which ensure higher returns and increased productivity. In contrast, labor flows in the opposite direction. Free trade in goods and services allows specialization based on comparative advantage, and, as a result, it is expected to lead to a long-run narrowing of the labor productivity gap between Croatia and the EU. Table 3 compares GVA per employee in Croatia and the EU in 2015 and 2024 at the sectoral level.

On average, Croatian labor productivity increased by 67.6% in nominal terms during the analyzed period. The productivity gap with the EU has narrowed, and a Croatian employee produces approximately 55% of the EU average value added, up from 44% in 2015. If the EU sectoral productivity is considered a benchmark for the Croatian economy's convergence, the agriculture and hospitality sectors are where the convergence process is almost complete. Nominal labor productivity convergence in agriculture is mainly achieved through substantial employment reductions, whereas nominal convergence in the accommodation and restaurant sectors is achieved through price increases (Table 3). A significant increase in agricultural productivity is surprising and is primarily a result of a rapid decline in employment. Supported by technological modernization and subsidies from national and EU budgets, agricultural output in the analyzed period recorded moderate growth, while employment decreased due to intensified emigration and an aging farming population. Less productive family farms consolidate or shut down, while the share of agricultural companies using modern equipment increases.

Table 3. Gross value added in current prices per employee in the EU 27 and Croatia in the 2015–2024 period, at the sectoral level.

Industry	2015			2024			Index, Croatia 2024	
	Croatia	EU	Index Croatia, EU = 100	Croatia	EU	Index Croatia, EU = 100	Total =100	2015 =100
Total economy	24,104	55,283	43.6	40,387	73,841	54.7	100.0	167.6
A Agriculture, forestry, and fishing	9476	18,905	50.1	31,775	33,401	95.1	45.2	335.3
B, C, D, E Industry	25,080	68,385	36.7	33,176	93,026	35.7	126.0	132.3
F Construction	15,725	44,069	35.7	38,853	60,837	63.9	82.4	247.1
G, H Trade and transport	20,492	46,047	44.5	35,549	61,918	57.4	83.9	173.5
I Accommodation and food services	22,260	30,896	72.0	40,740	42,277	96.4	57.3	183.0
O, P, Q Public services	19,435	44,321	43.9	32,651	57,011	57.3	77.2	168.0
J, K, L, M, N, R, S Other services	44,957	80,192	56.1	62,475	103,007	60.7	139.5	139.0

Source: Authors' calculations based on Eurostat database.

In construction, price, productivity, and employment growth are more balanced (Table 2). However, an expected change in the allocation of EU funds in the new EU financial envelope after 2028 could result in a lower share of funds invested in construction projects, requiring the construction sector to adjust. The same applies to the Agriculture, Forestry, and Fishing sector. Labor productivity across various service types (trade, transport, public, and other services) reached approximately 60% of the EU average. As value added in the service sector primarily consists of wages and salaries, further convergence in nominal productivity will follow the pace of wage increases. In most of those sectors, pressures for further wage increases are partially constrained by the influx of foreign workers willing to work for wages close to the minimum wage.

Productivity convergence in the industry is absent, and nominal productivity relative to the EU average even declined during the period analyzed. In relevant literature, industry is usually considered a sector that drives labor productivity growth through the application of modern technologies and capital invested in transforming production processes [31]. An increase in productivity in the manufacturing sector usually spreads to other sectors that provide various inputs, leading to technological upgrading and upscaling of the entire economy. In the Croatian case, industry lost significance and lagged other sectors in productivity growth. Obviously, it is an obstacle to further development as productivity growth in most service sectors is limited. If the economy is unable to increase the volume of supply, further demand increases lead to higher prices and wages, while the process of real convergence may be absent. The economy's competitive international position in the tradable sector is eroding, while vulnerability to the expanded share of accommodation activity is rising.

4.4. Labor Requirements and GVA Induced by a Unit Change in Final Demand

The input–output model provides more in-depth analyses of the effects of changes in final demand across an industry's supply chain. Higher multipliers indicate greater integration of domestic producers into an industry's supply chain. Besides direct effects on the sector that delivers the final product, an increase in demand indirectly stimulates economic activity in sectors that supply intermediate inputs used to produce it. Table 4 presents output multipliers and GVA effects by sectors.

