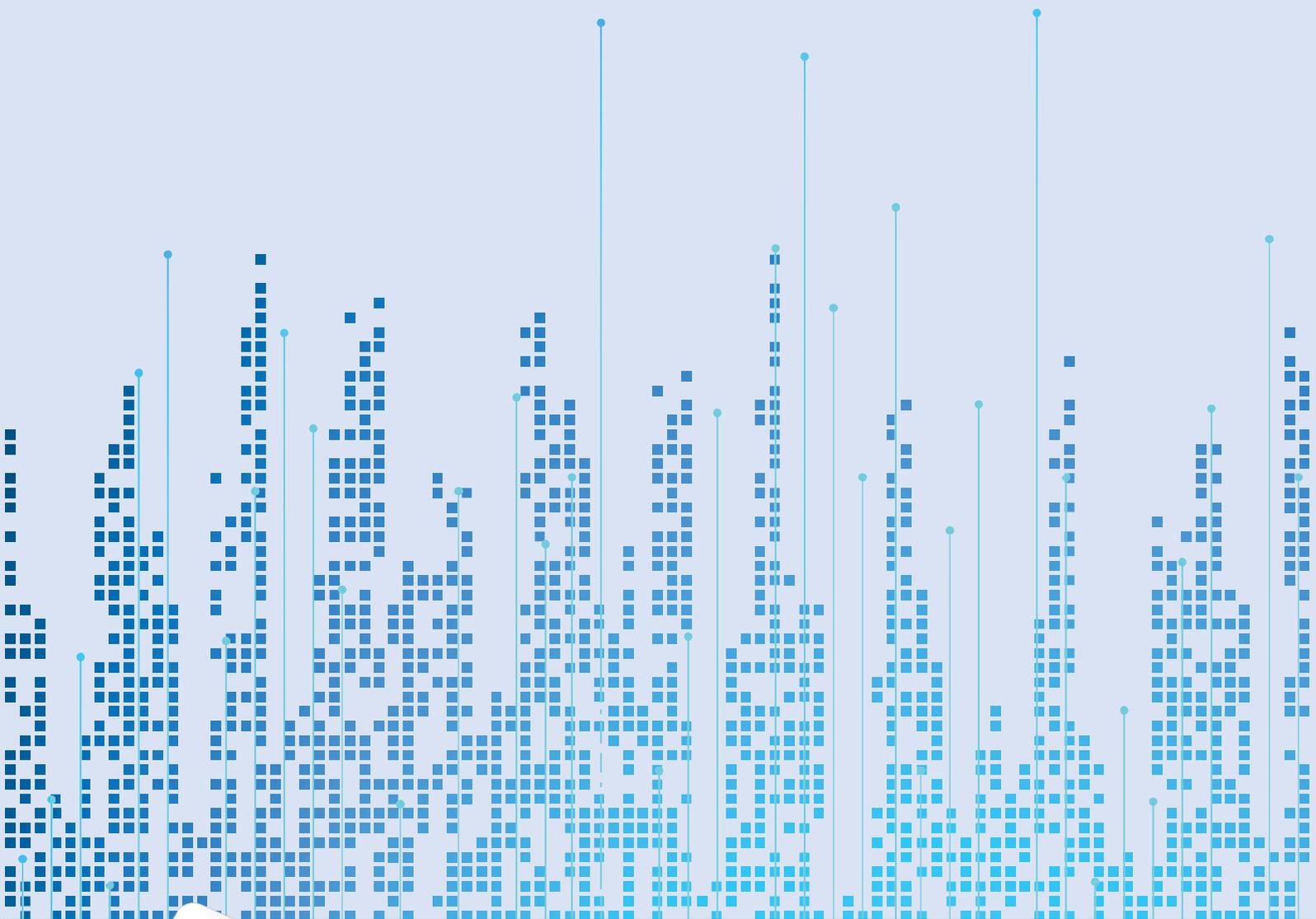


National Development Strategy Croatia 2030 Policy Note:

Growth, Competitiveness and Innovation

July 2019



Acknowledgements

This policy note was prepared in the context of the Reimbursable Advisory Services Agreement “Support for Establishing the System for Strategic Planning and Development Management and for Preparing the 2030 National Development Strategy”. The core World Bank team was led by Donato De Rosa (Lead Economist, Team Leader), Josip Funda (Senior Economist, co-Team Leader), and Catalin Pauna (former Team Leader) and included Stanka Crvik Oreskovic (Project Coordinator) and Bogdanka Krtinic (Program Assistant). The team worked under the guidance of Arup Banerji (Country Director), Elisabetta Capannelli (Country Manager) and Gallina Andronova Vincelette (Practice Manager).

Preparation of the policy note Growth, Competitiveness and Innovation was led by Paulo Correa (Lead Economist). The main authors of the policy note are Paulo Correa (Lead Economist), Todor Milchevski (Private Sector Specialist), Jorge Pena Izquierdo (Consultant) and Joao Bevilaqua T. Basto (Consultant). Written inputs were provided by the following team members: Matija Laco (Operations Officer), Elwyn Davies (Young Professional), Blair Lapres (Economist), Fernando Montes-Negret (Consultant), Thorsten Posselt (Consultant), Steffen Preissler (Consultant), Sonja Radas (Consultant), and Jasmina Mrkonja (Consultant). The Note benefited from the invaluable advice, comments and suggestions of: i) Marialisa Motta (Practice Manager) and Natasha Kapil (Program Leader) from Finance, Competitiveness and Innovation Global Practice, and (ii) Donato De Rosa (Lead Economist) and Rogier J. E. van den Brink (Program Leader) from Macroeconomics, Trade and Investment Global Practice.

The policy note team thanks the following individuals and organizations in Croatia:

- the Ministry of Regional Development and EU Funds for overall coordination and guidance, especially Ana Odak, the Assistant Minister, and her team;
- the Ministry of Economy, Entrepreneurship and Crafts, especially Natasa Mikus-Zigman, the State Secretary and her team, for meetings and consultations that have informed the policy note.

Note

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Executive Summary¹

Overcoming global challenges and seizing new opportunities

The Croatian economy is set to face a challenging global context, marked by an expected slowdown in the global economy and potentially difficult adjustments to disruptive technologies. The expansion of the global economy is expected to decelerate, as output gaps close and monetary policy settings continue to normalize in developed economies. After experiencing a temporary rebound, global trade declined and currently faces downside risks with the continuation of trade frictions between the United States and China. At the same time, the new wave of technological innovation has the potential to bring considerable business opportunities, especially in the digital economy, but also entails potentially challenging adjustments in labor markets. Croatia's specialization in tourism tends to mitigate the negative and direct effects associated with the deceleration of global trade. Disruptions in labor markets related to technological progress are also unlikely to be predominant, as industrial manufacturing, the segment more susceptible to automation, does not represent a large share of employment. Moreover, advances in the digital economy may provide opportunities for the growth of new businesses in the country – including, as the Euro adoption approaches, in the space of knowledge-intensive services such as digital finance. Despite some short-term resilience, Croatia needs to be prepared to weather the second-order effects related to those global trends which, compounded with an economic slowdown in advanced economies, may cause a cyclical decline in the demand for tourism services in the country.

Convergence to the productivity frontier is essential for Croatia's long-term economic performance

Croatia's growth, and export performance have been sluggish in recent years, and its productivity has fallen further behind the productivity frontier. Since 2008, the gap in per capita income between Croatia and the EU has been widening, reflecting a lack of convergence in productivity levels. After a sharp rise in the 1992-98 period, the TFP of Croatia reached 70 percent of the US levels in 2004, only to revert to 60 percent in 2014. Despite the recent improvement in export performance, trade openness remains low. Most of the export growth in 2010-16 was driven by an expansion of 'old' exports to existing geographic markets -- rather than by new products and new destinations. This result suggests that (i) existing firms did not achieve the productivity thresholds necessary to export and (ii) new, potentially more productive firms (and, thus, more likely to export) are not entering Croatia's economy – indicating a lack of dynamism in Croatia economy. Following the strategies adopted by the European Union in the past decade, Croatia could address its lackluster growth and trade performance by raising R&D expenditures. However, the current stage of development of Croatia's national innovation system (NIS), where the capacity to transform knowledge inputs into outputs is low, makes those expected effects less likely. Enhancing TFP growth, therefore, is critical for improving the country's long-term performance.

¹ This Policy Note was prepared as part of the Reimbursable Advisory Service (RAS): Support for Establishing the System for Strategic Planning and the Preparation of the National Development Strategy – Croatia 2030 (P166454). The recommendations provided in this policy note should be complemented by those presented by the policy notes addressing labor markets, skills and education issues. Labor regulation and pro-active labor market policies have direct implications on the efficiency of labor reallocation. Reforms of the higher education sector have a dominant effect on the performance of research, research commercialization and, potentially, academic entrepreneurship.

Resource misallocation remains a significant drag to aggregate productivity in Croatia

Misallocation of resources is the main driver behind Croatia's weak productivity performance in recent years. In a typical market economy, market resources tend to shift from less to more productive firms; new and innovative firms are often more productive than existing firms, and less productive firms are forced to exit the market. In Croatia, evidence suggests that since 2010 resource reallocation, especially between incumbent firms, has had a large negative effect on productivity. In other words, resources were allocated away from more productive firms towards less productive firms. This phenomenon of misallocation has been observed in most sectors of the Croatian economy. Civil engineering, telecommunications, construction, oil, pharmaceuticals, land transport and food and beverage service activities all had a large, negative contribution to aggregate productivity in 2010-17. In turn, the contribution of firms' upgrade, another potential source of aggregate productivity growth, was positive, albeit modest -- slightly above half the Slovenia's levels right after structural reforms took place. Croatia's annual aggregate productivity growth in the period, 0.5 percent per year, was below the expansion of the global productivity frontier, explaining the country's productivity gap.²

A few firms with a disproportionately large and negative TFP have a substantial impact on aggregate productivity growth. Without those companies, Croatia's aggregate productivity growth in 2010-17 would have been three times larger (9.72 percent). An increase in the contribution of firm's upgrade efforts is the main factor behind the new result -- indicating that upgrade efforts by those firms were inferior to those of the remaining enterprises. Most of those firms are state-owned and large firms, in transport and storage, construction, information services, mining, and manufacturing sectors.

Business environment factors have relevant impacts on firms' upgrade and reallocation in Croatia

State ownership, red tape, access to credit, competition, and informality have relevant impacts on both firm-level productivity and misallocation in Croatia. Lower TFP levels reflect well-known challenges faced by the public sector in exercising ownership and control. Time spent by managers with red tape reduces the time to be allocated to efforts related to firm upgrade. Access to credit expands firms' capacity to finance productivity-enhancing tasks. Competition is expected to reduce misallocation by encouraging lagging firms to catch-up and leading firms to reduce mark-ups. The presence of informality, in turn, may be an indication of low productivity segments remain untouched by competition.

- **State-owned enterprises and large firms appear to be less productive overall, reflecting the limited effect of reallocation on aggregate productivity growth.** Annual median TFP values for state-owned enterprises (SOEs) were systematically lower than for privately owned firms in 2010-17, a gap that did not decrease over time. Large firms presented the lowest annual median TFP values since 2012, contrary to the expected relationship between size and TFP in competitive economies. The result might be capturing the effect of SOEs, as many large firms are also state-owned, or may indicate a dysfunctional selection process in which more productive firms are not necessarily those that grow more.
- **Red tape and access to credit also matter for firm-level productivity.** This Policy Note estimates that time spent by management with government regulations in a typical week is associated with a reduction of 12.2 percent in firm TFP. In 2013, managers spent 19 hours per week dealing with red tape. The Policy Note also finds that better access to credit would likely

² Croatia aggregate productivity grew 3.2 percent between 2010-17, with a contribution of 14.81 percent of firm upgrade; -13.19 percent of reallocation between incumbent firms and 1.58 percent of entry and exit.

increase productivity, but only in firms that are already more productive. The effects of access to credit are negligible for enterprises with productivity levels in the bottom 33 percent of the TFP distribution, increasing exponentially after that. The implication is that policies to facilitate access to credit should target more productive firms.

- **Competition and informality seem to have important effects on TFP dispersion which, with some caveats, we interpret as preliminary evidence of misallocation.** The Policy Note estimates that the current level of competition faced by an average firm reduces dispersion by 58.1 percent. The Policy Note also estimates that the presence of informal firms increases dispersion by 20.77 percent which, combining with a negative effect of this variable on average TFP levels, we interpret as evidence of the relevance of an informal low-productivity sector. In fact, Croatia's share of the shadow economy is estimated to be the third largest in Europe between 17 and 26 percent of GDP.

The impact of firm upgrade levels on productivity is also hindered by low R&D capabilities in Croatian firms

The lack of R&D-driven innovation limits the impact of firm upgrade efforts on aggregate productivity. Innovation based on proprietary knowledge (e.g. patents and registered designs), being difficult to replicate/copy, is likely to generate larger demand-effects for the innovators and thus have a larger effect on aggregate productivity growth. Proprietary knowledge, in turn, is often generated by investments in R&D capabilities.³ While Croatia's non-R&D driven innovation performance, including marketing and organizational innovation, improved well recently, R&D-driven innovation expenditures declined. Non-R&D innovation expenditures of Croatian firms stood at 1.2 percent of turnover in 2015, well above the EU average of 0.76 percent. Croatia innovative firms were spending on average 0.47 percent of turnover in R&D in 2016, as compared to 0.57 of turnover in Bulgaria, a 'modest' innovator and 0.85 percent in the Czech Republic, a 'moderate' innovator as Croatia according to the EU Innovation Scoreboard. Firm R&D expenditures increased in all countries between 2010-16 -- with annual average growth rates ranging from 1.5 percent in Denmark to 39.5 percent in Bulgaria -- compared to a decline of 19.5 percent in Croatia. Unsurprisingly, Croatia is also lagging in terms of creation of knowledge-based startups, despite notable cases of success. The business R&D gap also limits the country's capacity to explore the opportunities opened by the emergence of the digital economy and the new wave of technological progress.

The decline in firm R&D expenditures reflects the lack of 'complementary factors' and the weaknesses of the innovation 'policy mix'. The decline in business R&D expenditures in the past decade was mainly driven by large firms with a lower number of companies investing less on average. Yet the number of innovative firms investing in R&D declined across firms of all sizes during 2008-16, even when total business R&D expanded in the country (2008-12), indicating the intensive (more per firm) rather than extensive (more firms) nature of R&D growth in Croatia. In fact, quick-start R&D in firms in Croatia seems difficult: less than 2.6 percent of firms that did not invest in R&D in 2016, started doing so one year later. This phenomenon contrasts with the international experience, especially of countries with sizeable increase in business R&D expenditures such as Bulgaria and may be an obstacle for the expansion of business R&D in the country. It also indicates that Croatian markets are missing "complementary factors" that make returns to private investments in R&D profitable. Those include, in

³ Innovations increase the efficiency of existing firms and improve the goods and services they offer, thus increasing demand and reducing production costs. Innovating firms are likely to grow more than others, and new entrants with better products to offer are expected to displace existing inefficient firms with a concomitant increase in aggregate productivity levels. By performing R&D, firms engage in routine, rather than occasional, process of innovation, enabling a systematic process of internal learning through which proprietary knowledge is more likely to be obtained.

addition to a mature NIS and a modern business environment, a policy mix that reflects better the country's stage of development. By 2011, the government budget appropriations or outlays for R&D (GBAORD) was equivalent to less than 0.042 percent of GDP, very low for international standards. About two-thirds of that corresponded to indirect support (tax breaks), an instrument that tends to favor large incumbent firms. This low volume declined to very low levels in 2018, with the suspension of tax breaks. A negligible support to business R&D, especially direct support (subsidies) that could benefit small, young firms and startups, and a bias towards large are not consistent with Croatia's needs.

Financial sector: the challenge of diversifying capital markets and enhancing access to long-term capital and risk finance

Financial markets in Croatia are currently concentrated in debt financing and lack the depth and diversity necessary for efficient allocation of resources and financing productivity-enhancing projects. Banks hold about 70 percent of total financial sector assets in Croatia. The role of non-bank financial institutions (NBFIs) remains limited and not oriented towards corporate sector funding. Pension funds hold the bulk of total assets (15 percent) among NBFIs, but around two-thirds of them are invested in government securities due to both regulatory requirements and restrained engagement in private capital investments. Assets of venture capital funds are insignificant at about HRK 20 million by the end of 2017. The European Business Angel Network (EBAN) estimates that investments by business angels in Croatia totaled EUR 1.1 million, with an average amount of EUR 275,000. In 2010 the Croatian Government launched a tender to seed a domestic institutional private equity (PE) industry through the Economic Cooperation Funds program. In 2011, five funds attracted the necessary co-finance and started operating.

Although the banking sector is overall well-capitalized, NPL ratios remain elevated, which may potentially hinder aggregate productivity growth. The capital adequacy of the Croatian banking sector is among the highest in the region, with a total capital ratio of 22.9 percent, at the beginning of 2018, compared to 16.4 percent ten years ago. Yet corporate NPL ratios are still above pre-crisis levels (22.1 percent in mid-2018) and are relatively high when compared to peer countries and the EU average. Most NPLs are concentrated in low productivity sectors such as the construction activity, in which more than half of the loans are classified as non-performing. Not surprisingly, those are the sectors where low TFP prevails and little reallocation was observed. The persistently high levels of NPLs indicate that many firms are still unable to achieve profitability levels compatible with its debt servicing. The continuous pattern of default across firms ultimately increases risk-aversion by lenders and the cost of capital and may prevent growth of more productive firms by locking resources -- a hazard to the reallocation process. High NPL dynamics create barriers for the restructuring of indebted but potentially viable firms as well, concentrating capital in short term cash flows urgencies and impeding productive investment, restricting the contribution of firm upgrade.

Policy implications: structural reforms and selected programs to support firms' upgrade efforts and knowledge-based startups

Accelerating economic growth and expanding exports in Croatia requires a broad strategy to raise productivity. Higher productivity will rejuvenate Croatia's economy and expand the base of potentially exportable goods and services, including in non-tourism services exports. It will also enable the country to explore the opportunities opened by the emergence of the digital economy and related technologies, such as the 'fintechs.' A more diversified and productive economy, in turn, will lead to the diversification of exports, reducing the country's reliance on tourism. A more productive and diversified economy will help Croatia address its demographic challenges of an aging population, and net negative migration flows.

Croatia could propel its lackluster productivity by: (i) reducing the misallocation of resources in the economy, and (ii) promoting innovation and entrepreneurship. Structural measures involve the reform of state-owned enterprises, better regulation of service sectors, pro-competitive use of state-aid and reduction of red-tape. They should be complemented by measures to facilitate the reallocation of resources and policies to promote investments in intangible assets and entrepreneurship, including expanding government's support to business R&D and early-stage funding for knowledge-based startups and a dedicated innovation agency that could enable better design, monitoring and evaluation of Croatia's national innovation system. In that context, reforming the public research system would further enhance the country's innovation potential. This note details some of those policies and explains how, by reinvigorating business dynamism, they could help Croatia achieve faster economic growth and a more innovative and diversified economy.