Although the output multiplier (total output to initial change in demand ratio) increased slightly during the analyzed period, the GVA effects, measured as GVA generated in the Croatian economy per unit growth in final demand, decreased. It is a consequence of the increased share of imported intermediates used by Croatian producers, especially in sectors such as industry, construction, trade, transport, and accommodation and food services. It means less intensive cooperation between domestic producers and a higher share of indirect GVA effects exported abroad. GVA effects are generally higher in services, but a decreasing trend is observed across all sectors in the period analyzed.

Table 4. Output multiplier and GVA effects estimated by an input–output model.

	Output Multiplier		GVA Effects	
	2015	2023	2015	2023
Total economy	1.55	1.56	0.79	0.75
Agriculture, forestry, and fishing	1.62	1.53	0.75	0.75
Industry	1.65	1.63	0.71	0.66
Construction	1.75	1.70	0.73	0.68
Trade and transport	1.60	1.60	0.78	0.74
Accommodation and food services	1.48	1.54	0.86	0.77
Public services	1.39	1.40	0.85	0.82
Other services	1.61	1.60	0.82	0.79

Source: Authors' calculations.

An increase in final expenses increases labor demand. New jobs are required directly in industries producing final goods and services, as well as indirectly in sectors that deliver intermediates. Table 5 presents the input–output model's labor requirements matrix. The first row of the table is direct requirements, measured as full-time equivalent jobs (FTE, translating part-time jobs into the equivalent of full-time employees) engaged directly by units supplying the demanded final product. Other rows indicate indirect job requirements for units that deliver inputs to the direct supplier of the final product. Thus, the first column presents total job requirements in the Croatian economy induced by a final demand for agricultural products. The figure in the first cell of the table (39.3 thousand) represents the number of jobs on farms that directly produce the agricultural products required by final consumers. An additional 4.3 thousand agricultural workers produce inputs required in agriculture (e.g., seeds or animal feed) while 3.3 thousand industrial workers produce fertilizers, energy, and other industrial inputs required in agriculture. Rows for each sector show indirect jobs in the production of input delivered to other sectors.

The last column indicates that, in the Croatian economy, 1.120 thousand jobs are required directly in units that deliver goods to final consumers. In comparison, an additional 551 thousand jobs are required indirectly in units that produce intermediate inputs. The last row of the table presents the employment multiplier, the ratio of total to direct employment required to produce and deliver final products. The employment multiplier for the Croatian economy is estimated at 1.49, meaning that every 100 direct jobs in industries supplying final products induce an additional 49 jobs in other sectors. The highest employment multipliers are estimated for industry, construction, and other services, while the lowest multiplier is estimated for public services.

Table 5. Distribution of total Croatian employment in 2023 on direct and indirect employment by sectors, in thousands of FTE jobs.

	Agriculture, Forestry and Fishing	Industry	Construction	Trade and Transport	Accommodation and Food Services	Public Services	Other Services	Total
Direct employment	39.3	179.1	98.1	184.3	100.6	343.6	174.6	1119.7
Indirect employment effects								
Agriculture, forestry, and fishing	4.3	20.6	1.2	4.3	3.5	1.6	2.2	38
Industry	3.3	44.2	19.4	21.9	11.9	20.0	24.5	145
Construction	0.2	4.8	14.9	4.9	0.9	1.7	7.6	35
Trade and transport	3.5	39.4	15.9	35.6	10.3	15.4	22.9	143
Accommodation and food services	0.1	1.8	0.9	2.0	0.5	2.0	3.7	11
Public services	0.5	4.6	3.1	5.3	1.8	9.4	9.1	34
Other services	2.8	29.5	12.3	23.7	9.7	14.7	52.2	145
Indirect employment—total	14.7	145.0	67.8	97.7	38.6	64.8	122.2	550.9
Total employment	54.1	324.1	165.9	282.0	139.3	408.5	296.8	1670.6
Employment multiplier	1.37	1.81	1.69	1.53	1.38	1.19	1.70	1.49

Source: Authors' calculations.

To compare sectors, the total job requirements are presented in Table 6 in relative terms, as the number of jobs induced by a final demand of 1 million EUR. To compare real effects across periods, the 2015 input–output table is expressed not only in current, but also in 2023 prices. Thus, the first column of Table 6 is the result from the 2015 input–output table in current prices, while the second column presents the results of the 2015 input–output table expressed in 2023 prices. The final column compares job requirements in 2023 and 2015 (expressed in comparable prices). The index for the total Croatian economy is 80.4, indicating that the total number of FTE jobs per 1 million EUR of demand has decreased by 19.6%. It implicitly means that labor productivity has risen for 19.6% in the period 2015–2023. In 2023, total labor requirements were the highest for public services, followed by agriculture and accommodation. Final demand for public services of 1 million EUR requires 27.8 FTE employees, almost double the industry's 15.4 FTE jobs. A very low rise in productivity is also recorded in the Accommodation and food services sector (87.7). Above-average labor requirements are also present in agriculture, accommodation and food services, and distributive sectors. It is interesting to note that construction, with 17.9 jobs per 1 million EUR of final deliveries, outperformed the national average of 19.3 jobs in 2023, driven by increasing productivity.

Table 6. Sectoral labor intensity in 2015 and 2023, number of FTE jobs induced by 1 million EUR of final demand.

	2015		Index 2023/2015 (2023 Prices)
	2015 Input–Output Table in 2015 Current Prices	2015 Input–Output Table in 2023 Prices	
Total economy	31.9	24.0	19.3
Agriculture, forestry, and fishing	59.4	43.1	23.3
Industry	28.6	22.1	15.3
Construction	34.5	25.7	17.9
Trade and transport	34.3	26.4	20.1
Accommodation and food services	33.8	24.3	21.3
Public services	39.2	28.2	27.8
Other services	29.1	22.6	19.3

Source: Authors' calculations.

Although national account data on the structure of final demand and total employment in Croatia are available for 2024, input–output data on supply and demand for output and labor input, cross-checked at the sectoral level, remain unavailable. Labor requirements at the sectoral level for 2024, based on labor-intensity factors, can be estimated using different assumptions:

- Scenario 1: Labor intensity factors in 2024 remain the same as in 2023. This implies that productivity did not increase in 2024.
- Scenario 2: Sectoral productivity increased at the annual rate as recorded in the 2015–2023 period (average sectoral productivity growth 2% on an annual basis);
- Scenario 3: Productivity growth in each sector is 50% higher than recorded in the 2015–2023 period (average sectoral productivity growth 3% on an annual basis).

A significant increase in final demand in 2024 requires an annual increase in FTE jobs of 30–80 thousand, depending on the actual productivity growth (Figure 3). Given slow productivity growth in public services, accommodation, and personal services, the current dynamics of final demand induce strong labor demand in those sectors, regardless of the scenario.

To assess the reliability of the assumptions, model results based on the 2023 IO table and different scenarios are compared with officially published aggregate data on GVA and employment growth derived from administrative and LFS data. According to the official national accounts data, real GVA growth in the total economy in 2024 was 3.2% while GDP increased by 3.8%. At the same period, employment based on administrative data increased by 3.4% while LFS data indicate an increase of 3.9%. Although the final 2024 IO data will provide consistent sectoral data, aggregate data indicate that productivity growth in 2024 was weak and justify the application of labor-intensity factors from 2023.