1 Introduction

This Policy Note was prepared as part of the Reimbursable Advisory Service (RAS): Support for Establishing the System for Strategic Planning and the Preparation of the National Development Strategy – Croatia 2030 (P166454).

The objective of the Note is to identify the structural reforms and policies that could promote growth through enhanced competitiveness and innovation. The Note follows a common structure established for all Policy Notes under the agreed thematic areas (Growth, Competitiveness, and Innovation being one of them). The structure of the Note was proposed and requested by the client.

While self-contained in its core diagnostic, a deeper understanding of a few policy-specific issues, especially on macro-fiscal, labor, science and education and governance, may be obtained by referring to the other policy notes covering those topics in the context of this RAS.

2 Overview of global trends

This section summarizes trends on global growth, trade, and technology considered relevant to inform the subsequent discussions in this policy note.⁴

Global growth: steady expansion expected to decline in the absence of structural reforms and productivity driven policies.

The steady expansion underway since mid-2016 continues, with global growth for 2018–2019 projected to remain at its 2017 level. Yet, Global growth is projected to slow from 3.6 percent in 2018 to 3.3 percent in 2019, before returning to 3.6 percent in 2020. Expansion in world trade and industrial production declined in the first half of 2018. Outcomes fell short of projections in the euro area and the United Kingdom, with Italy’s debt situation being a source of uncertainty. Growth prospects for emerging economies, especially Argentina Brazil, Iran, and Turkey, deteriorated this year reflecting country-specific factors. Overall, escalating trade tensions and the potential shift away from a multilateral, rules-based trading system are key threats to the global outlook.

In developed economies and, to a lesser extent, in developing countries, the rate of growth of output per worker has fallen since the global financial crisis in 2008. In the United States, aggregate labor productivity growth averaged only 1.3 percent per year from 2005 to 2015, less than half the average annual growth rate of 2.8 percent sustained over 1995–2004. Similarly-sized decelerations have occurred in 28 of 29 other countries for which the Organization for Economic Co-operation and Development (OECD) has compiled productivity growth data, as shown in Figure 2.1. The unweighted average annual labor productivity growth rates across these countries were 2.3 percent from 1995–2004 but only 1.1 percent from 2005–14. These trends, if permanent, are hugely consequential. The worldwide drop of 0.8 percent per year in average labor productivity growth that occurred after 2006 sustained for ten years lowered gross world product in 2017 by about USD 8.3 trillion—or USD 1,100 per person.⁵

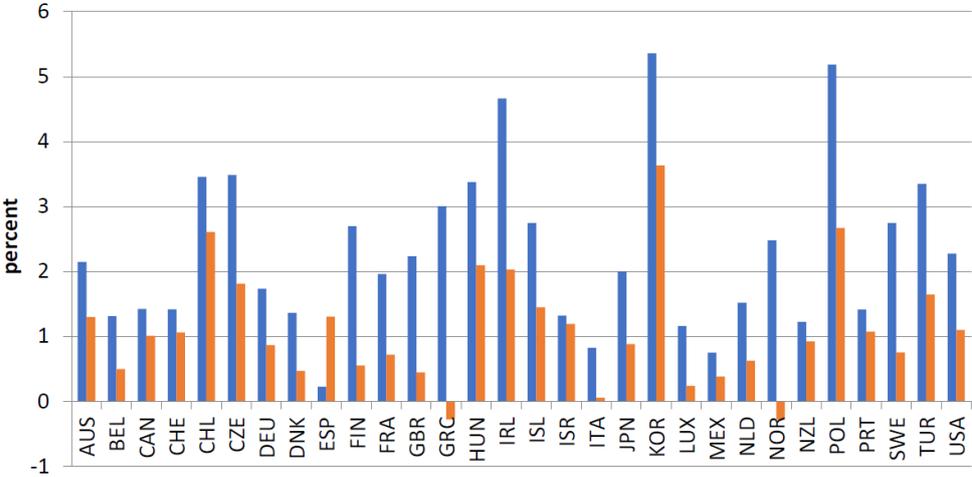
The decline in labor productivity, at least in developed economies, has been driven by poor total factor productivity (TFP) performance. Labor productivity results from the contributions from capital accumulation and TFP -- a measure of the efficiency with which countries transform factors of production and intermediate inputs into the final output. Approximately 0.9 of the total 1.1 percentage point slowdown in labor productivity from 1999–2006 to 2013–15 in OECD countries is accounted for by total factor productivity. The explanatory power of TFP for the individual developing countries whose labor productivity fell varies but is still important. TFP decline, at least in more advanced economies, is to a large extent caused by diminishing dynamism in those economies: the “churn” in the economy—job reallocations, firm turnover, and entrepreneurial activity—has been declining for some time, including in what are thought by many to be vibrant sectors, like information and communications technology (ICT). This, in turn, would be closely related to the existence of regulations and other market

⁴ We do not intend to be exhaustive and limit the analysis to the topics addressed in the policy note, nor do we try to derive full implications for Croatia’s National Development Strategy in this section (which will be done in each section as appropriate).

⁵ Cusolito, A. and Maloney, B. (2018). Reviving Global Productivity: Shifting Paradigms in Analysis and Policy. Washington, DC: World Bank.

frictions that prevent efficient reallocation of capital and labor towards more productive firms throughout the economy, despite the recent acceleration of technological progress.⁶

Figure 2.1. Average annual labor productivity growth, 1995–2004 and 2005–14



Source: Cusolito and Maloney (2018)

As output gaps close and monetary policy settings continue to normalize, growth in most advanced economies is expected to decline to potential rates—well below the averages reached before the global financial crisis of a decade ago. Slower expansion in working-age populations and projected lackluster productivity gains are the prime drivers of lower medium-term growth rates. To counterbalance this trend, “countries should grasp the opportunity to adopt structural reforms and policies that raise productivity and ensure broad-based gains—for instance, by encouraging technological innovation and diffusion, increasing labor force participation (especially by women and youth), supporting those displaced by structural change, and investing in education and training to enhance job opportunities”.⁷

Trade: After experiencing a temporary rebound, global trade declined and faces downside risks in the short run –continuous trade frictions between the United States and China play a major role in defining the future of global trade.

Global trade in goods and services experienced a cyclical rebound. After a protracted period of weak performance, global goods trade showed a strong performance in 2017, as trade in goods grew 4.6 percent in relation to 2016, almost three times the pace experienced in previous years. The upsurge was more pronounced in emerging markets and developing economies, especially emerging Asia and China. Trade in services also experienced positive performance in the same period and had shown a much stronger trend since the global financial crisis (Figure 2.2).⁸ Over the past decades, global trade was enabled by innovations in logistics (e.g. containerization) and information and technology which reduced costs of transportation and communications as well as a multilateral open trade regime that kept

⁶ Davis, S. J., & Haltiwanger, J. (2014). Labor market fluidity and economic performance (No. w20479). National Bureau of Economic Research.

Decker, R., Haltiwanger, J., Jarmin, R., & Miranda, J. (2014). The role of entrepreneurship in US job creation and economic dynamism. *Journal of Economic Perspectives*, 28(3), 3-24..

⁷ International Monetary Fund (Oct. 2018). *World Economic Outlook: Challenges to Steady Growth*.

⁸ World Bank (Jan. 2019). *Global Economic Prospects: Darkening Skies*. Washington, D.C. World Bank.

protectionism barriers low. Currently, the global economy is “hardwired” in a complex production process through global value chains.

Looking forward, however, growth in global trade of goods and services lost steam and is expected to stagnate on a lower level (Figure 2.3). Following a broad-based upswing in cyclical growth that lasted nearly two years, the global economic expansion decelerated in the second half of 2018. This is largely explained by a combination of key structural factors, such as slower growth of global value chains and a reduced appetite for further trade liberalization in the world - which has contributed to reducing the long-run income elasticity of trade over the last decade - with a projected deceleration of capital spending in China and in most advanced economies. Following strong momentum in 2017, growth in global goods trade markedly slowed during the first half of 2018 and has only partially recovered since then. Increasing protectionist rhetoric and actions from the United States especially, though not exclusively, towards China, combined with retaliatory measures from trade partners placed the multilateral trade regime at risk. The specific effects of escalating trade protectionism are estimated to be large, especially for emerging and developing economies. In this scenario, highly protected sectors – such as food processing and agriculture – would be among the most affected.⁹

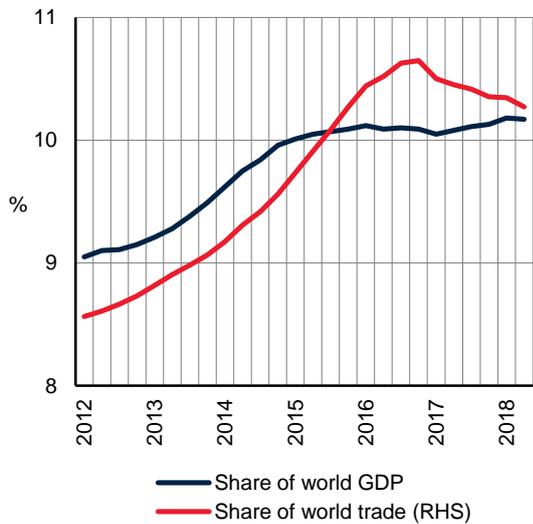
The new wave of technological innovation has the potential to bring considerable economic benefits but also entails challenging adjustments, especially in labor markets.

Technological breakthroughs may be catalytic for long-term productivity and income growth, but this will require technology diffusion to accelerate between and within countries. The uptake of new technologies, such as digital technologies, 3D printing, big data analytics, synthetic biology, nanomaterials, robotics, and artificial intelligence (AI) remains uneven across firms. In developed economies, for example, broadband connections and web pages are more frequently used than advanced ICT applications such as enterprise resource planning software and cloud computing – normally used by a minority of larger enterprises. Uneven technology adoption, in turn, is creating a divide between frontier and lagging companies which, in turn, translates into lower aggregate productivity growth. To enable technology diffusion, governments will have to strengthen their national innovation systems, creating an enabling environment for firms to invest in physical and intangible capital, organizational change, managerial skills, research and development, and innovation.¹⁰

⁹ Kutlina-Dimitrova, Z. and Lakatos, C. (2017). *The Global Costs of Protectionism*. Washington, D.C. World Bank.

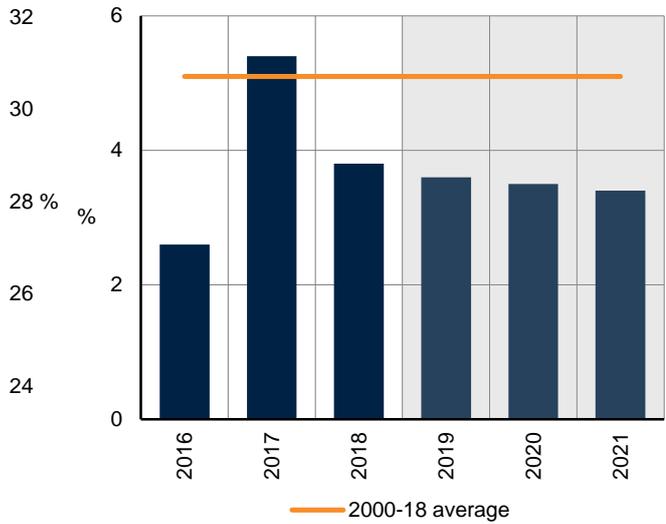
¹⁰ OECD (2018): *Achieving Inclusive Growth in the Face of Digital Transformation and The Future of Work*. Report to G20 Finance Ministers.

Figure 2.2. Global services trade, shares (2012-2018)



Source: World Bank (2018) “Global Economic Prospects, January 2019”

Figure 2.3. Global trade growth, volumes



Source: World Bank (2018) “Global Economic Prospects, January 2019”

New technologies may be more disruptive for labor markets, especially in the case of automation. Machines can perform an increasing range of tasks that were reserved for workers in the past; progress in robotics has changed manufacturing, and AI makes robots more productive and able to perform a much wider range of tasks. As the technology 'AI-robotics' becomes cheaper relative to labor, pressure over middle-skills jobs regarding unemployment and lower wages will increase. This is not a new process: throughout history, technological change has eliminated some jobs and transformed others; while new ones have been created – as reflected in growing total employment levels over time. Yet, shifts in the sectoral composition of employment come with high adjustment costs and skills mismatches likely to cause frictional unemployment. Governments are therefore encouraged to adopt policies and reforms that reduce those adjustment costs by facilitating labor reallocation (e.g. easier employment protection legislation with a stronger but temporary safety net) and shortening the period during which labor remains idle (e.g. relocation grants).¹¹

Digital technologies, in particular, have diffused quickly, radically transforming business models and creating a whole new sector – the digital economy. Digital technologies—internet, mobile phones, and all other tools to collect, store, analyze, and share information digitally— were cheap, relatively easy to use with immediate private benefits, and have therefore diffused quickly. In the United States, for example, the digital economy has grown at an average annual rate of 5.6 percent between 2005-16, compared to 1.5 percent growth in the economy. The digital sector, which includes network infrastructure, e-commerce, and digital media, accounted for USD 1.2 trillion, or 6.5 percent,

¹¹ International Monetary Fund (2018). Group of Twenty. Technology and the Future of Work. Mimeo.

of gross domestic product in 2016.¹² They are an important source of new jobs. Internet-based services drive marginal transaction costs to zero which, in theory, ignites competition pressure. In practice, however, many regulatory and competition policy issues have emerged challenging the authorities – such as the regulation of new financial service providers (‘fintechs’) and abuse of market dominance by large platforms and search engines. The digital revolution can give rise to new business models that would be beneficial to consumers, but not when inadequate regulations, including in service sectors, and incumbents prevent market entry.¹³

The implications of those global trends on trade and technology for Croatia are not straightforward and more likely to be of second-order nature.

Croatia’s specialization in tourism tends to mitigate the negative and direct effects associated to global trade and technological progress. Compared to other EU member countries where the share of the manufacturing sector in the overall economy and exports is larger (e.g. the Czech Republic), Croatia’s exports, concentrated in tourism will feel the impact of deteriorating global conditions less directly – at least in the short term. Disruptions in the labor market related to technological progress are also unlikely to be predominant, as industrial manufacturing, the segment more susceptible to automation, does not represent a large share of employment. Moreover, advances in the digital economy may provide opportunities for the growth of new businesses in the country – including, as the EURO adoption approaches, in the space of digital finance. Despite some short-term resilience, Croatia needs to be prepared to weather the second-order effects related to those global trends which, compounded with an economic slowdown in advanced economies, may cause a cyclical decline in the demand for tourism services in the country. This, in turn, requires raising productivity, the main source of long-term growth, by reinvigorating business dynamism, promoting better allocation of resources and encouraging innovation -- as discussed in the next section.

¹² Bureau of Economic Analysis (March 2018). United States Department of Commerce.

¹³ Peña-López, I. (2016). World development report 2016: Digital dividends.

3 Overview of developments in Croatia

Croatia is likely to feel the first-order negative impacts of global trade and technological trends less than other EU member states. Yet to weather the second-order effects and strengthen its growth prospects, the country needs to raise total factor productivity (TFP), the long-term source of economic growth.¹⁴ This, in turn, will require a renewed emphasis on strengthening business dynamism through reallocation of resources and innovation by advancing structural reforms and implementing policies to strengthen firm capabilities for innovation.

With higher productivity gains, a more dynamic economy will also increase the availability of products that can be sold in foreign markets, raising international competitiveness and helping to diversify Croatia's exports. Such economy will also be able to achieve higher rates of economic growth, helping to mitigate Croatia's demographic challenges. In fact, the link between firm innovation, market reallocation, productivity gains and augmented export competitiveness will guide the development of the analysis in this section.

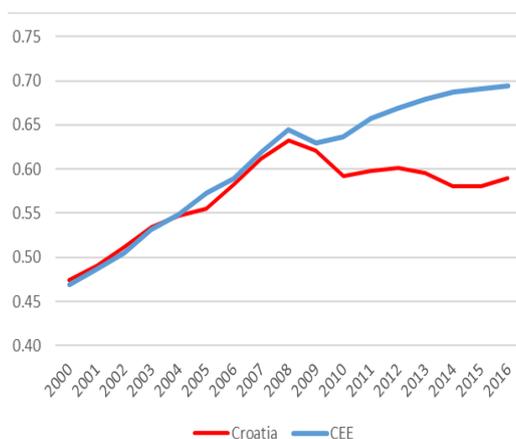
The remainder is organized as follows: section 3.1. discusses recent developments in terms of growth, trade, and innovation; section 3.2. decomposes the sources of TFP growth and discusses the impact of firm characteristics (ownership and size), selected business environment and innovation with the goal of informing the decision about policy priorities; section 3.3. reviews the conditions of Croatia's financial markets; and section 3.4. concludes. The policy implications of this analysis are developed in Sections 4 and 5 of this Policy Note.

¹⁴ Total factor productivity (TFP) is a residual of output once all measured inputs are accounted for, notably labor (augmented by the quality of human capital) and capital (including physical capital, such as machinery, computers and buildings, and also energy, materials, and services, plus some measures of intangible capital). TFP therefore captures the efficiency with which all inputs are combined into the productive process.

3.1 Croatia's recent performance: growth, trade, and innovation

Economic Growth: Post-2008 growth performance was insufficient to promote convergence to EU income levels...

Figure 3.1. GDP per capita (at PPS): Croatia and CEE



Source: World Bank (2018)

Croatia's growth after 2008 has severely limited convergence towards the living standards of its European Union peers. In the 2000-2008 period, Croatia's GDP per capita rose by 4.2 percent per year while GDP per capita rose above USD 22,000, reaching 63 percent of the EU28 GDP per capita level. The global economic crisis started for Croatia one of the longest economic recessions in modern European history. Over the next six years, GDP fell by 12 percent, household incomes dropped across the income distribution, and poverty and vulnerability increased sharply. The recovery since 2014 has been slow, and, unlike its Central and Eastern European (CEE) peers, Croatia has yet to resume convergence with EU income levels (Figure 3.1). The interruption in convergence since 2008 also deteriorated Croatia's social indicators. The share of the population living on less than ten dollars a day (in poverty or vulnerable) increased from 26.6 percent in 2009 to 33.4 percent in 2014.¹⁵

... reflecting, in part, intrinsic limitations of growth based on the expansion of aggregate demand.

Croatia growth in 2000-2008 was essentially driven by a systematic increase in aggregate demand. Demand expansion resulted, in turn, from an expansionary fiscal policy with recurrent fiscal deficits and a surge in household consumption. Aggregate investments concentrated basically in real estate, accommodation, and infrastructure also contributed. As productivity deteriorated, external imbalances widened, and the liabilities of households, firms and the public sector increased. The boom ended abruptly with the crisis, as global demand fell and capital inflows dried up.¹⁶ The negligible contribution of TFP in that period was a striking difference compared to most of its peers, and to the country's own experience in the first years of transition (1994-2001) when reforms were being implemented. In 2008 the economy was reaching its full capacity, and higher rates of growth would have required expanding the economy's potential output by increasing labor market participation, better use of labor, and capital and/or innovation (TFP).