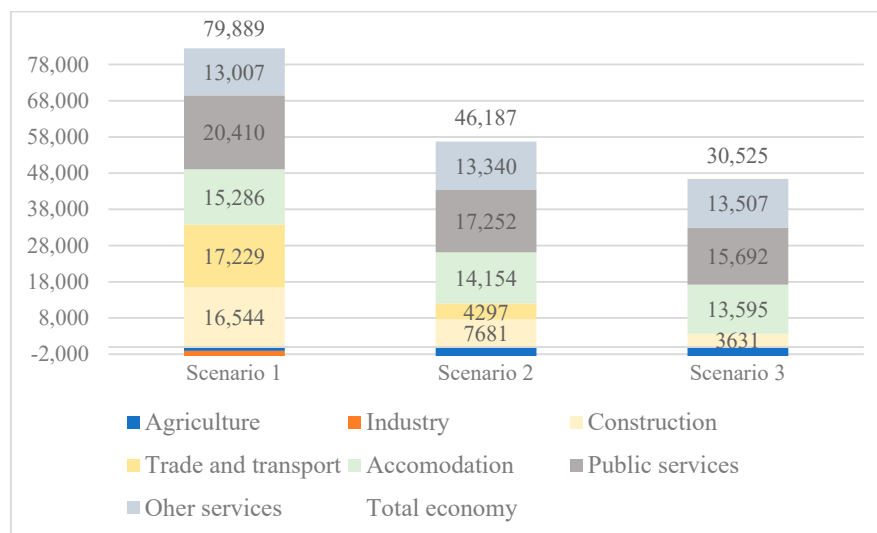


Figure 3. Increase in job requirements in 2024, sensitivity analysis. **Source:** Authors' calculations.

If the constant labor-intensity factor for 2023 (scenario 1) is applied to 2024, we can calculate the annual and total increases in FTE jobs in the analyzed period required to address increased final demand (Table 7).

Table 7. Increase in job requirements induced by an increase in final demand.

Sectoral Demand for Final Products	Increase in FTE Jobs, in Thousands		Increase, in %	
	2024/2023	2015–2024	2024/2023	2015–2024
Agriculture, forestry, and fishing	−1.1	−42.1	−1.4	−35.6
Industry	−1.5	−22.0	−0.5	−6.4
Construction	16.5	37.4	12.4	33.4
Trade and transport	17.2	37.8	5.3	12.3
Accommodation and food services	15.3	29.0	13.7	29.7
Public services	20.4	74.3	5.4	23.0
Other services	13.0	102.8	4.1	44.7
Total increase in job requirements	79.9	217.1	4.8	14.2

Source: Authors' calculations.

The current growth model of the Croatian economy, driven by rising tourist final demand and investment in buildings and infrastructure, is unsustainable due to labor shortages. At the annual level, structural changes in demand toward products from labor-intensive sectors, coupled with poor labor productivity performance, require an additional 80 thousand workers. Given unfavorable demographic conditions and a lack of workers in the prime working age due to emigration in the previous period, those workers are unavailable.

In the first years of full EU membership, free movement of labor led to Croatian emigration to higher-wage countries. High labor demand, especially in the post-COVID period, depleted the labor force, and Croatia reached the natural rate of employment of 5%. Administrative data on unemployment indicate that the number of unemployed persons in Croatia recently oscillates around 80 thousand, but the age and occupational structure do not meet the demand. During the period analyzed, employment decreased in agriculture and industry. However, workers in those sectors often lack the skills and motivation to apply for construction or accommodation jobs when vacancies exist. Those services do not require a significant proportion of highly educated or skilled labor, but the nature of those activities is physically exhausting and requires relatively young, healthy people. Half of the registered unemployed in 2024 were aged 45 or older “<https://statistika.hzz.hr/Statistika.aspx?tipIzvjestaja=1> (accessed on 2 March 2026)”. Besides age and occupational mismatch, there are significant regional differences in labor supply and demand. The unemployment rate is highest in Slavonia (10.1% in 2023, estimated by the labor force survey), followed by Adriatic Croatia (6.0%). In the City of Zagreb (3.8%) and Northern Croatia (4.4), the unemployment rate is below the national average (6.1%), and labor reserves are practically absent. On the other hand, labor demand is the highest in Adriatic Croatia and Zagreb. High housing costs in regions with evident job vacancies limit labor mobility, especially since vacancies are concentrated in industries paying below-average wages.

To address high labor demand, especially in construction and hospitality, employers hired foreign workers. Thus, the trend in migration reversed in the last few years. During the period 2015–2019, net migration was negative, totaling 90 thousand people. Over the last few years, net migration has been positive, totaling over 70 thousand people in the 2022–2024 period (Figure 4).

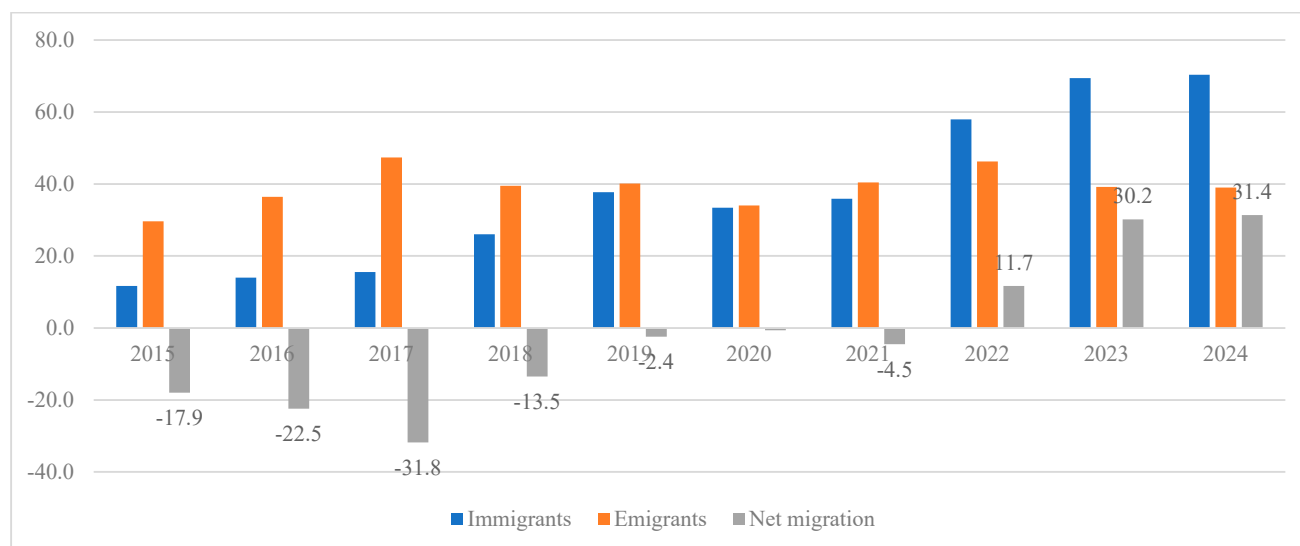


Figure 4. International migration in Croatia. **Source:** Croatian Bureau of Statistics: “<https://podaci.dzs.hr/2025/en/97256> (accessed on 2 March 2026)”.

Most migrants are young men (Figure 5). Almost three-quarters of immigrants in 2024 are in the 15–44 age group (51.6 thousand out of the total 70.4 thousand immigrants). The number of males is almost three times that of females in total immigration, a result of increased demand for physically demanding construction jobs. The age and sex distribution indicates that a typical migrant arrives in Croatia without a family, motivated to work to send part of their earnings to family abroad. Statistics on working remittances and international transfers indicate an increasing share of funds directed to foreign economies. The gender distribution of emigration is also uneven, with a male-to-female ratio of about 2. As in the case of immigration, the highest share of emigrants is recorded in the 15–44 age group.