¹⁵ World Bank (2018). Croatia – Systematic Country Diagnostic. Washington, D.C. World Bank Group

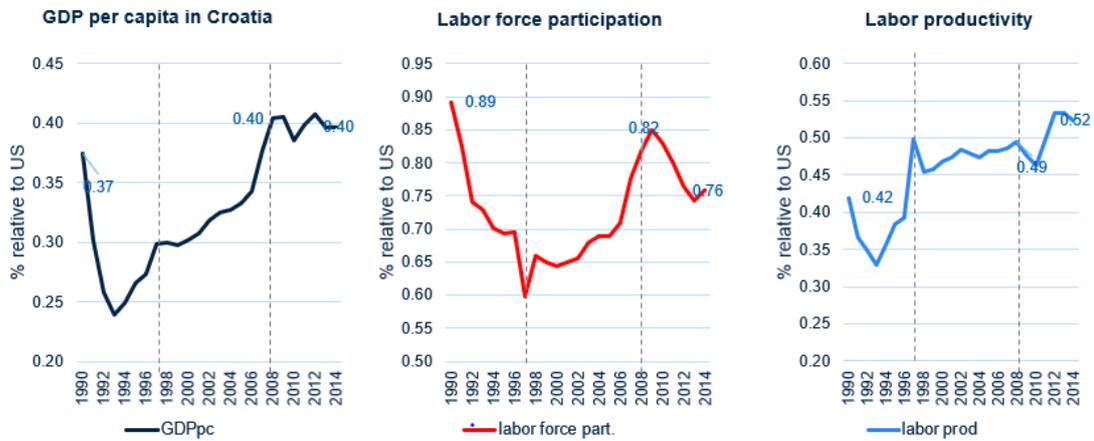
¹⁶ World Bank (2009). Croatia's EU Convergence Report. Report N. 48879-HR

Croatia ought to revert to labor productivity to reignite the process of economic and social convergence, and this requires TFP catching up with the global frontier.

To understand the main challenges faced by Croatia in the process of economic convergence at the macro level, we looked at its recent performance compared to the global frontier. Figure 3.2 describes the evolution of Croatia's per capita income convergence in regards to two main components – labor participation and labor productivity – compared to the US (conventionally taken as the global frontier). It shows a significant catching up regarding labor utilization in the past decade, but much less so in term terms of labor productivity. In turn, Figure 3.3 decomposes the evolution of labor productivity in two other components, the capital-labor ratio (i.e. the amount of capital – the machinery and equipment, infrastructure – per worker) and total factor productivity. It shows a significant catch up of the capital-labor ratio, and a decline in TFP – i.e. Croatia became less efficient and less innovative (in comparison with the global frontier) in recent years.

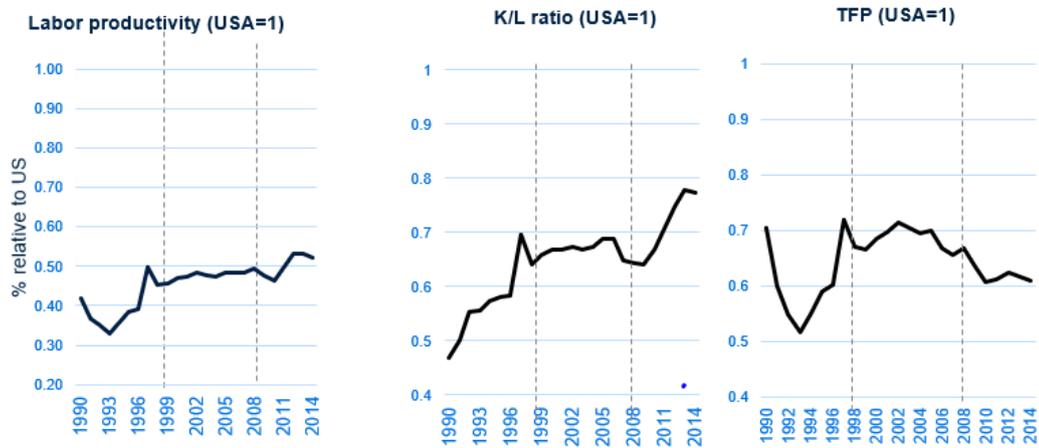
The rise in the capital-labor ratio reflected a major surge in investments and the shrinking of labor force participation during that period. The capital-labor ratio increased from about 55 percent to almost 80 percent of the global frontier. Noticeably, investments were relatively more abundant in construction, accommodation and restaurant industries than in manufacturing (which corresponded to more than 15 percent of the total gross formation of fixed capital). Overall, the composition of gross fixed capital formation was biased towards consumption-related and non-tradable sectors, instead of the tradable sector – possibly reflecting public investments in infrastructure and the boom in the construction sector. By neglecting the role of TFP over the past years, Croatia missed the variable that explains half of the difference in per capita income between countries around the world.

Figure 3.2. Decomposing convergence in GDP per capita: labor market participation and productivity



Source: WB staff elaboration using Penn Table 9.0
 GDP per capita is defined as output-side real GDP at current PPPs (in mil. 2011US\$) divided by population
 Labor productivity is output-side real GDP at current PPPs (in mil. 2011US\$) divided by number of persons engaged (in million)
 "Labor force participation" is number of people engaged by population

Figure 3.3. Decomposing labor productivity convergence: K/L ratio and TFP

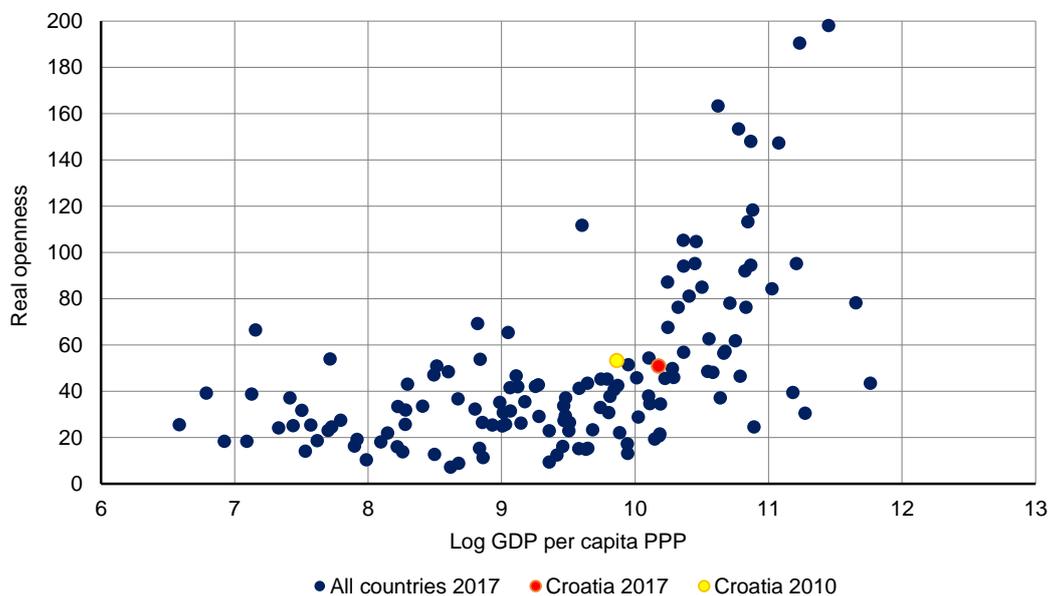


Source: WB staff elaboration using Penn Table 9.0
 Labor productivity is output-side real GDP at current PPPs (in mil. 2011US\$) divided by number of persons engaged (in million)
 Capital labor ratio is defined as capital stock at current PPPs (in mil. 2011US\$) divided by number of persons engaged (in million)

Trade Performance: Croatia trade openness is still low, despite recent improvements in export competitiveness, including some preliminary signs of structural transformation.

Croatia’s trade openness continues to be low when compared to countries with similar development level.¹⁷ Trade openness in 2017, about 99.9 percent of GDP in nominal terms, represents an improvement in relation to 2010 levels (75.6 percent). The level of trade openness compares well with other tourism-intensive economies such as Greece (67.5 percent), and other small open economies such as Slovenia (154.8 percent). The picture changes, however, when a measure of real openness is used: in that case, not only does trade integration seem much lower (50.9 percent of GDP in 2017), it also seems to have slightly decreased over time from 53.3 percent in 2010 (Figure 3.4).¹⁸ In comparison, Slovenia’s real openness was equivalent to 104 percent of GDP in 2017. As open trade regimes are one of the well-known regularities of the several episodes of growth acceleration in recent decades, such low levels of trade openness do not seem to favor Croatia’s long-term growth prospects.¹⁹

Figure 3.4. Real trade integration



Note: Real openness is defined as nominal imports plus exports relative to GDP in purchasing power parity

Source: Source: World Development Indicators dataset

Croatia’s exports have been increasing in recent years, with growing participation of non-tourism exports. Croatia’s exports expanded from 34 percent since 2009, reaching 51 percent of GDP in 2017 – an increase of 5 percent per year. The result is equivalent or above what was achieved in the

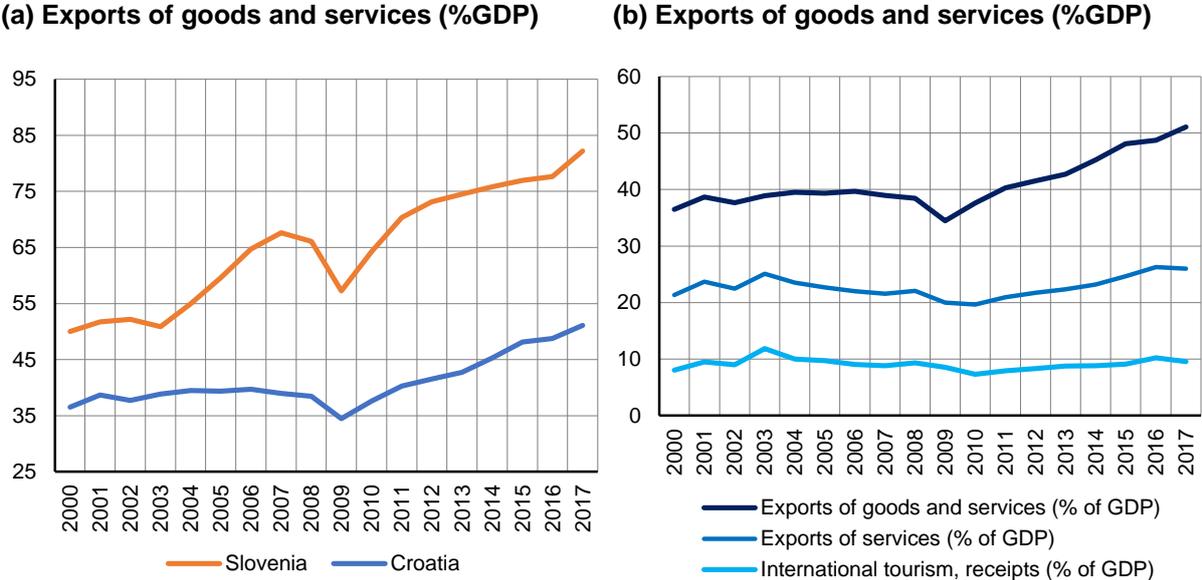
¹⁷ Trade integration is defined as the value of exports plus imports of goods and services in a year over divided by the nominal GDP in that year.

¹⁸ The real openness indicator is defined by nominal trade volume (total export and imports) divided by GDP in purchasing power parity. The measure is proposed by Alcalá and Ciccone (2004) to ‘correct’ for the fact that productivity gains are greater in manufacturing than in non-tradable services (the Balassa-Samuelson hypothesis). Relatively greater productivity gains in manufacturing lead to a rise in the relative prices of services (non-tradable), which may result in a decrease in openness. The objective of using real openness instead of nominal openness is to eliminate distortions due to cross-country differences in the relative prices of non-tradable goods – hopefully making cross-country comparisons of trade openness more accurate. See Alcalá, F., & Ciccone, A. (2004). Trade and productivity. *The Quarterly Journal of Economics*, 119(2), 613-646.

¹⁹ See Hausmann, R., Pritchett, L., & Rodrik, D. (2005). Growth accelerations. *Journal of Economic Growth*, 10(4), 303-329.

post-crisis period by many export-oriented economies such as Slovenia, with 4.6 percent per year (Figure 3.5 (a)). Croatia’s services exports declined from 58 percent to 51 percent of the total, while the share of tourism in services stabilized over time, indicating a small but noticeable expansion in the exports of goods (Figure 3.5 (b)).

Figure 3.5. Croatia exports evolutions, 2000-17



Source: World Development Indicators dataset

Another positive change is the growing specialization in industries for which global demand is increasing. Between 2013-17, most of Croatia’s top export sectors have increased their global market shares in industries for which global demand is expanding (“winners in growing sectors”). These include sectors such as pharmaceutical products, footwear, apparel, and wood products. In 2008-12, most of the top 20 largest export sectors in Croatia were losing market share in markets for which global demand was declining.²⁰ The change of performance between 2008-12 and 2013-17 -- like in footwear, moving from losing to winning market share in a sector for which global demand is expanding.²¹

Those results, although preliminary, indicate the potential for structural transformation of the tradable sector. Indeed, Croatia has maintained or increased its global market shares in several sectors, including in industrial niches with some degree of technological sophistication – such as specialized industrial machinery and parts, vehicle parts, and medicaments. Yet, most growing niches were isolated in the product-space, neither representing a new cluster of economic activity nor the expansion of existing ones. Overall, Croatia’s exports are still dominated by industries competing by price (not quality), reducing the capacity of Croatia’s firms to obtain extra value in international markets.

²⁰ See Apramian, A.. and Correa, P. (2015): Smart Specialization in Croatia: Inputs from Trade, Innovation and Productivity Analysis. World bank , Washington DC. and the

²¹ See Policy Note on Macroeconomic Stability, Fiscal Policy and Taxation prepared for this RAS..

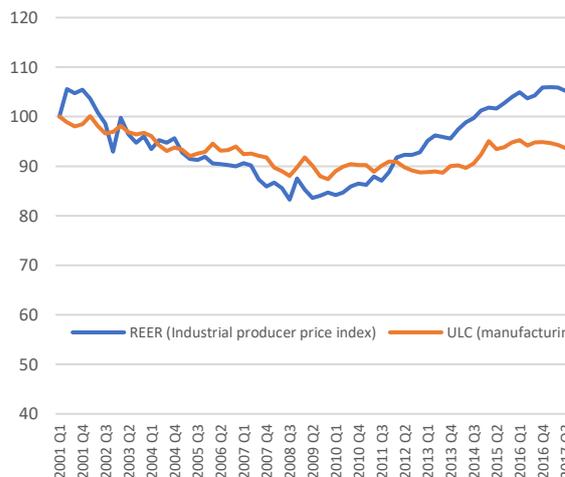
Recent improvements in export competitiveness were driven by a gradually competitive exchange rate and stable unit labor costs, compensating for a rise in the relative price of services.

The recent export performance is to a large extent caused by a substantial improvement in the real effective exchange rate (REER) after 2011.²² Between 2001-08, Croatia's REER appreciated about 16 percent and unit labor costs (ULC) did not reduce enough to compensate for that appreciation, dragging down Croatia's exports competitiveness in the industrial sector.²³ Between 2008-17, a gradual depreciation of the REER of about 25 percent more than compensated the modest increase in ULC that occurred after 2014, improving the price competitiveness of Croatia's industrial goods (Figure 3.6 (a)).

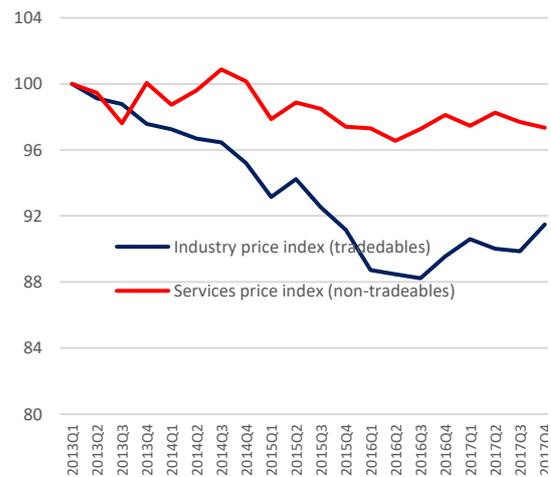
Meanwhile, the relative prices of non-tradable goods increased. The tradable sector consists mostly of sectors of the manufacturing industry, while the non-tradable sector consists of locally-rendered services including health, education, retail, and construction. In Croatia, both industry and services prices curves faced a drop since 2012, followed by stagnation and partial return from mid-2015. Nevertheless, the drop in industries prices has been more acute than the decline in services prices, with a total gap of 5.86 percentage points by the end of 2017, revealing the more significant impact on the manufacturing side of exports (Figure 3.6 (b)).

Figure 3.6. Unit labor costs and trade price index

(a) Real Effective Exchange Rate (REER) and Unit Labor Cost (ULC) 2001Q1=100



(b) Price Index: Tradable and Non-Tradable Sectors (2001Q1=100)



Source: Staff elaboration using Croatian National Bureau data and World Development Indicators

²² The real effective exchange rate (REER) is the weighted average of a country's currency in relation to an index or basket of other major currencies. The weights are determined by comparing the relative trade balance of a country's currency against each country within the index.

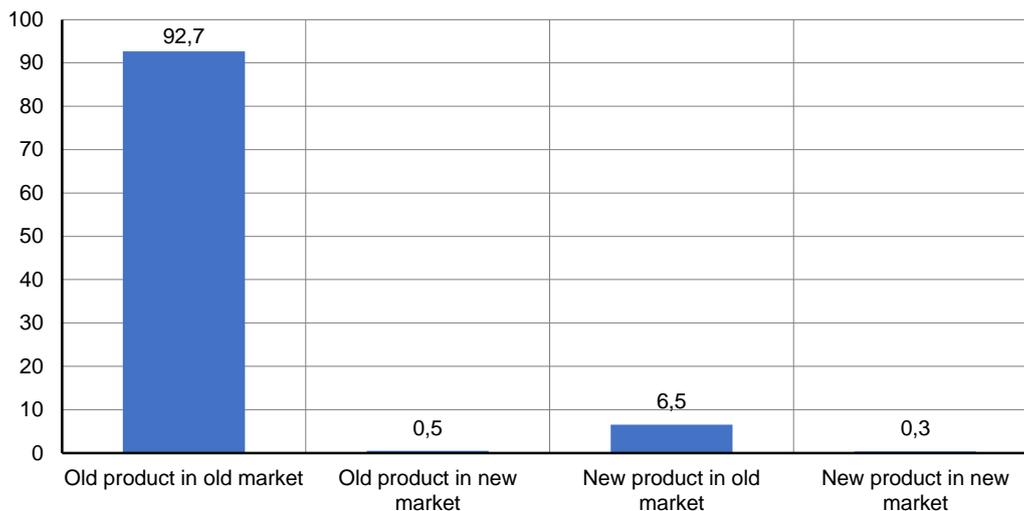
²³ Unit labor costs (ULC), corresponds to the labor costs per unit of output in the market sector and is calculated as compensation of employees (gross wage and social transfers) divided by the volume of production (deflated value added)

The limits of the structural transformation underway in the tradable sector is evident from the analysis of extensive and intensive margins of the recent trade performance.

Analysis of extensive and intensive margins of the trade reveals that Croatia has been specializing in existing markets while showing little growth in new products and markets. Figure 3.7 describes the decomposition of Croatia’s export growth between 2010-2016 concerning products and geographic destinations. It shows that most of Croatia’s recent export growth in the 2010-2016 period has been driven by ‘old products’ being exported to existing geographic markets, to the detriment to new geographic markets and new products.²⁴ Analysis of export products and destinations reveals that Croatian export profile has shown little dynamics and a limited capacity to diversify exports, despite the positive recent developments.

Croatia’s limited trade integration is explained, in part, by a relative specialization within the service sector. Though some emerging exports are promising, they are still insufficient to pull Croatia to higher levels of trade integration. Other high-income economies went through a similar structural transformation but ended up with higher levels of trade openness. The issue seems to be that business services exports, the larger share of services exports in high-income countries, is very low in Croatia. Croatia’s sophistication of services exports is still behind most its peer countries.²⁵ In 2012, ‘Transport and Other Business Services’ currently making-up to about one-fifth of services exports – resulting from a declining trend of “Transport” and raising participation of “Other Business Services”.²⁶

Figure 3.7. Export growth decomposition, 2010-2016



Source: Staff elaboration

²⁴ Old products are defined as goods that are already have domestic production and exportation. Increase in old products is associated with gains in the intensive margin of trade growth. For more see Hausmann, R., & Klinger, B. (2006).

²⁵ See Aprahamian and Correa (2015).

²⁶ See Aprahamian and Correa (2015). For further discussion on the composition of trade and trade in services see the *Policy Note on Macroeconomic Stability, Fiscal Policy and Taxation*, prepared as part of this RAS.

The anemic development of the remaining non-tourism tradable sector explains the concentration of Croatia's exports in tourism services. In other words, the dependence on tourism export is caused by an underdevelopment of tradables and non-tourism services sectors – not the other way around. Such emphasis may create challenges for the preservation of Croatia's natural capital and impose additional stress for the system of waste management in the country, including regarding reaching Croatia's agreed EU targets.²⁷ The tourism industry has been supporting economic growth and will continue to play a large, positive role in the foreseeable future. But the opportunities for productive diversification based on tourism are intrinsically limited (see Box 3.1).

²⁷ European commission (2017). The EU Environmental Implementation Review Country Report – Croatia.

Box 3.1. The Tourism Sector

Croatia's tourism sector boomed in the 2000s with the combination of vast and unique natural resources, strong cultural heritage, massive investments in infrastructure, especially roads, the proximity to Europe and the end of geopolitical tensions in the region.

Travel services grew by an average of 6.7 percent per year in 2000-17, as the number of international arrivals climbed from around 5.8 million to 17.4 million. Travel services exports grew even faster before the 2008 global crisis, when the decline of global growth affected global demand for tourism. More recently, political and security issues in alternative destinations further raised the demand for Croatia's destinations.

According to the Tourism Satellite Account for the Republic of Croatia, the tourism direct gross value added accounted for 10.89 percent of total gross value added and the total contribution of tourism to the gross domestic product of Croatia amounted 16.9 percent.²⁸ The tourism sector generates foreign exchange, will be a source of demand for key enabling technologies, and provides job opportunities, especially to low- and medium-skilled workers, who tend to be more vulnerable. In a nutshell, tourism has become, and is likely to be in the foreseeable future, a major source of prosperity in Croatia.

Yet, sustainable management of natural resources deserves attention. The increase in visits to major national parks, for instance, requires an increase in their carrying capacity. Internal population growth and/or migration to areas that have greater economic benefits (i.e. protected areas) place additional pressure on local resources. On the macroeconomic side, the inflow of foreign exchange may be a source of a lighter version of the "Dutch Disease".

Spillovers of tourism activity, including backward and forward linkages, are intrinsically limited. Some evidence suggests that Croatia's tourism sector purchases fewer inputs from domestic producers (backward linkages) than the tourism sector in other countries, but this may be not unique to tourism – reflecting, rather, the country's pattern of trade specialization.

Moreover, spillover effects may depend on the regulation of other product and service markets. For instance, restrictive regulation of health-related professions (e.g. physiotherapy occupation) can have negative effects on the spill-overs and diversification of tourism activity (e.g. towards health tourism), as detailed in separate report.²⁹

Unexplored opportunities towards higher value-added services (e.g. health tourism) may still exist. But as Croatia explores the full potential of its tourism sector, a strategy to diversify the economy based on its linkages is unlikely to be fully successful. To achieve this goal, the country would have a better chance by implementing policy reforms that foster reallocation, innovation and business dynamism, as discussed in this Policy Note.

Source: Staff elaboration based on UNWTO data.

In sum, deepening trade integration in Croatia requires, therefore, structural reforms and firm capability policies to raise productivity and business dynamism.

The structural transformation of the export sector is undermined by low productivity levels and limited business dynamism of the overall economy. The low frequency of new exports suggests that the expansion between 2010-16 was driven mostly by exporting firms responding to an improvement in price competitiveness and higher global demand. This implies that other existing firms did not achieve the productivity thresholds necessary to start and sustain export activities and that potentially more productive firms (and, thus, more likely to export) did not enter the marketplace – indicating a lack of dynamism in Croatia's economy. These two effects reinforce each other, as the low

²⁸ For more see United Nations World Trade Organization (UNWTO) and Croatian Bureau of Statistics (<http://hrturizam.hr/tourism-satellite-account-for-the-croatia-2016/>)

²⁹ World Bank (2019). Croatia Review of entry and conduct requirements in regulated professions. Volume I: Health and construction. (Forthcoming).

export performance is also likely to reduce firm productivity in a low-level equilibrium in which the participation of low productivity service sectors is predominant.

Structural reforms and firm capability policies could help unleash new export potential in Croatia. For instance, proper reform of the logistics sector – railway and ports included – would enable the expansion of transport and business service exports, segments in which high income economies often specialize. Policies that support firm capabilities and entrepreneurship, enhancing the country’s capacity to explore the opportunities opened by the digital economy and the new technologies, would also be useful. In fact, innovation policies will have to play a more effective role to enable the emergence of a more resilient economy in Croatia.

Innovation: Croatia’s National Innovation System needs to mature to enable the absorption and use of knowledge, strengthening the transition towards a diversified and competitive economy.

Croatia’s innovation performance is at the very end of the group of ‘moderate’ innovators among the EU-28 countries. The 2018 European Innovation Scoreboard prepared by the European Commission categorizes thirty-six countries within four groups based on a composite indicator of national innovation system performance: Innovation Leaders, Strong Innovators, Moderate Innovators, and Modest Innovators.³⁰ In 2017, Croatia was ahead of Bulgaria, Macedonia, Romania, and Ukraine but behind Austria, Hungary, Slovakia, and Slovenia. Contrasting with other lagging countries, Croatia’s ranking position worsened in the past years, decreasing from 28th position in 2010 to the 32nd in 2017. By contrast, Serbia improved significantly to match the levels of Hungary and Slovakia.

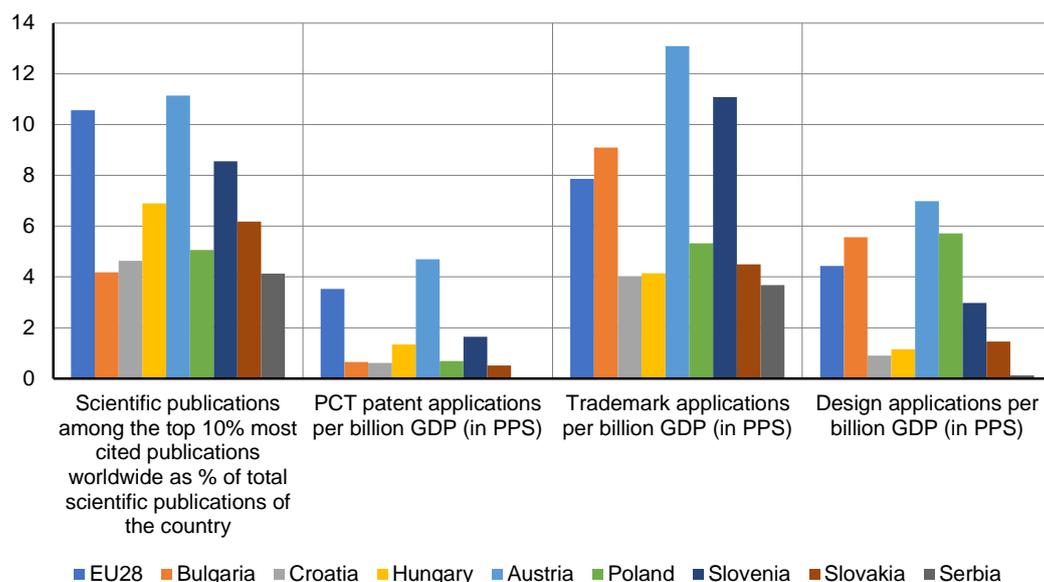
Output indicators, including those referring to the creation of proprietary knowledge and the generation of new, appropriable ideas, show very poor results. According to the EIS 2018 (European Innovation Scoreboard 2018), Croatia had in 2015 amongst the lowest levels of the core indicators of intellectual assets (see Figure 3.8).³¹ In the bottom quintile on patenting intensity (applications to the European Patent Office), and with approximately 0.61 patents per billion GDP, Croatia is underperforming relative to the EU 28 average of 3.53 patents per billion GDP. Results for other measures of intellectual assets do not show a better picture. In 2015, Croatia’s trade-mark and design applications corresponded to 38 and 26 percent respectively to Slovenia, and 54 and 20 percent respectively to the EU 28 average.

Croatia’s economy is not creating enough knowledge assets. Ownership of proprietary knowledge, such patents, trademarks, and design, matters because they enable a type of product differentiation which cannot be easily erased by competition. In this setting, the monopolistic competition is likely to generate longer periods of demand growth for the innovative firm.

³⁰ EU countries plus Norway, Iceland, Macedonia, FYR, Serbia, Turkey, Ukraine, Switzerland, Israel

³¹ A similar picture is obtained from the OECD data for Triadic patent families in 2014. A triadic patent family is defined as a set of patents registered in various countries (i.e. patent offices) to protect the same invention. Triadic patent families are a set of patents filed at three of these major patent offices: the European Patent Office (EPO), the Japan Patent Office (JPO) and the United States Patent and Trademark Office (USPTO).

Figure 3.8. Scientific publications and intellectual assets in 2015



Note: All data presented in 2015 values (last available data for scientific publications and patent application) for comparability purpose

Source: European Innovation Scoreboard 2018

Despite notable niches of excellence, world-class research is still a challenge. Whereas the overall number of Croatian publications almost doubled over the past decade (cited documents according to Scopus³²: 3,722 in 2006, 5,772 in 2016), the percentage of highly-cited publications in 2015 is below the EU average and most of the peer countries (Croatia: 4.5 percent, Serbia: 5.3 percent, EU-28: 10.5 percent of the publications among the 10 percent top-cited). Croatia’s research sector is, therefore, a limited source of new ideas for innovation and entrepreneurship.³³

This academic performance is closely related to the governance of Croatia’s research system. This includes a not always meritocratic distribution of research funding, favouring inward-oriented collaboration and ‘incumbent’ researchers. Previous experiences to promote meritocratic allocation of research grants, targeting international collaboration of young researchers through the Unity Through Knowledge Fund (UKF), a program implemented by the Ministry of Education, have shown some preliminary encouraging results (see Box 3.2).³⁴

Box 3.2: The Unity Through Knowledge Fund

The Unity Through Knowledge Fund (UKF) aimed to promote research excellence through collaboration between Croatia’s scientific diaspora and local researchers with the competitive provision of research grants.

In 2007–11, 325 project applications were submitted (for EUR 24.8 million) of which 91 were funded (EUR 7.8 million), benefiting 544 researchers from 260 institutions. Third parties (including foreign research institutes

³² <http://www.scimagojr.com/countrysearch.php?country=hr>

³³ Universities and public research institutes are not the only source of ideas for entrepreneurs, but their performance of such role in developed economies has increased in the past decades due to the potentially proprietary nature of knowledge generated by academic research. The goal of fostering research universities as a source of entrepreneurship and local economic development has been addressed by policy makes in the EU as the “Third Mandate” of universities

³⁴ Despite the success of UKF in promoting research excellence, the continuity of the program is currently uncertain.

and SMEs) contributed with about 35 percent of the total investment. UKF funding contributed to the publication of 177 articles in peer-reviewed publications, including Nature and Science; and the establishment or development of collaboration with top-level research organizations, such as Yale and Stanford universities and Harvard Medical School (United States), the Federal Institute of Technology, Lausanne (Switzerland), the Royal Institute of Technology (Sweden), and the Max Planck Institute (Germany).

Other evidence corroborates the idea that UKF had a positive impact on research excellence. First, the rate of approval of UKF-related applications to the EU Seventh Framework Program (about 30 percent) was about twice the Croatian average (15 percent). An assessment by the Institute of Economics of Zagreb (IEZ 2011) showed that the program, too, helped deepen collaboration. The program was also recognized as having best practices by the International Labor Organization and the European Commission.

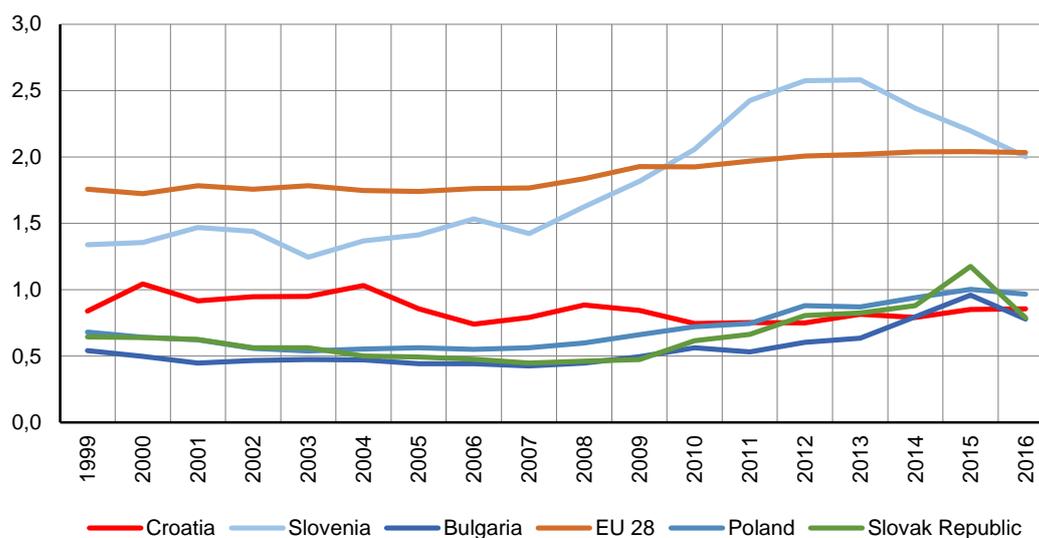
Source: Aprahamian and Correa (2015)

Gross expenditures in research and development have declined and been systematically low in the past decade, with a still significant participation of the public sector.

Croatia's gross expenditures in research and development (GERD) have declined substantially since 2000, stabilizing at a relatively low level. Croatia's gross expenditures in R&D (GERD) in 2016 corresponded to about 0.86 percent of GDP, a clear decline in relation to the 2004-10 period. Current levels are, nevertheless, well below the 2000-04 average (0.98 percent of GDP) or the 1.04 percent level of 2000, the highest value of the past 15 years. For comparison, Bulgaria's GERD, equivalent to half of Croatia's level in 2002, increased to 0.9 percent of GDP in 2015 – a consistent upward trend since 2009. Other countries, such as Slovakia and Poland, made similar efforts, starting from lower R&D spending in the pre-crisis period to achieve higher levels than Croatia in 2016 (Figure 3.9).

In this context, Croatia should not be able to achieve their own EU 2020 R&D targets. The EU has long advocated for higher R&D targets and corresponding public policies as a strategy to raise growth and exports. Such policies have been established by many documents, including the Lisbon Agenda (2000), the Innovation Union (2006) and EU2020 Strategy (2010). R&D and innovation policies were also a central objective in the stimulus packages adopted to help countries recover from the 2008 crisis. Given the low levels of total R&D expenditure and a pace of improvement of 2.5 percent per year between 2010-16, a linear projection suggests that Croatia would rather be at 0.95 percent of GDP by 2020. In turn, if this trend continues, the 1.4 of GDP target would be reached more than 15 years later (2035).

Figure 3.9. Gross research and development expenditures (% of GDP)



Source: World Development Indicators

The share of the public sector in total R&D is still high when compared to most of EU member countries. About half of total GERD (49 percent) is performed by the public sector, divided almost evenly between higher education institutions (universities) and public research institutes sectors while the remaining 51 percent is performed by the business sector. This is distinct from the situation in EU-28 countries, where 65 percent of GERD is performed by the business sector; 23 percent by the higher education sector and 11 percent by the government sector (plus 1 percent by private non-profits). In that context, effective science-industry collaboration, including technology transfer, is needed to transform R&D investments into innovation and productivity.

The business R&D gap is larger also when controlled for the size of the population. For instance, Croatia's business investments in R&D per inhabitant in 2012-16 corresponded to 5 percent of what was spent in Sweden (the highest in the EU) and 12.5 percent of Slovenia's level. The gap in government R&D expenditures was much lower. R&D expenditures performed by the government sector in Croatia corresponded to 80 percent of Sweden's and 50 percent of Slovenia's levels in per capita terms. This difference matters because business R&D, dedicated to more applied research and development of new products/processes, is more likely to result in innovation, export diversification, and growth.

Human capital seems adequately available and rapidly increasing, despite the continued risk of brain-drain.