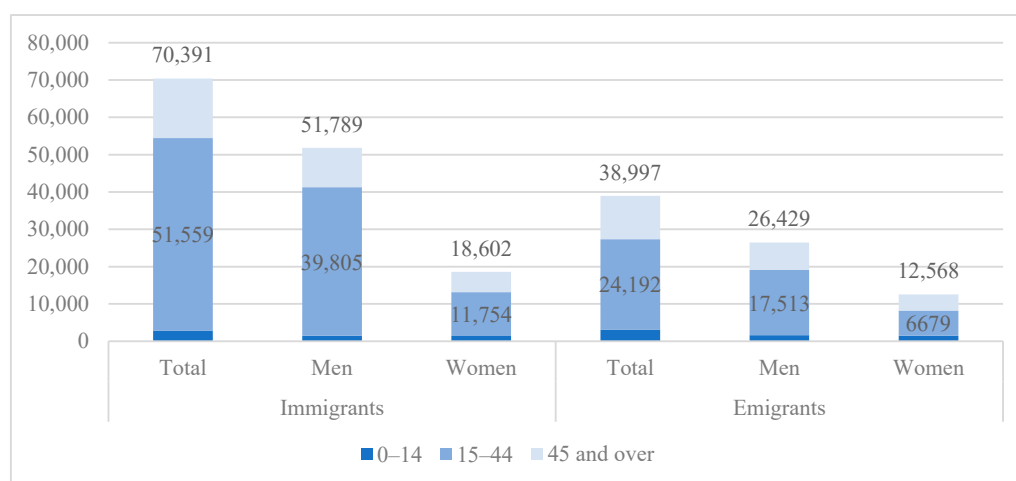


Figure 5. Distribution of migrants in 2024, by age and sex. **Source:** Croatian Bureau of Statistics: “<https://podaci.dzs.hr/2025/en/97256> (accessed on 2 March 2026)”.

While in 2022 and 2023 the largest share of immigrants in Croatia originated from European economies outside the EU (Ukraine, Bosnia and Herzegovina, Serbia, and Kosovo), in 2024 the majority arrived from Asia (primarily Nepal, the Philippines, and India)

(Table 8). The citizenship of emigrants indicates that a certain proportion of foreign workers use Croatia as an entry point to the EU labor market and, after short-term work in Croatia, migrate to more developed EU economies with higher wages.

Table 8. Immigrants and emigrants to/from Croatia, by country of citizenship.

	2022	2023	2024	2022	2023	2024
	Immigrants			Emigrants		
Croatia	10,340	10,852	13,290	32,739	25,427	20,147
EU	5167	4649	4819	960	457	362
Other European economies	29,200	33,405	22,056	10,295	10,069	12,834
Asia	11,874	17,923	26,601	1980	2813	4926
Africa	675	1673	2567	59	110	321
Other	716	894	1058	254	342	407
	57,972	69,396	70,391	46,287	39,218	38,997

Source: Croatian Bureau of Statistics: “<https://podaci.dzs.hr/2025/en/97256> (accessed on 2 March 2026)”.

The number of emigrants with Croatian citizenship still exceeds the number of Croatians returning to the domestic economy. A factor behind this process is the structure of job demand. It is unlikely that selective incentives for emigrants’ return to Croatia will reduce the scale of labor market supply shortages, as these incentives primarily target the educated young population seeking above-average wages. The share of open positions is highest for simple, low-paid but exhaustive jobs in sectors such as construction and hospitality. Instead of developing an immigration strategy to attract educated foreigners to high-tech sectors that support sound economic growth through increased labor productivity, the arrival of foreign workers as an additional source of low-paid labor is conducted on a random basis. In the short term, that kind of immigration supports the current operations of labor-intensive sectors. However, it limits the Croatian economy’s potential for further development and convergence with more developed economies.

The list of job positions for which the Croatian unemployment agency issued a positive opinion on permits for foreign workers, based on the labor market situation, is presented in Table 9. Jobs where the supply of domestic labor is insufficient are primarily in construction and hospitality, as well as in supporting activities such as cleaning services and transport. In 2024, the statutory minimum gross wage in Croatia was 840 EUR, while the average gross wage was 1821 EUR, indicating that job positions offered to foreign workers are poorly paid and do not cover the living costs of a typical Croatian citizen. The structure of issued work permits for foreign workers is consistent with input–output results on sectors where labor demand is most apparent. If the estimated increase in total job requirements (Table 7) in the period 2015–2024 is compared to valid work permits for foreign workers, it can be concluded that over 80% of the increased requirements are satisfied by foreign workers (180 out of 217 thousand jobs required).

Table 9. Issued work permits for foreigners, valid on an annual basis, for job positions.