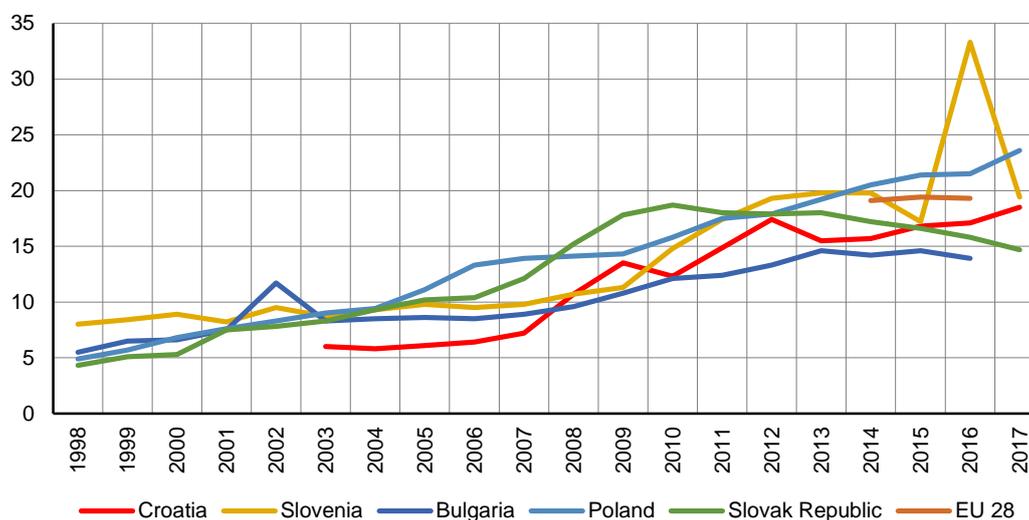
The number of science graduates in Croatia is comparable to similar countries and shows a trend consistent to other peers in recent years. The number of science and technology graduates per 1,000 population aged 20 to 29 in Croatia raised from 6 to 18.5 graduates between 2003-17, corresponding to annual average growth of 8.4 percent per year. Figure 3.10 shows that by 2017, Croatia's supply of science graduates was like the EU-28's (19.3) and Slovenia's (19.4), far from the EU leader (Ireland, 32.7), but ahead of 'innovation' leaders' such as Sweden (15.5) and innovation 'followers' such as Netherlands (12.0). Those results seem to suggest, therefore, that Croatia has, so far, ensured enough

supply of (post) graduates in science, technology, engineering and mathematics for a much better and robust innovation performance --despite the well-documented process of brain drain in recent years.³⁵

Figure 3.10. Tertiary graduates in science and technology, 1998-17

(Graduates per 1 000 inhabitants aged 20-29)

(Graduates per 1 000 inhabitants aged 20-29)



Note: Break in time series in 2013 due to switch from ISCED 1997 to ISCED 2011

Source: Eurostat data (online data codes: TC02_10 and educ_uoe_grad04)

Collaboration between public research organizations and the business sector is still missing.

The lack of collaboration between public research organizations and the business sector is a central weakness of Croatia's NIS. For instance, Croatia performs poorly in the number of public-private co-publications (per million population) with 5.7 versus an EU average of 28.7 and is well behind Austria, Slovenia, and Hungary – countries with a well-established scientific reputation. Moreover, in the ranking for university-industry collaboration in R&D of the Global Competitiveness Index, Croatia is 118th out of 137 countries, below all its peers. The lack of adequate linkages between the research institutions and the business sector is one of the main areas of improvement of the Croatian R&D sector according to most analysis of the NIS, including the 2017 RIO Country Report.³⁶ Previous experiences to reduce asymmetry of information and mitigate the risk of collaboration, such as the Sponsored Research and Development Program (SPREAD), implemented by the former Croatian agency for small business, innovation, and investment (BICRO), showed some encouraging results.³⁷

³⁵ See Draženović, I., Kunovac, M., & Pripuzić, D. (2018). Dynamics and determinants of emigration: the case of Croatia and the experience of new EU member states. *Public Sector Economics*, 42(4), 415-447.

³⁶ 2017 RIO Country Report - <https://rio.jrc.ec.europa.eu/en/country-analysis/Croatia/country-report>

³⁷ See World Bank (2012). Implementation Completion Report on a Loan in the Amount of EURO 30 Million to the Republic of Croatia for a Science and Technology Project. Report No. ICR2017 Washington DC. Currently, the continuity of Spread program cannot be observed. However, many elements of SPREAD have been replicated in other government's programs (in terms of target beneficiaries, stage of the innovation chain etc.) with unclear results so far.

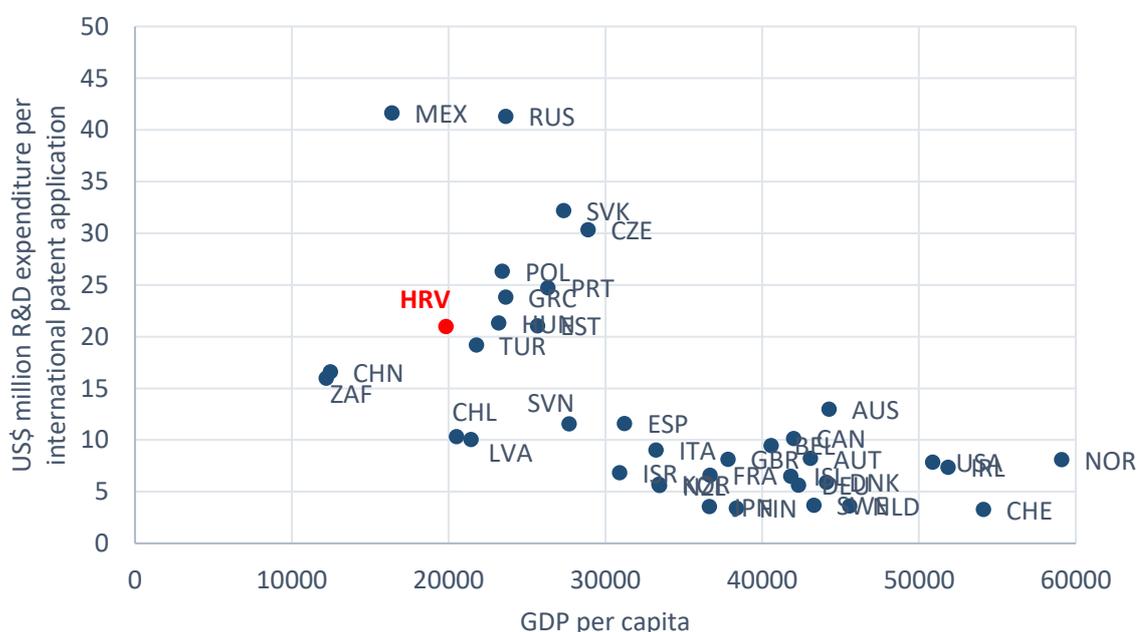
In a nutshell, Croatia's NIS seems relatively inefficient, limiting the impact of effective R&D expenditures on exports gains and economic growth.

The rate of transformation of inputs into outputs of Croatia's NIS is below the rate shown by countries with similar levels of development. As Figure 3.11 indicates, the volume of R&D investment required per patent in Croatia is higher than in China and Turkey and more than double the resources needed by Chile and Latvia, countries with similar development levels. In principle, a higher volume of expenditure per patent could reflect higher quality (intrinsic value). Yet, most advanced economies – and known innovators such as Israel, Japan, and the United States – show much lower levels of R&D expenditures.

Higher R&D 'costs' per patent application seem to reflect the dysfunctionalities of Croatia's NIS. One of these dysfunctionalities is the low amount of R&D investments by the business sector both in per capita terms and as a share of total. For comparison, the volume of expenditures per patent in Slovenia, where approximately three-quarters of GERD comes from the business sector, corresponds to half the amount spent by Croatia. Other challenges include the lack of science-industry collaboration and research excellence, as discussed before.

In the absence of such dysfunctionalities, evidence suggests that larger GERD would raise growth and exports in Croatia. In fact, a 2009 study calculated the impact of different targets of the Lisbon Agenda on key economic variables in Croatia by 2025 and showed that raising aggregate R&D to 3 percent of GDP could increase GDP by 5.8 percent and export volumes by 12 percent in relation to the baseline scenario. For comparison, achieving the corresponding human capital targets would increase GDP and exports by 0.3 percent.³⁸ Yet, this potential impact is unlikely to be realized unless the above-mentioned inefficiencies of Croatia's NIS are corrected.

Figure 3.11. Cost-Effectiveness of R&D (R&D expenditure/ per patent)



Source: Staff elaboration based on Eurostat data

³⁸ World Bank (2009). Croatia EU Convergence Report. Report N48879-HR.

Increasing the efficiency of Croatia's NIS will require addressing a legacy of unfinished reforms.

Inefficiencies of Croatia's NIS are at least in part caused by a set of outdated laws and regulations governing public research activities and public research organizations. The comparatively low investments from business in R&D, which in turn are a result of a business environment that decreases private returns to investments in R&D, also contribute to this result. But major changes in those regulations are needed. These include: (i) strengthening the meritocratic allocation of public funding (e.g. reforming selection criteria and process for concession of research grants along the lines of those followed by the European Research Council to strengthen meritocracy); (ii) guaranteeing fair access to research infrastructure by all qualified researchers (e.g. along the lines of the regulations established by the European Strategy Forum on Research Infrastructures); (iii) providing the right incentives for research and research organizations in seeking and protecting intellectual property (IP) originated in publicly funded research (as illustrated by the U.S. 'Bayh Dole' Act); and (iv) strengthening the legal framework for public research organizations to own and manage IP (e.g. clarifying the applicability of public procurement regulations in that cases).³⁹ The reform of the higher education sector can potentially address some of those outdated regulations.⁴⁰

The agenda to improve the effectiveness of public research needs to address two other challenges. First, the fragmentation of public research institutes, which unnecessarily increases costs of research in the public sector by the increasing overhead costs, decreasing synergies and often duplicating research efforts -- including public investments in small and mid-size research infrastructure. The second challenge is the lack of effective mechanism of horizontal coordination among the different organizations involved in designing, implementing and evaluating science, technology and innovation policy in Croatia. The National Council for Science, Higher Education and Technological Development's mandate and functioning need to be strengthened to increase the capacity to formulate, oversee the implementation and evaluate policies.⁴¹

In sum, a mature NIS would enable transition towards a diversified and competitive economy but enhancing productivity across the economy should be the priority.

With reforms, Croatia's NIS will enable the absorption and use of knowledge, facilitating the transition towards a diversified and competitive economy. Croatia's dysfunctional NIS needs reform, especially its public research segment. Given its current stage of development, Croatia cannot count on more larger public investments in R&D as a driver of economic growth, export competitiveness or innovation. Rather, it will have to focus on raising productivity and business dynamism across the economy.

The next section addresses the role of reallocation and firm upgrade for productivity growth in recent years with the goal of informing the decision about policy priorities.

³⁹ For instance, some lawyers argue that it is unclear to what extent a public research institute can own a spinoff company and, if so, to what extent would rules of public procurement apply to the management of such organizations. Such legal uncertainty, in turn, is likely to appear in any standard due diligence implemented by potential investors, making the decision to invest less likely. Directors in charge of the decision to invest and manage a certain spinoff company would also run the risk of violating public procurement and other legislation, discouraging the active pursuit of this goal. Spinoff companies are a frequently used form of research commercialization and a potential source of knowledge-intensive startups.

⁴⁰ For further details see Policy Note on Education prepared as part of this RAS.

⁴¹ The reforms required to improve business R&D and knowledge-intensive startups will be discussed in section 3.3.

3.2 Decomposing aggregate TFP growth: reallocation and innovation

Following Melitz and Polanec (2015), aggregate productivity growth may be decomposed in four main components: (i) existing firms becoming more productive ('within-firm' component); (ii) more productive, surviving firms gaining market shares ('between-firms' component); (iii) new and more productive firms entering the market ('entry'); and (iv) less productive firms exiting the market ('exit').⁴² Altogether, the effects of 'between firms', entry and exit components can be interpreted as the contribution of the process of reallocation of resources.

In a typical market economy, the reallocation effect on aggregate productivity growth is expected to be positive since market shares shift from less to more productive firms. Each relocation component, provided enough time, is also expected to have a positive contribution. A negative effect, therefore, indicates that the resources shifted from more to less productive firms and that allocation was distorted overtime (misallocation), lowering aggregate productivity growth.

The contribution of the 'within-firm' component can be interpreted as capturing the effect of firms' upgrade to aggregate productivity growth. Firms' upgrade are improvements in products and processes, including organizational changes, that happen at the firm level -- or, put it simply, innovation. Once lumped together, these individual firm-level upgrade effects are expected to have a positive impact on aggregate productivity growth.

One channel through which innovation operates is by raising the demand of innovating firms. This not only improves firms' performance (sales and profits). It also strengthens the reallocation process over time, as innovative firms, incumbent or new entrants, 'steal' demand from their less productive competitors.⁴³ In this sense, the type of innovation perused by the firm matters because the size and duration of this demand effect depend on its replicability by competitors.

Innovation based on proprietary knowledge (e.g. patents and registered designs), being difficult to replicate/copy, is likely to generate larger demand-effects which last for a longer time. Innovation based on proprietary knowledge is highly correlated with firm investments in R&D.⁴⁴ By performing R&D, firms engage in routine (rather than occasional) process of innovation, enabling a systematic process of internal learning -- often called absorptive capacity -- through which proprietary knowledge is more likely to be obtained.⁴⁵

Yet formal investments in R&D are neither enough nor necessary for innovation. Other investments in intangible assets, such as in marketing or managerial capabilities, also have a positive impact on

⁴² See Melitz, M. J., & Polanec, S. (2015). Dynamic Olley-Pakes productivity decomposition with entry and exit. *The Rand Journal of Economics*, 46(2), 362-375.

⁴³ Bronwyn H. Hall. Innovation and Productivity. *Nordic Economic Policy Review*, Number 2/201.

⁴⁴ See, for example, Crépon, B., Duguet, E., & Mairessec, J. (1998). Research, Innovation and Productivity [Ty: An Econometric Analysis at The Firm Level. *Economics of Innovation and New Technology*, 7(2), 115-158. It is also conceivable that more productive firms are more likely to innovate.

⁴⁵ Cohen, W. and Levinthal, D. 1990. Absorptive Capacity: A New Perspective on Learning and Innovation. *Administrative Science Quarterly*, 35: 128-152; and Griffith, R.; Redding, S. and Van Reenen, J. 2003. R&D and Absorptive Capacity: Theory and Empirical Evidence. *Scand. J. of Economics* 105(1), 99-118. Moreover, Firm's R&D activities rarely occur in fancy labs with high-tech scientist. Rather, they tend to happen in ordinary offices where development of new products and processes are conceived and tested by engineers and technicians.

innovation and firm productivity. In fact, they may be more relevant than R&D investments depending on the country's development level, the stage of the firm's life cycle and their existing capabilities.⁴⁶

The results of the Melitz-Polanec decomposition for Croatia are described next.⁴⁷ Knowing the contribution of each component facilitates mapping the possible sources of distortions to reallocation in terms of frictions affecting rivalry between firms, as well as the entry or exit processes. A closer look at the within component helps us infer the strength of firm's upgrade efforts and thus consider policies that could enhance firms' capabilities.

Sections 3.2.1 and 3.2.2, in turn, investigate distortions related to firm characteristics (ownership and size) and business environment factors (red tape, access to finance, among others) respectively. Section 3.2.3 provides a deeper dive on firm innovation performance.

Overall: Croatia's limited aggregate TFP growth is explained predominantly by remaining misallocation of resources ...

The Melitz-Polanec decomposition of the sources of TFP growth, using FINA data for 2010-17, provides evidence on the mechanisms through which aggregate productivity evolved in that period.⁴⁸ In this initial (baseline) exercise the share of input costs is used to estimate input elasticities in the production function and the sectors are aggregated using their shares in total value added. All sectors and firms are included unless otherwise specified. Table 3.1 describes the main results:

- I) Croatia's TFP grew 3.20 percent during 2010-17, approximately 0.5 percent per year -- below the historical US TFP growth rate of 1.6-1.8 percent per year.
- II) The 'between firms' component subtracted 13.19 percentage points from aggregate productivity during this period, indicating that economic resources were allocated from more to less productive firms between 2010-17, the opposite of what is expected in well-functioning market economies. The contribution of the component becomes negative after 2012, with a decline of 8.44 percentage points in absolute terms between 2012-13 and further deterioration between 2014-15 (-2.27), and 2015-16 (-0.68).
- III) 'Entry' had an overall positive contribution, as conceptually expected, adding 1.06 percentage points to productivity during 2010-17, a result that is consistent throughout the period.
- IV) The contribution of the 'exit' component changed over time, resulting in a small positive contribution (0.52) to aggregate productivity growth, indicating that less productive firms are exiting the market – which is an expected result in well-functioning market economies.

⁴⁶ Cirera, X., & Maloney, W. F. (2017). The innovation paradox: Developing-country capabilities and the unrealized promise of technological catch-up. The World Bank.

⁴⁷ Based on the background note "Micro-foundations of Total Factor Productivity in Croatia: Evidence and Policy Implications" prepared by Correa, P. and Pena, J. for this report.

⁴⁸ Throughout this section of the policy note, TFP-revenue (TFPR), estimated as sales (gross output) minus cost of intermediate inputs and cost of capital – is used as proxy for TFP. We follow the overall decomposition approach of Melitz and Polanec (2015) but our methodology differs in the following ways: the estimation of the elasticities of the production function is based on Hsieh and Klenow (as opposed to simple OLS estimates); we study the non-agricultural sector (as opposed to manufacturing sectors only) and we use gross output as proxy for revenues (as opposed to value added). In a separate exercise we replicate fully Melitz-Polanec (2015) for comparison purposes.

... with a positive albeit comparatively modest contribution of the ‘within’ firm component.

The ‘within firm’ component (firm-level upgrade) is the major force behind the productivity growth in the economy in 2010-17. Such performance of the ‘within’ component in Croatia is observed in many EU member states, reflecting the importance of firm-level upgrade efforts (new machinery and equipment, labor force training, better management etc.) and innovation to TFP growth. The weak performance in 2011-12, closely related to the aftermath of the 2008-crisis, is also observed in other countries and may reflect a contraction in demand or supply-side factors. Decreases in firm TFP have been associated with deflation caused by protracted weak global demand, the lack of technological upgrade or innovation and balance sheet vulnerabilities, which encourages firms to engage in low risk-low return activities.⁴⁹

Overall, misallocation is ‘taxing’ firm level efforts to increase productivity. The negative contribution of the reallocation process implies that market shares shifted from more to less productive firms, and more than compensated a positive net entry-exit process. With a variation of approximately 2 percent per year, the contribution of the ‘within’ component is larger than the U.S. historical rates of TFP growth. This implies that Croatia could have reduced the aggregate TFP gap with the U.S. had the reallocation process contributed positively throughout the period. In other words, a poorly functioning market system is ‘taxing’ the impact of Croatian firms’ upgrade efforts on aggregate productivity growth and the economic catch up with higher standards of living. This result suggests the need to continually to advance the agenda of structural reforms implemented the transition years and the EU accession period.