	2022	2023	2024	Average Gross Wage 2024, in EUR
Construction worker	10,685	17,418	17,297	927
Cleaner	3316	7933	12,498	893
Waiter	6884	10,116	11,813	998

Assistant cook	4822	9079	11,225	931
Delivery worker	2272	6097	9514	865
Bricklayer	7719	9072	8962	971
Construction helper	5383	8323	8894	934
Cook	5391	7784	8079	1050
Assistant waiter	3227	5865	7378	918
Chambermaid/Room attendant	3994	5932	6063	929
Carpenter	5554	5812	5317	973
Reinforcer and concrete worker	2924	3927	4727	973
Facade worker	2979	3730	4373	965
Other	44,091	59,357	64,234	n/a
Total	109,241	160,445	180,374	948

Source: Croatian unemployment agency, “<https://www.hzz.hr/statistika/statistika-usluga-test-trzista-rada-i-radne-dozvole/> (accessed on 5 March 2026)”.

Although immigration helps smooth the operation of economic activities in the short term, in the long run, it binds the unfavorable economic structure and limits labor productivity and wage growth. In addition, the increasing share of immigration from Asia and other regions with significantly different social and cultural values and traditions raises the issue of the costs of integrating these immigrants into Croatian society.

5. Discussion

The improvement in the institutional environment, the free movement of goods and capital within the EU, and the availability of significant financial resources from the EU budget contributed to strong growth in the Croatian economy and to economic convergence towards the EU average. Accommodation services and gross fixed capital formation in buildings made the largest contribution to overall economic growth, especially in the post-COVID period. Structural change indicators reveal that Croatia still lags significantly behind the more successful NMS of Central and Eastern Europe in advancing international competitiveness, labor productivity, and manufactured goods exports. Unlike the dominant role of labor-intensive services in Croatia, in other NMS, the manufacturing industry has been the most important sector, attracting significant foreign direct investment, raising productivity, and integrating into international value chains [32]. Data from the input–output analysis presented in this study support the earlier studies [30], that the manufacturing sector has been marked by technological downgrading and poor productivity growth.

In the 2015–2024 period, the Croatian economy reduced the development gap and reached 77.7 percent of the EU27 GDP per capita in PPS in 2024. GDP recorded relatively stable annual growth rates of 3.4–4.8 before the 2020 recession, while employment and wages increased moderately. In the post-COVID period, the availability of abundant EU structural funds and the growth in tourist arrivals led to a strong increase in demand. Strong labor demand led to wage growth and annual growth in relative wages (as a percentage of the EU average) in 2022 and 2023, which were equal to the cumulative 5-year growth before the 2020 recession.

Free access of Croatian labor to the large EU market led to a significant increase in emigration to higher-wage countries, especially among the population in prime working age. Economic growth based on labor-intensive sectors, especially in the post-COVID period, depleted the labor force reserve. The 5% unemployment rate is currently close to the natural rate, and there is a mismatch between labor requirements and the unemployment

rate across age, occupation, and region. Although construction and hospitality services do not require a significant proportion of highly educated or skilled labor, those occupations require relatively young, healthy people, while the majority of registered unemployed are aged over 45. According to our results on labor requirements increase in the period 2015–2024, based on the input–output model, it can be concluded that over 80% of the increased requirements are satisfied by foreign workers (180 out of 217 thousand jobs required)

Total labor requirements in Croatia, estimated by the input–output table model, were the highest for public services, followed by trade, transport and accommodation services. The relative labor intensity of public services is almost double that estimated for industry. Obviously, there is a substantial labor reserve among public sector employees. The changing structure of the Croatian economy, favoring accommodation, distributive sectors, and services, coupled with a rising share of public-sector employees, limits productivity growth and requires more workers to meet increasing demand. Analysis indicates that the current Croatian growth model is unsustainable because of high labor requirements and slow labor productivity growth. Labor constraints and continued demand growth without substantial structural changes could result in rising wages and prices rather than real GDP growth. However, clear signs of an economic slowdown in the EU are evident, driven by rising energy prices and global instability. Furthermore, as found in previous literature, the implementation of EU climate policy will affect the dynamics of economic growth and labor markets across all member states, including Croatia.