Table 3.1: Contribution on TFP Decomposition in Croatia

Accumulated TFP (in log percent) - Value-added Share Weights

Croatia - Aggregate Productivity Change (Relative to 2010)					
Year	Aggregate	Within	Between	Entry	Exit
2011	4.16	0.78	3.17	0.14	0.07
2012	1.29	0.84	0.27	0.17	0.02
2013	-1.73	5.69	-8.17	0.54	0.21
2014	-1.84	7.05	-10.25	0.63	0.74
2015	-1.41	9.83	-12.52	0.72	0.55
2016	0.82	12.59	-13.20	0.87	0.56
2017	3.20	14.81	-13.19	1.06	0.52

Source: Staff elaboration based on FINA data for Croatia

⁴⁹ The almost null contribution of the ‘within’ component in the initial years indicates that surviving firms faced early difficulties for getting traction. But since TFP-revenue is used as the proxy for TFP, a decline in TFP may reflect, therefore, demand factors -- a contraction in prices and or quantities, depending on the shape of the demand curve – and should not be interpreted solely as a deterioration in firm physical productivity (i.e. supply-side effect). An illustration of supply side factors is the interruption of modernization projects due to raising uncertainty or tighter credit conditions.

Sector analysis: previous results hold for most sectors, suggesting that the lack of business dynamism is pervasive to the whole economy – despite noticeable nuances.

Box 3.3. Comparison with Slovenia

In this Box we replicate the exact exercise developed by Melitz-Polanec for Slovenia between 1995-2000, a period that captures the effects of most structural reforms in that country, allowing proper comparison between the two exercises. In particular, we include the same sectors (NACE 2 Digits 15-37) in the analysis, adopt the same methodology and use the same econometric strategy – specifically, to estimate the elasticities of the production function.

While there are changes in the magnitude of the effects, the overall conclusion of the baseline exercise doesn't change, as the comparatively poor performance of the 'between' firm component seems to be the major source of difference between the performance of aggregate productivity in both countries. One nuance, however, is that the contribution of exit becomes negative, in comparison to a positive result in the original exercise.

For the new sample, aggregate productivity in 2010-17 increased 23.04 percent, 3.01 per year between 2010-17, below the estimated TFP growth for Slovenia between 1995-2000 equivalent to 37.81 percent or 6.6 percent per year. The 'between' firm component in Slovenia contributed with 8.23 percentage points in that period, compared to a null contribution in Croatia. Meanwhile, the contributions of the other reallocation mechanisms (entry and exit) did not differ much between the two countries.

Table 3.2: Contribution on Melitz-Polanec Decomposition

Accumulated TFP (in log percent) - Value-added Share Weights

Year	Aggregate	Within	Between	Entry	Exit
Croatia - Aggregate TFP Change Relative to 2010					
2017	23.04	20.77	0.01	2.58	-0.33
Slovenia - Aggregate TFP Change Relative to 1995					
2000	37.81	27.35	8.23	2.64	-0.41

Source: Staff elaboration for Croatia. Based on Melitz and Polanec (2015) for Slovenia

Interestingly, the contributions of the 'within' firm component in Slovenia was 6.58 percentage points larger. Slovenia's positive performance of the 'within' component is, at least in part, also a result of reforms -- such as the privatization of state-owned enterprises and the opening of sectors to foreign ownership -- measures that tend to enable different forms of firm-level upgrades.

These differences in performance are not insignificant. Croatia's TFP average annual growth would have increased to 4.1 percent, i.e. 1 percentage point higher per year, had the contribution of the between and 'within' component in the country been the same as in Slovenia.

Source: Staff elaboration; Melitz and Polanec (2015) for Slovenia

Next, we estimate the results of the Melitz-Polanec decomposition by sectors repeating the same exercise for the sub-sample of firms that compose each sector (sector decomposition). Figure 3.12 describes the results for the sector analysis and confirms that the average results described above hold true for most sectors, albeit with a few noticeable nuances. The key results are as follows:

- TFP growth in 80 out of 83 sectors stayed in the 25 percent variation range of the aggregate level (3.20 percent) – with 73 of those also in the 10 percent variation range.⁵⁰

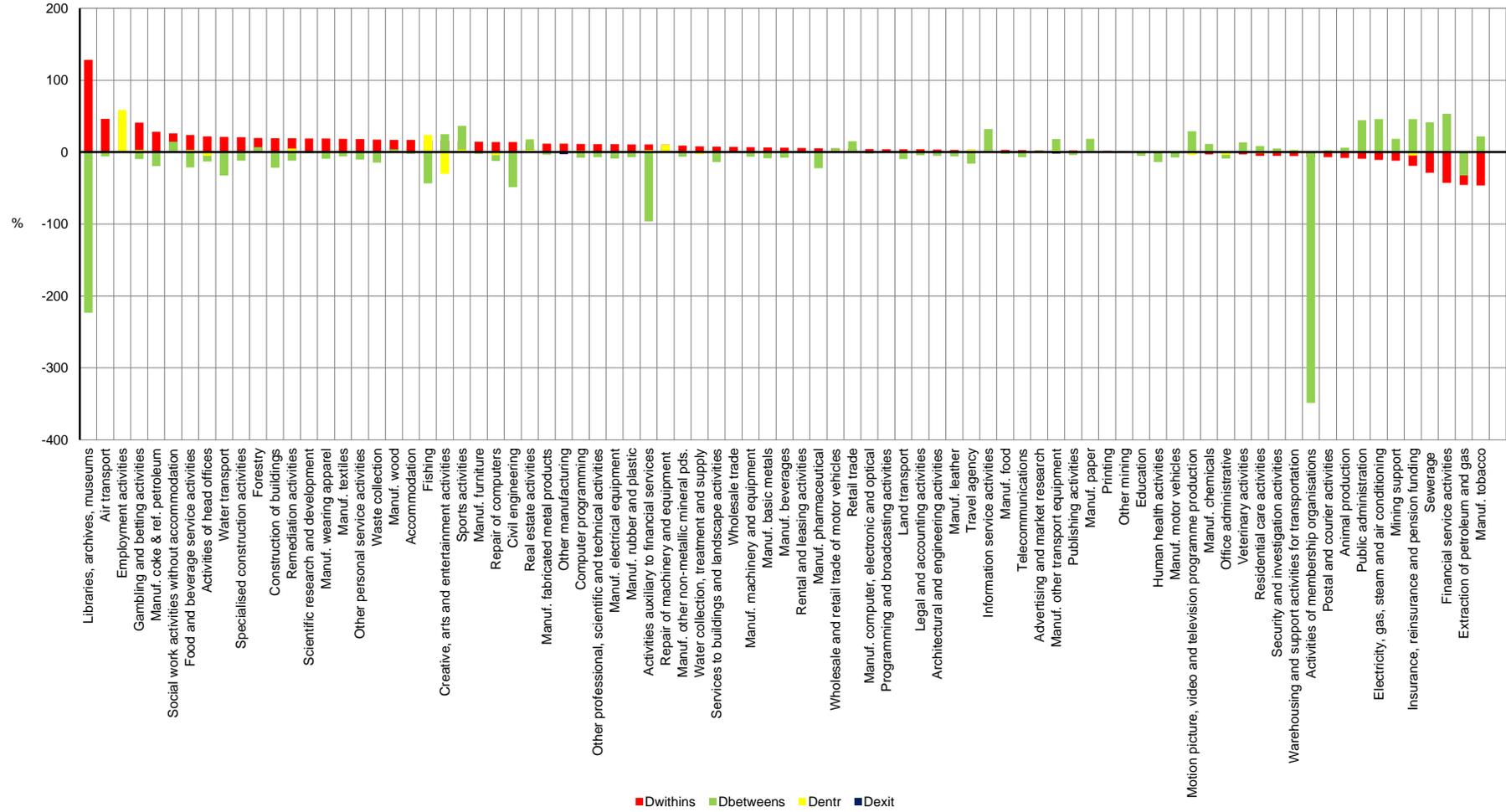
⁵⁰ The sectors outside the 25 percent deviation range are: NACE 78. Employment activities (1.87%), NACE 35. Electricity, gas, steam and air conditioning (2.27%), NACE 61. Telecommunications (4.95%), and NACE 42. Civil engineering (5.06%).

- Most sectors present a positive contribution of the ‘within’ component, in line with aggregate results. However, half of them stand below or equal to 5.93 percent, much lower than the aggregate result of 14.81. Moreover, 20 out of the 83 sectors show a negative contribution, with pronounced negative values, most notably for Manufacturing of Tobacco (-46.4%), Extraction of Petroleum and Gas (-45.6%), Financial Service Activities (-42.9%), Sewerage (-28.9%), Insurance, Reinsurance and Pension Funding (-19%), Mining Support (-11.9%), and Electricity, Gas, Steam and Air Conditioning (-10.7%).
- Most sectors present an average negative effect on the ‘between-firm’ component (51 of 83 sectors). In fact, 14 sectors stand below the aggregate result of -13.19 percent for the component. Within these, two sectors stand out with pronounced negative contributions on the component (more than 3 standard deviations from the average values), namely: Activities of Membership Organizations (-348.66%), and Libraries, Archives, Museums (-223.35%). Coincidentally, the last one is also the sector with the largest positive contribution of the within component.
- The ‘entry’ component presents a positive contribution to about two-thirds of sectors, also confirming aggregate results. Employment Activities (58.6%), stands out with the largest positive contribution and is also the only sector to present positive growth in all of its components. Creative, Arts and Entertainment Activities (-30.3%) counterbalance the average results with the largest negative effect on the component.
- Finally, the ‘exit’ component is the smallest of the four components both in aggregated levels and by sectors. In fact, 27 of 82 sectors have null results for this component and 93 percent of sectors stay within 1 standard deviation from the average for 2010-17 (0.52). On the negative side, Other Manufacturing (-2.98%), and Manuf. Other Transport Equipment (-2.03%) are the two sectors with the most notable negative contributions of this component.

TFP growth in shipbuilding and railway industries show opposite performances, possibly reflecting the different stages of sector reforms.⁵¹ Aggregate TFP growth in the shipbuilding industry corresponded to 12.93 percent in 2010-17 (4 times the overall growth) driven by a positive ‘within firm’ effect (11.84 percent) and a reallocation effect of 1.38 percent – strikingly different from the contribution of the ‘between-firm’ component in the whole sample (-13.8). Aggregate TFP growth in railways, in turn, decreased 2.95 percent with a modest contribution of the ‘within’ component (9.79 percent), despite efforts to improve management in the railway system, and a negative contribution of the between component (-12.75 percent). The results suggest that efforts to restructure the shipbuilding industry under the strict supervision of state aid regulations are paying off in terms of their contribution to overall TFP growth.

⁵¹ We replicated the decomposition analysis for railway and shipbuilding sectors (for which data can be obtained only at more disaggregated level than NACE 2 digits) given their importance to the Croatian economy.

Figure 3.12. Identifying the sources of TFP change 2010-2017 at Sector Level



Source: Staff elaboration based on FINA data

Marginal effects: The largest negative contributions to aggregate TFP growth in the period are from Civil Engineering and Telecommunications.

In addition to the performance of each sector, we calculate the contribution of each sector to aggregate TFP and its main components (marginal effect). We compute the sector’s marginal effects as the difference between the results of the aggregate decomposition exercises with and without the sector. With that, we capture how much the sector adds (or subtracts) to total aggregate TFP and to each of its components (the ‘within’ firm and reallocation effects). A negative (positive) effect means that aggregate TFP increases (decreases) in the absence of the sector. The marginal effect on the overall TFP allows us, therefore, to ‘rank’ sectors according to their contribution to aggregate TFP, as well as their contribution to each of the referred components (column (a)).⁵² To facilitate the comparison, we also present the results for the sector decomposition as described in the previous figure (column b). Table 3.3 summarizes the results.

- Civil Engineering, with a productivity decline of 33.2 percent, was the sector with the largest negative contribution (-1.86 percent) to aggregate TFP, followed by Telecommunications with -1.74 percent. The third largest negative contribution, of -0.57 percent, was from the Financial Services Activities sectors, despite its own improvement of 10.5 percent in the period. These results suggest that further review of services regulations may be beneficial to Croatia.
- Eight out of the top most negative contributions, including Pharmaceutical, Petroleum and Construction of Buildings also show the most negative contributions for the reallocation component. The diversity of industries, including standard tradable sectors, illustrate how misallocation in Croatia is pervasive across sectors – and thus, how challenging advancing sector reforms may be.
- Food and Beverage Services, Accommodations and Land Transportation are sectors that appear among the top 10 largest negative contributions to aggregate TFP and to the ‘within’ component. The large negative impact of Land Transportation to the ‘within’ component is possibly related to the relatively large presence of state-owned firms and to the incompleteness of broader structural reforms in this sector.
- Wholesale Trade is the most negatively contributing sector for the ‘within’ productivity component, with -1.33 percentage points of marginal effect respectively. However, this effect is more than compensated by the positive impact of reallocation, mainly pushed by the ‘between’ component, with 1.53 component percentage points of marginal effect. A similar result is found for Retail Trade.

Table 3.3: Ten Largest Marginal Effects

Accumulated TFP (in log percent) – Value added Share Weights

Sector (NACE 2 D)	Aggregate		Sector (NACE 2 D)	Within		Sector (NACE 2 D)	Reallocation*	
	Marginal Ef- fect (a)	Sector Decom- position (b)		Marginal Effect (c)	Sector De- composi- tion (d)		Marginal Effect (e)	Sector Decomposi- tion (iv)
Negative Marginal Effects								
42.Civil engineering	-1.86	-34.22	46.Wholesale trade	-1.33	7.23	42.Civil engineering	-1.85	-48.22

⁵² The full table can be found on the annex 9.2. Annex 9.3 shows the same exercise using employment as weights.

61.Telecommunica-tions	-1.74	-4.46	47.Retail trade	-1.17	4.47	61.Telecommunica-tions	-1.75	-7.12
64.Financial service ac-tivities	-0.57	10.52	1.Animal production	-0.94	-8.08	64.Financial service activities	-0.53	53.34
55.Accommodation	-0.50	14.97	68.Real estate ac-tivities	-0.67	12.63	41.Construction of buildings	-0.45	-20.98
19.Manuf. coke & ref. petroleum	-0.31	8.97	45.Wholesale and retail trade of motor vehicles	-0.60	5.41	96.Other personal ser-vice activities	-0.35	-11.09
6.Extraction of petro-leum and gas	-0.30	-78.10	49.Land transport	-0.43	3.79	19.Manuf. coke & ref. petroleum	-0.31	-19.29
41.Construction of buildings	-0.30	-1.65	10.Manuf. food	-0.28	2.94	70.Activities of head of-fices	-0.30	-18.15
21.Manuf. pharmaceu-tical	-0.29	-16.67	35.Electricity, gas, steam and air condi-tioning	-0.23	-10.72	6.Extraction of petro-leum and gas	-0.30	-32.55
49.Land transport	-0.28	-6.03	55.Accommodation	-0.20	17.11	55.Accommodation	-0.30	-2.14
56.Food and beverage service activities	-0.16	5.73	56.Food and bever-age service activi-ties	-0.15	23.89	21.Manuf. pharmaceu-tical	-0.28	-22.22
Positive Marginal Effects								
63.Information service activities	0.22	34.44	78.Employment ac-tivities	0.07	44.90	10.Manuf. food	0.23	-2.90
33. Repair of machin-ery and equipment	0.23	27.56	95.Repair of com-puters	0.07	14.11	93.Sports activities	0.29	39.99
73.Advertising and market research	0.29	3.72	41.Construction of buildings	0.15	19.34	92.Gambling and bet-ting activities	0.46	-6.28
47.Retail trade	0.44	19.75	73.Advertising and market research	0.16	2.50	45.Wholesale and retail trade of motor vehicles	0.60	5.84
92.Gambling and bet-ting activities	0.48	34.88	86.Human health activities	0.19	-0.80	1.Animal production	0.78	6.98
68.Real estate activi-ties	0.54	33.00	74.Other profes-sional, scientific and technical activities	0.20	10.85	35.Electricity, gas, steam and air condi-tioning	1.17	46.60
70.Activities of head of-fices	0.64	3.72	43.Specialised con-struction activities	0.40	20.56	68.Real estate activi-ties	1.22	20.37
62.Computer program-ming	0.69	5.20	96.Other personal service activities	0.42	17.99	78.Employment activi-ties	1.27	93.19
35.Electricity, gas, steam and air condi-tioning	0.94	35.89	62.Computer pro-gramming	0.66	11.20	46.Wholesale trade	1.53	0.66
78.Employment activi-ties	1.34	138.09	70.Activities of head offices	0.94	21.88	47.Retail trade	1.61	15.28
All Sectors	3.20		All Sectors	14.81		All Sectors	-11.61	

*Reallocation is the combination of between, entry and exit effects. Note 1: Sectors marginal effects are calculated as the difference between the TFP using all sectors and TFP excluding the respective sector. Sectors are weighted by value-added share. Note 2: Sector decomposition is calculated as the aggregation of firms' contribution components to overall TFP by sector. Source: Staff elaboration

A group of about 50 firms are a major drag to productivity, with a large participation of SOEs.

Further analysis allows us to give a first idea of the importance of a relatively small number of firms with very low TFP performance in the period. We call those firms 'outliers' and define them as firms that fall outside a 3 standard deviation range from the aggregate average. Out of a total of almost 113,000 companies, a group of about 50 enterprises was found to be outliers, all of them with negative TFP growth. The main results are:

- In the exercise without those firms, Croatia’s aggregate TFP during 2010-17 grew 9.72 percent, approximately 1.3 percent per year (three times more compared to the value with the full sample). Except for the ‘exit’ component, the exclusion of ‘outlier’ sectors doesn’t modify the direction of the results presented at the aggregate level.
- The ‘within’ firm component was the major force behind the difference of productivity growth, with a contribution of 19.92 percent (over 5 p.p. above the baseline exercise).
- In the case of the ‘between’ component, the exclusion of the ‘outlier sectors’ reduces the negative impact of the component by 4.5 percentage points— confirming the importance of this small number of firms for the negative effect on aggregate productivity growth.
- In contrast to all firms’ analysis, the ‘exit’ component contributed negatively (-2.26) to aggregate productivity growth, indicating more (not less) productive firms were exiting the market. In other words, some positive selection (exit of less productive firms), happened among the outliers.

Most of the outlier firms are state-owned, large and responsible for a non-negligible share of employment in different industries. By 2010, 28 (out of 50) companies were state-owned or had more than 50 percent of shares owned by the government while only two companies were fully privately owned. Those fifty firms employed on average 2,459 workers in 2010-17, as compared to 6.6 for the rest of the sample. They were, among others, in the following sectors: Transport and Storage (9), including Croatian Airlines, Croatian Postal Service, Port of Rijeka and Croatian Railways Cargo Company; Manufacturing (8), all of them with more than 50 percent of shares privately owned in a diverse set of activities including petroleum and pharmaceutical sectors, fruits and vegetables processing and furniture industries; Electricity, Gas, Steam and Air Conditioning (3), as for the case of the two Croatian electricity companies (generation and distribution), Information Services (1), including Croatian Telecom; as well as Wholesale and Retail Trade; Repair of Motor Vehicles and Motorcycles (5); Construction (3); Agriculture, Forestry and Fishing (2); Mining (2); Accommodation and Food Service Activity (2); and Water Supply and Sewage (1) sectors. The complete list of firms can be found in Annex table 9.3.

Poor results in SOEs are related to both costs and revenue factors. One aspect is the higher labor costs. Wages in SOEs have been systematically higher than in the private sector in all but two sectors with large wage differentials in transport, energy and construction, among others. Salaries are also higher in international comparisons: by 2014, total costs of employees as a share of operating revenues were higher in Croatia than in Central Eastern European countries. On the revenue side, collecting claims is a major challenge: the time needed to collect receivables in the trade sector, for example, was 185 days, compared to 10 days for payment of their obligations.⁵³ Not surprisingly, subsidies still account on average to 5 percent of SOEs’ operating revenues (15 percent in the transport sector).⁵⁴

In the next two sub-sections, we (i) explore how firm ownership and size affect TFP levels and TFP dispersion and (ii) look at evidence about the relative importance of the impact of selected business environment factors on TFP levels and dispersion. We interpret the evolution of the median TFP level

⁵³ EBRD (2018). Croatia: Background Study on State-Owned Enterprises. Mimeo. February.

⁵⁴ Staff calculations.

as an indication of how the median firm's upgrade efforts evolve -- helping understand the evolution of the 'within' component. We interpret TFP dispersion as a preliminary indication of misallocation.⁵⁵

3.2.1 Firm Characteristics

Ownership and size: State-owned enterprises (SOEs) and larger, less productive companies are hindering aggregate productivity growth.

Figures 3.13 (a) and (b) compare the evolution TFP of SOEs and non-SOEs. The median TFP is systematically lower for the SOEs cohort, a gap that seems to reduce over time. Low TFP in SOE enterprises is not uncommon and reflects challenges in the exercise of ownership and control by the government (e.g. politicization of management; management goals differing from those of stakeholders, etc.) SOE reforms in transition economies – either through privatization or improvement in corporate governance – aimed to address those challenges. Together with evidence of the negative contribution of the 'within' component in industries of water and sewage, these results may suggest a strong case for renewed emphasis on this type of measure.

Another way in which a larger SOE presence seems to impair growth is through negative externalities (the non-neutrality of SOEs). Results here are a bit less conclusive. TFP is higher in sectors with a lower state presence about half the time only. TFP dispersion increased since 2016 for sectors with large SOE presence and decline since 2015 for sectors with low SOE presence. Yet, contrary to what one would expect as evidence of non-neutrality, dispersion was systematically lower in sectors with large SOE presence during the whole period (Figures 3.13 (c) and (d)).

Figures 3.13 (d) and (e) compare the evolution of TFP for micro, small, medium (MSME) and large firms. The figures show that large firms show a systematically lower median TFP level than all other firms during all periods. This result is at odds with empirical evidence, as larger firms benefit from different sources of economies related to firm size (e.g. economies of scale at plant-level) that tend to reduce average costs. TFP dispersion among large firms is the second highest and, contrarily to the trend in other firm sizes, slightly increases over time – suggesting, possibly, a persistent misallocation of resources in this size cohort. This result may be evidence that large firms may benefit from some support, not necessarily in the form of formal EU State Aid (e.g. arrears) -- as a result of some implicit 'too big to fail' policy. This may also reflect the fact that many large companies are state-owned, in which case this evidence may be redundant.

⁵⁵ This interpretation follows Hsieh, C. T., & Klenow, P. J. (2009). Misallocation and manufacturing TFP in China and India. *The Quarterly journal of economics*, 124(4), 1403-1448. Indeed, one of the main implications of this framework is that dispersion in revenue-based total factor productivity reflects the presence of economic distortions and, under specific conditions, higher TFP dispersion implies lower productivity at the aggregate level. The advantage of the framework is its tractability and easy replicability. that has helped policymakers to understand how economic distortions may be affecting the efficiency with which resources are allocated across firms better informing the discussions about the necessary policy reforms. The disadvantage is that the framework relies on very restrictive assumptions, including constant markups, homogeneous technology, and elasticity of prices to technological improvements equal to -1 (e.g., constant returns to scale and perfect pass-through), that empirical evidence may show inadequate to a certain context. In this sense, the analysis is treated as preliminary. For a broader discussion see Cusolito, A. and Maloney, B. (2018). *Reviving Global Productivity: Shifting Paradigms in Analysis and Policy*. Washington, DC: World Bank.

Box 3.4.: Non-neutrality of State-Owned Enterprises: The Case of *Hrvatske Šume*

Governments often use state-owned enterprises (SOE) to implement public policies with suboptimal results to the enterprise itself and negative economic effects on third markets. Competition authorities have alerted of the perils of such policies. Implemented through SOEs, support policies become less transparent and accountable, potentially bypassing standard state-aid regulations and public scrutiny.

One example of non-neutrality is the tendering process for selling prime-type lumber implemented by the state-owned forestry company Hrvatske šume. These tendering processes are not fully transparent and prime-type raw material is awarded on a non-competitive basis to local companies at average prices often lower than those offered by foreign companies. This implicit subsidy creates an artificial competitive advantage to local producers, distorting competition in the downstream markets (e.g. furniture), preventing reallocation and inhibiting innovation.

Among other effects, Hrvatske šume tendering and distribution schemes allocate resources too sparsely to a set of small saw millers. This distortion forces sawmilling activities into operating at a scale that is too small to be efficient. As a result, drying processes are poorly observed since the capital equipment for kilns is too expensive for small sawmilling operations. This results in much of the sector's raw output becoming damaged, leading to a lower value, with less (environmentally) efficient resource use. Ultimately, a large portion of the raw material is channeled into the industry with the lowest quality requirements. Thus, much of the high-quality Croatian roundwood is destined to be burned, turned into low-value composite woods, or sold as lumber to construction markets in the Middle East that have no building requirements on the durability of wood.

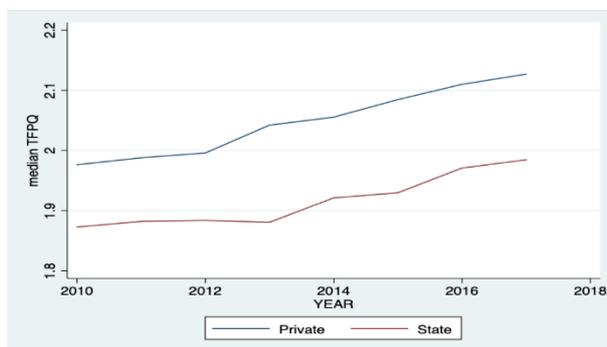
As an implicit subsidy, this form of support to local producers is less visible and harder to be monitored by state-aid regulators. In addition, exports of raw wood have been recently prohibited, increasing the local supply to keep domestic prices artificially low. The policy benefits local producers in downstream markets but implies a larger cost to the public in the format of productivity losses in downstream markets and socially suboptimal management of a natural resource (with overuse of the resource).

Eliminating this policy would likely generate reallocation and TFP growth in downstream markets and – by bringing domestic prices closer to international levels -- encourage better management of natural resources. That, in turn, would require an effective implementation of SOE's neutrality policy.

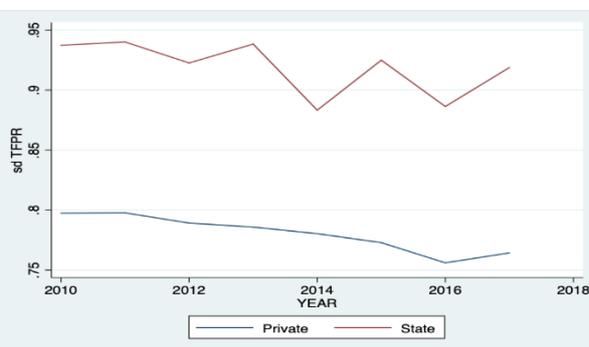
Source: Staff Elaboration

Figure 3.13. Evolution of TFP levels and TFP dispersion by the firm's ownership, SOE market share and firm's size

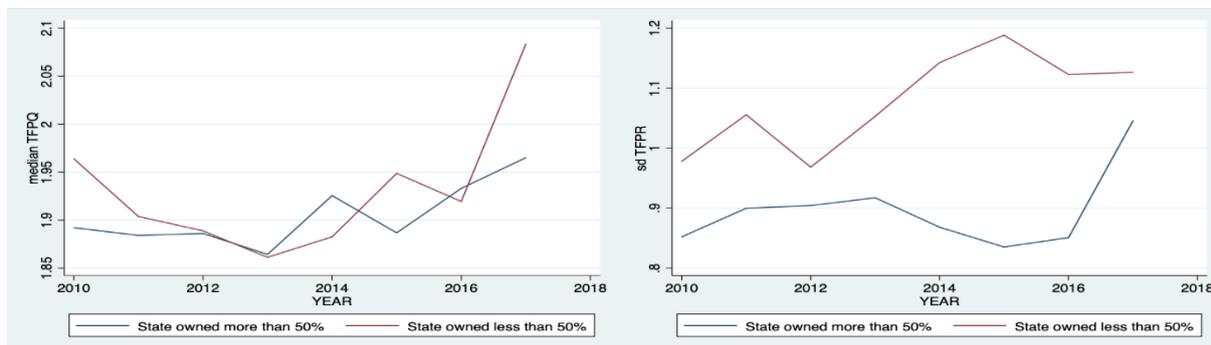
(a) Ownership (TFP levels)



(b) Ownership (TFP dispersion)

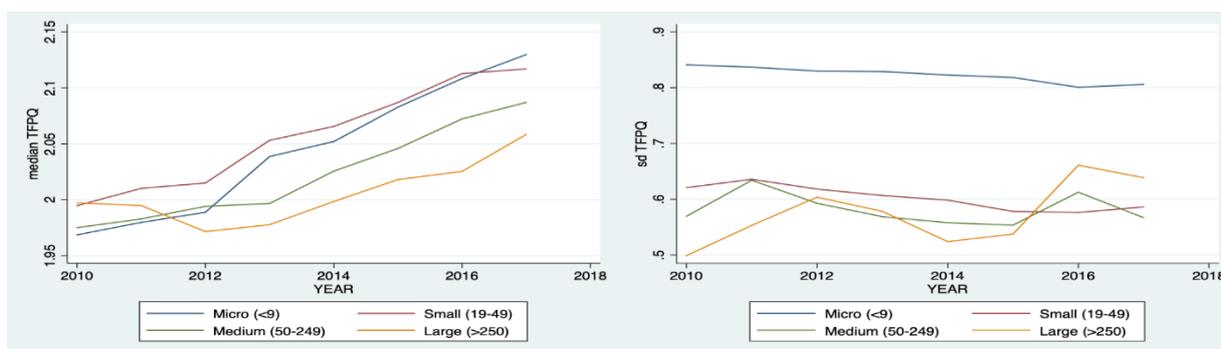


(c) Sectors with lower vs. larger SOE presence (TFP levels) (d) Sectors with lower vs. larger SOE presence (TFP dispersion)



(e) Firm's size (TFP -levels)

(f) Firm's size (TFP dispersion)



Source: Staff calculations using FINA data

Public procurement: reducing the political influence and enhancing the quality of the process are determinant for its success.

A high presence of SOEs and public procurement could be harming optimum allocation of public procurement contracts. Public procurement in Croatia accounted for around 9.7 percent of GDP on average in the years 2011-13, comparable to Cyprus (10.5 percent in 2010) and Greece (10.8 percent). Although Croatia's procurement law has transparency and control mechanisms in place, the result is undermined by a dysfunctional process. A large share of public contracts is assigned by entities which are owned by government units and thus subject to political influence and constrained by a much weaker control framework. Moreover, between 2008-13, around one-half of the total contract was won by tenderers which are not private companies but rather entities partially or fully owned by the government.⁵⁶

⁵⁶ Procurement can be undertaken by four types of contracting authorities, namely: (i) Central government bodies such as ministries; (ii) regional government/local and regional agencies; (iii) Legal persons other than public authorities, for example Croatian Roads Ltd., and Croatian water management company; and (iv) State owned companies. Around one-half of total public procurement contracting value in 2008-13 was executed by types (iii), and (iv).

In fact, the large presence of potential political influence in the process (with SOEs control) seems to have created the potential for misallocation of public contracts in order to benefit themselves or third-parties.⁵⁷

The new law on public procurement recently put into effect the most important provision: the economically advantageous bid mechanism. In the beginning of 2017, a new law on public procurement was put in place with the obligatory application of the most economically advantageous bid as the selection criterion, instead of the lowest-price criterion (like it was so far). In the previous year, Croatia realized public procurement was worth about 45 billion kunas, which makes up around thirteen percent of the country's GDP, and was seven percentage points less than in the European Union. Although the most economically advantageous bid may be seen by authorities as a more complex criterion (and thus expensive), a major improvement in the quality of the tender documentation has been noticed by the competent authorities.

3.2.2 Business Environment

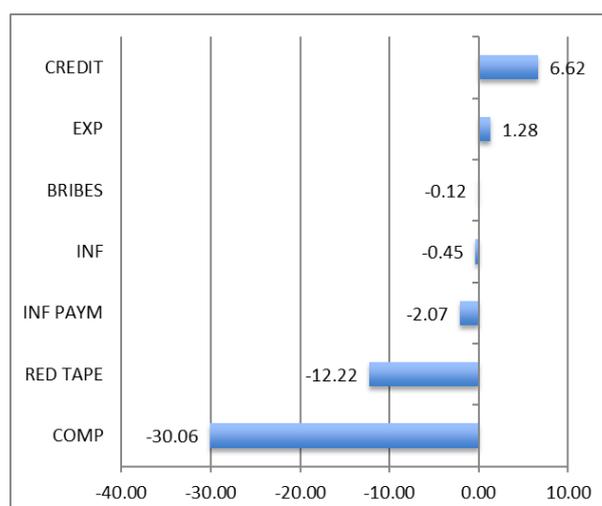
Business environment and TFP levels: red tape, poor access to credit and foreign markets seem to be the main factors hindering TFP growth.

We find robust evidence of the impact of seven business environment variables on the TFP levels.⁵⁸ Figure 3.14 describes the results for the average Croatian firm. We found a statistically significant association between TFP levels and all tested variables: competition in product markets, management's time spent on red tape, access to credit, informal payments, exports; informal payments and bribes. In particular:

⁵⁷ For more, see Podumljak, M., & David-Barrett, E. (2015). Political favoritism in Croatian public procurement. *Government favoritism in Europe*, 3, 69-83.

⁵⁸ The approach developed in Correa, Cusolito and Pena (2019) aims to account for the endogeneity of input choices and other common methodological limitations in this type of exercise. The exercise is based on 2012 data – the latest year for which WBES data for Croatia is available. The variables selected are those for which the effect on firm TFP is well documented in the literature and a proxy can be found in the WBES database. For a summary of the methodology, see Annex box 9.1. See Correa, P., Cusolito, A., and Pena, J. (2019). *Business environment distortions and firm-level productivity: Global evidence*. Mimeo, February 2019. The paper, originally prepared as background to Cusolito and Maloney (2015), is available upon request.

Figure 3.14(a). Effects of business environment variables on TFP levels in Croatia (%)



Note: The numbers represent the estimated contribution of each variable for TFP for the average firm in Croatia (considering the performance of that variable for the average firm in the case of continuous variables). For example, the level of competition (COMP = the number of competitors declared by the surveyed firm) decreases TFP levels in 30 percent, given the average number of competitors for Croatian firms. In the case of binary variables, the interpretation is the usual one. For instance, access to credit (CREDIT) increases firm TFP by 6.62 percent.

Source: Staff Elaboration based on Correa, Cusolito and Pena (2018).

- Competition has the largest effect. More competition is associated with less productivity levels for the average firm, possibly reflecting a negative effect of competition on firm's markups.
- Red tape comes second. The current level of red tape face by the Croatia firm is reducing TFP in 12.2 percent.
- Better access to credit has a positive impact, possibly by enabling investments in intangible assets and other productivity enhancing projects.
- Exports are expected to generate knowledge (learning by exporting) and thus raise TFP. A larger (foreign) market also enables firms to profit from a larger consumer base, raising the potential returns for investments in intangible assets and innovation.

These results are consistent with existing evidence. While surprising at first sight, this result is consistent with estimates that place Croatia's share of shadow economy as the third highest in Europe (in the range of 17.2-26.5 percent of GDP) after Bulgaria and Turkey.⁵⁹ According to the World Bank's Enterprise Survey, Croatian managers spent on average 19.6 hours per week dealing with different government regulations, such as taxes, customs, labor regulations etc., in 2013 (last year available). Equivalent to half the 40 hours work-week, Croatia was the 16th worst performer among 139 countries in the survey. This represented a significant (opportunity) cost to the Croatian economy given the documented evidence about the importance of managerial skills for firm productivity.

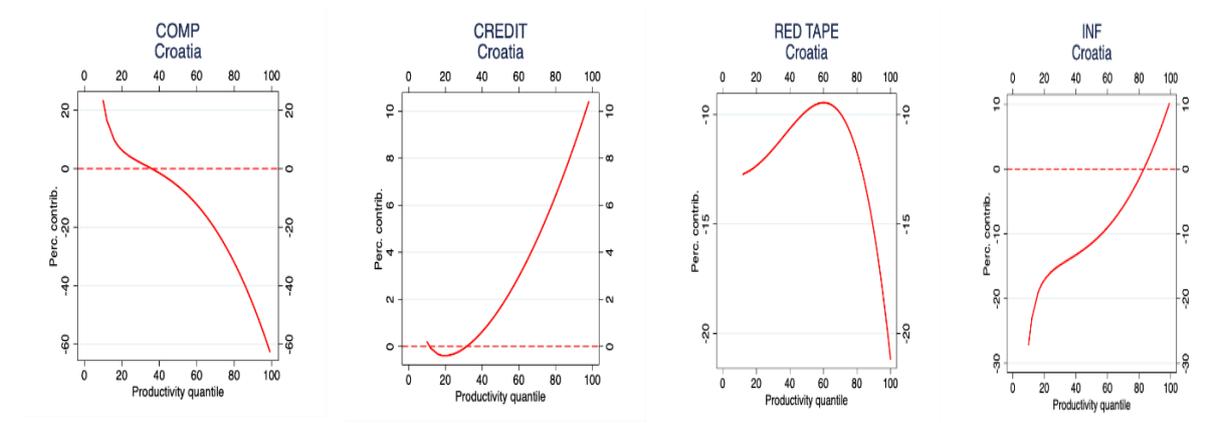
Moreover, business environment effects on firm TFP is are not linear, with productive firms relatively more penalized. While previous results focused on the average firm, an analysis by firm decile shows how the effect of business environment differ by TFP levels (Figure 3.14 (b)). This, in turn, could be interpreted as an anti-growth. For example:

⁵⁹ (See Schneider, F., & Medina, L. (2017). Shadow economies around the world: New results for 158 countries over 1991-2015 (No. 1710). Working Paper.