In the short term, the arrival of foreign workers eases labor shortages, boosting economic activity and enabling the Croatian economy to access EU funds for many infrastructure projects that would otherwise go unexploited without sufficient labor. In the long run, a national industrial strategy aimed at the structural transformation of the Croatian economy and its reorientation toward more technologically complex and productive sectors is required. In addition, developing an integration policy for foreign workers should be a priority, as migration from Asia and other regions with which Croatia has few economic or cultural ties is changing the social, ethnic, and cultural structure of the population [20]. The government should take a more active role in demand management, especially in sectors where a further increase in demand could have negative consequences. Preferential tax treatment of the hospitality industry and low property taxation are among the factors that fuel demand in accommodation and construction, where labor shortages are most pronounced. Instead of a passive approach to immigration policy, the government should develop a migration policy that balances labor-market needs with social and cultural factors, as excessive migration could endanger social cohesion, as other studies have found [21].

6. Conclusions

This paper provides an analytical assessment of the effects of increased demand, driven by EU structural funds and tourism arrivals, on economic activity and labor requirements in Croatia in the post-accession period, using an input–output model. The results confirm the hypothesis that the current Croatian growth model is unsustainable due to labor shortages and slow productivity growth. Rising demand, amid slow structural transformation and weak labor productivity growth, depleted the available domestic labor force, while the absorption capacity for integrating foreign workers is close to saturation. Further increase in demand could lead to price increases rather than real growth. Weak competitiveness of domestic industrial products and high dependence on imported energy are factors behind the declining share of domestic GVA generated from unit growth in final demand. It brings less intensive cooperation between domestic producers and a higher share of indirect GVA effects exported abroad. A declining trend in GVA multipliers is observed across all sectors during 2015–2024. period. It signals a weakening

of an economy's ability to generate broader economic growth through its supply chain as a response to an increase in final demand. Although reduced spillovers imply that an injection of demand results in lower labor requirements, in the long run, they limit overall economic growth prospects.

The papers sought to close a research gap by applying input–output analysis as a powerful tool to examine the relationships among migration policy, growth, productivity, and labor-market constraints in Croatia. It contributes to an empirical assessment of the convergence process in Croatia and provides an opportunity to link final demand, labor productivity, constraints, and migration policy.

The novelty of the research lies in the empirical assessment of direct and indirect labor requirements in Croatia, a small, service-oriented economy. Although an increase in final demand induced economic growth, unsatisfactory productivity growth and emigration of the young, educated population depleted the labor force reserves. The study's implications primarily include the need to shift from demand-driven to productivity-driven economic growth and to address demographic challenges. Results imply that European Union membership brings many advantages, but if not coupled with an adequate industrial development strategy and technological upgrading of the economy, economic growth based mainly on final demand could reach its limits due to limited labor supply, a critical production input. Results could be of interest not only to Croatian policymakers but also to government units in other candidate countries in Western Balkan economies that face demographic issues and labor supply bottlenecks similar to those in Croatia.

Although the input–output model is powerful for identifying indirect effects of final demand arising from intersectoral interactions, it has some limitations that must be considered in interpreting the results. The advantages and disadvantages of the input–output model have been widely discussed in previous literature [23,24], and its limitations are generally related to the assumption of fixed technical coefficients, limited substitution among inputs, and its static nature. The input–output model assumes fixed technological coefficients, thereby ignoring the possibility of input substitutions resulting from changes in availability and prices on domestic and global markets. A basic input–output model is assumed to be exclusively demand-driven with sufficient inputs and fixed prices.

Besides the limitations inherent to the application of the input–output model, other limitations include sectoral aggregation, regional labor mismatches, accommodation seasonality, and the long-term mobility of migrant workers. While certain labor resources are still available in the less developed regions of Eastern Croatia (Slavonia), high housing costs and low wages in sectors requiring labor along the Adriatic coast prevent inter-county mobility. Due to low labor productivity in the public sector, there are also certain employment reserves pending on public sector reforms. Future research could apply dynamic models to better assess how increased demand affects the Croatian economy and the long-term employment constraints.

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