- Competition has a positive effect on firms up to the 4th decile of the TFP distribution but a negative one after that – suggesting a possible dual effect of competition i.e. forcing less productive firms to upgrade while restraining the capacity of more productive firms exercise market power through higher markups.
- Red tape, while showing a negative effect in all productivity levels, seems to be penalizing more the most productive firms (in the last deciles of the distribution) – which may be reflecting the larger opportunity costs that more productive firms incur by deviating management’s time from productivity-enhancing activities to address red tape.

This non-linearity has an important insight for policy-making. As Figure 3.14 (b) shows, access to credit has an almost null effect for firms below the 3rd decile, becoming increasingly positive to reach its largest effects for the most productive firms (10th decile). The insight here is that policymakers should target more – not less productive firms – when adopting programs that improve access to credit. Low productivity firms do not seem capable to improve their performance when credit becomes available.

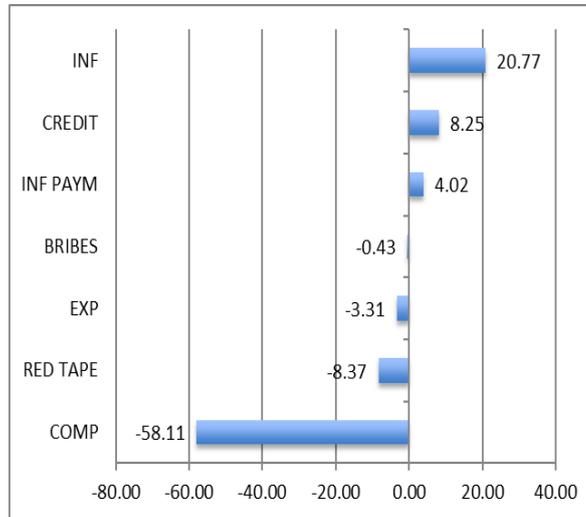
Figure 3.14(b). Effects of business environment variables on TFP level by decile



Staff own elaboration based on Correa, Cusolito and Pena (2018)

Business environment and TFP-dispersion: Evidence suggests that competition, informality, red tape, and access to credit are affecting TFP dispersion

Figure 3.15. Effect of business environment factors on TFP dispersion in Croatia (%)



Note: The numbers represent the estimated contribution of each variable for TFP dispersion in Croatia. For example, access to credit (CREDIT) increased TFP dispersion by 8.25 percent.

Source: Staff Elaboration based on Correa, Cusolito and Pena (2018)

Following a similar approach, we address the impact of business environment variables on TFP dispersion.⁶⁰ Figure 3.15 describes these business environment variables and their estimated impact on TFP dispersion. Of those seven, four explain more than 90 percent of the observed dispersion, namely, competition, informality, time spent by managers with red tape and access to credit. More specifically:

- Competition in product markets explains more than half of the dispersion of TFP distribution. As expected, this has a negative impact on TFP dispersion possibly by encouraging less productive firms to catch up and more productive firms to decrease their markups. Competition seems to reduce misallocation in Croatia.
- Informality explains about 20 percent of total dispersion, with a positive effect, suggesting that the existence of a larger number of low productivity informal firms (larger left-tail).
- Red tape has a comparatively small but still relevant and negative impact on dispersion with additional analysis showing that the result holds for all levels of firm productivity.
- Access to credit (CREDIT) has a positive effect on dispersion. While we can conceive two opposing effects – a reduction in dispersion by enabling a catch up by low productivity firms (trimming the ‘left tale’) or an increase in dispersion by enabling firms to invest in intangible assets and innovation (enlarging the ‘right tale’) – the overall positive effect suggests that the later effect dominates the first one.

⁶⁰The link between TFP and dispersion, however, is not straightforward. A large dispersion caused by the survival of a large number of less productive firms may be, with the appropriate caveats, an indication of misallocation. However, a dispersion caused by many more productive firms, pushing the frontier, may not be indicating misallocation but a simple time lag in the operation of the selection process.

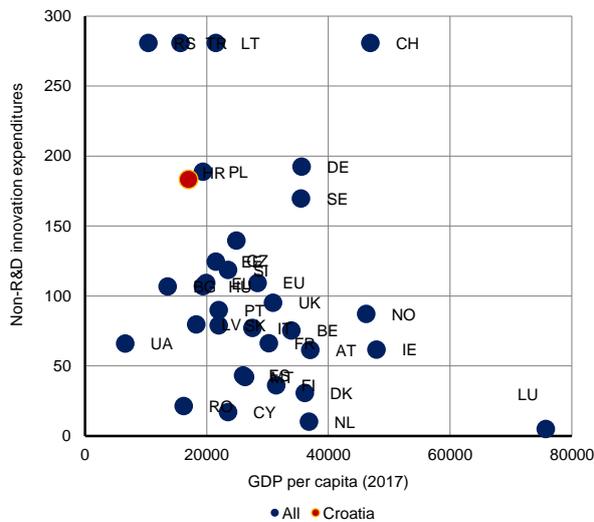
3.2.3 Firm Innovation

Croatian enterprises spend comparatively well in innovation but less so in intangible assets such as marketing, organizational innovation, and R&D...

Croatian firms' investments in non-R&D innovation increased significantly in recent years to reach levels superior to the EU-28 average. The non-R&D innovation expenditures (as a percentage of firm turnover) in 2015 stands at 1.2 percent, well above the EU-28 average of 0.76 percent. It has also improved significantly between 2010-17. In 2017, investments of Croatian firms in non-R&D innovation was almost twice as large as the EU-28's average in 2010, equivalent to a growth rate of 5.4 percent per year. This performance, close to Poland's, places Croatia among the best 10 performers in the period (Figure 3.16(a)).

Expenditures in marketing or organizational innovation by SMEs also improve recently but more catching-up is still needed. In 2017, expenditures in marketing and organizational innovation by Croatian SMEs corresponded to an improvement of about 70 percent in comparison to the EU levels in 2010, well above the results of several peer countries, including Bulgaria and Poland (Figure 3.17 (b)). On the other hand, 30.8 percent of the Croatian SMEs firms introduced marketing or organization in 2015, compared to about 88 percent in the EU-28.

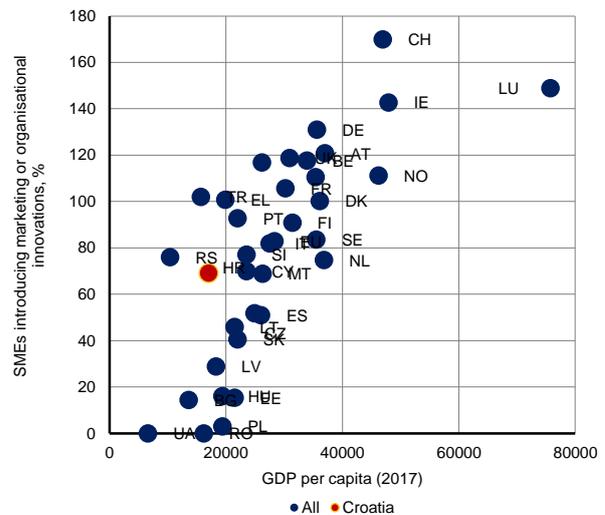
Figure 3.16(a). Non-R&D innovation expenditures vs. GDP per capita in 2017 (EU 2010 = 100)



Note: Non-R&D expenditure (as % of turnover) in 2017 relative to EU in 2010, by relative size.

Source: European Innovation Scoreboard 2018

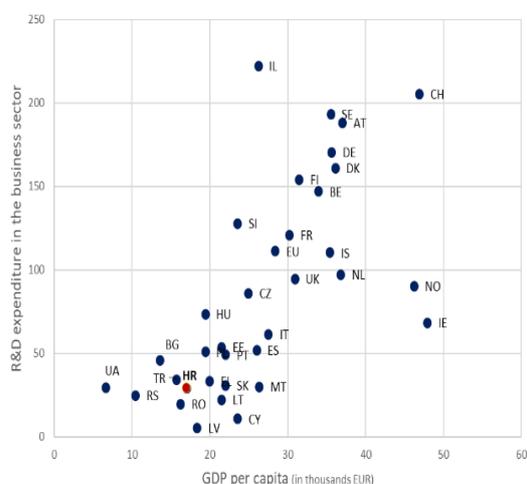
Figure 3.16(b). share of SMEs introducing marketing or organizational innovations vs. GDP per capita in 2017 (EU 2010 = 100)



Note: Percentage of SMEs introducing marketing or organizational innovations (as % of SMEs) in 2017 relative to EU in 2010.

Source: European Innovation Scoreboard 2018

Figure 3.17. R&D expenditure in the business sector in 2017 (EU 2010 = 100)



Note: Business R&D expenditure (as % of GDP) in 2017 relative to EU in 2010.

Source: European Innovation Scoreboard 2018

Firms' expenditures in R&D are comparatively low and have not improved in recent years. Croatia innovative firms were spending on average 0.47 percent of turnover in R&D in 2016, of which more than 90 percent in 'in house'. In the same year, innovative firms were spending 0.57 of turnover in Bulgaria, a 'modest' innovator according to the EU Innovation Scoreboard; 0.85 percent of the firm turnover in the Czech Republic, a 'moderate' innovator as Croatia; 1.53 percent in Slovenia, a 'strong' innovator and 4.59 percent in Denmark, an innovation 'leader'. Firm R&D expenditures increased in all countries between 2010-16 -- with annual average growth rates ranging from 1.5 percent in Denmark to 39.5 percent in Bulgaria -- compared to a decline of 19.5 percent in Croatia. Expenditures in R&D by Croatian firms in 2017 were 29 percent higher than the EU-28 in 2010, an annual average growth of 3.7 percent much lower the growth rate of expenditures in non-R&D innovation. This was the seventh-worst performance among the 36 countries covered by EUROSTAT. (Figure 3.17).

... in contrast with EU trends.

Most countries are spending relatively more on R&D than non-R&D innovation overtime, including 'modest' and 'moderate' innovators. Figure 3.18 shows expenditures in R&D and non-R&D innovation in each country in 2018 compared to the EU-28 average in 2010 (EU-28 in 2010=100). Non-R&D innovation expenditures in Croatia in 2017 were 83 percent larger than the EU-28 average in 2010. In 2010, Croatia was spending 26.8 percent more. Meanwhile, expenditures in R&D remained basically unchanged. As for comparison, growth rates of both expenditures were roughly in the EU-28 between 2010-17. Compared to their 2010 levels, both R&D and Non-R&D innovation expenditures declined in 2018 in innovation leaders such as Denmark and Finland, but the decline of non-R&D innovation expenditures was larger.

The performance of some 'modest' and 'moderate' innovators suggests some gradual upgrade in firms' capabilities. In fact, in Bulgaria and Romania, 'modest' innovators, and Poland, a 'moderate' innovator, non-R&D innovation expenditures decreased in relation to the EU-28 average in 2010 be-

tween 2010-17 while R&D expenditures increased. The transition from non-R&D to R&D driven innovation expenditures seems consistent with the notion of ‘capability escalator’ – according to which countries need progressively more complex capabilities throughout the development process.⁶¹ Croatia’s firms, however, do not seem to be progressing along those lines which in turns reflects on the lack of performance of knowledge assets on Croatia (see Box 3.5).

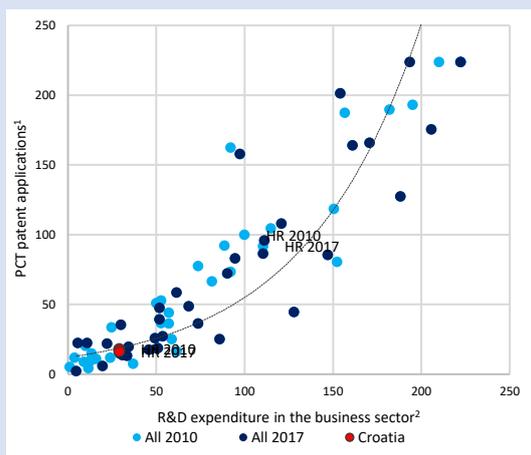
⁶¹ Cirera, X., & Maloney, W. F. (2017). The innovation paradox: Developing-country capabilities and the unrealized promise of technological catch-up. The World Bank.

Box 3.5.: R&D, Knowledge Assets and Exports

The underinvestment in R&D is affecting the generation of proprietary knowledge and the exports of knowledge-intensive services. Croatia low business R&D expenditures have a direct impact on science-driven innovation, as indicated by the high exponential correlation between patent applications and business R&D (Figure 3.19(a)). In fact, in 2017 (and in comparison, to the EU-28 average in 2010) Croatia presents both low levels of R&D expenditures in the business sector (29.3 percent of EU level) and patents applications (16.5 percent of EU level). On the same period, Bulgaria, Slovenia and Denmark expended in R&D 45.8, 128, and 161.2 percent of EU average to obtain patent applications levels of 17.5, 44.7, and 164.1 percent respectively.

Croatia's knowledge-intensive services exports as a percentage of total services exports stand at 19 percent in 2016, well below most peer countries (and a minor decrease since 2010). The under-investment in knowledge assets also has a direct implication on productivity (TFP) because it limits the degree of product differentiation and the potential demand growth faced by firms as Figure 3.19(b) demonstrates. When comparing EU countries, Croatia presents itself on the low end of bottom performers, i.e. poor R&D expenditure and poor performance in knowledge-intensive services exports (2.8 percent to the EU average of 2010). As previously cited, and with higher levels of knowledge spending, Bulgaria and Slovenia stand at 43.3, and 37.2 percent in relation to the EU average. On the top performer group, Denmark has 71.7 percent of total exports on knowledge-intensive services exports, which equals to 109.9 percent to the EU average.

Figure 3.19(a). PCT patent applications vs. R&D expenditure in the business sector in 2017 (EU 2010 = 100)

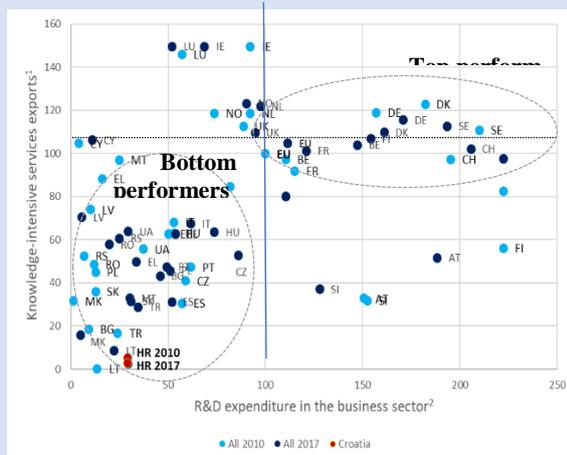


Note (1): PCT patent applications per billion GDP, relative to the EU-28 average in 2010.

Note (2): R&D expenditure in the business sector in percentage of country GDP, relative the EU-28 average in 2010.

Source: European Innovation Scoreboard 2018

Figure 3.19(b). Knowledge-intensive services exports vs. R&D expenditure in the business sector in 2017 (EU 2010 = 100)



Note (1): Knowledge-intensive services exports in percentage of total services exports, relative EU-28 average in 2010.

Note (2): R&D expenditure in the business sector in percentage of country GDP, relative EU-28 average in 2010.

Source: European Innovation Scoreboard 2018

Source: Staff Elaboration based on European Innovation Scoreboard 2018

Croatia is also lagging in terms of the creation of knowledge-based startups, despite notable cases of success. Croatia has one of the lowest number of enterprises in knowledge-intensive in a group of EU peer countries. Moreover, in the period of 2008-2014, Croatia has seen an increase in the number

of these enterprises by 26 percent, while in the case of Slovenia, the increase was three times larger.⁶² This possibly affected the reallocation effect on aggregate productivity by limiting the contribution of the ‘entry’ component in Croatia, as new knowledge-intensive firms, especially those with proprietary knowledge, are likely to have higher productivity levels and quickly gain market-share from less productive firms. Croatia’s successful cases include companies such as: Rimac Automobili (which caught global attention with the “electric supercar”), Pet Minuta (mobile solutions), Vollo (digital platform, tourism), Trakbar (artificial intelligence, business solution), Nanodiy (printing, textiles), Gideon (artificial intelligence, robotics), Gammachef (robotics, food processing).

Unsurprisingly, the opportunities of the digital economy are yet to be further explored. Croatia has recognized the digital economy as an increasingly important component of sustainable economic growth, however, this effort is still at the very beginning, and opportunities are still at large. In fact, Croatia seems open of adopting internet-related technologies and services, but firms and the regulatory environment still ranks poorly on the digital economy in comparison to other countries.⁶³ As practical examples, Croatia could benefit from further implementation of new management tools and web applications for data treatment (See box 3.6).⁶⁴

⁶² Eurostat data, 2008-2014.

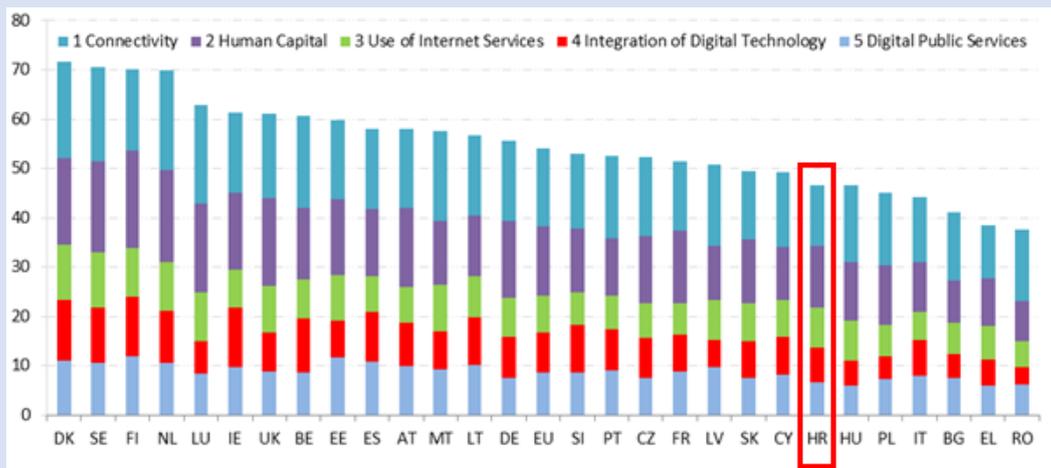
⁶³ Europe's Digital Economy and Society Index (DESI) and IMD World Digital Competitiveness Ranking.

⁶⁴ In addition to hereby mentioned opportunities, FinTechs opportunities for Croatia will be analyzed in greater detail on the next sessions 3.3-Financial Sector, 4- Assessment of the main developmental challenges and opportunities for Croatia, and 5- Prioritized policy recommendations.

Box 3.6.: Challenges and opportunities of the digital economy in Croatia

Croatia has recognized the digital economy as an increasingly important component of sustainable economic growth, however, this effort is still at the very beginning. Considering two important benchmarking exercises, such as Europe's Digital Economy and Society Index (DESI) and IMD World Digital Competitiveness Ranking, the overall impression is that Croatian individuals are quite open to using new Internet-related technologies and services. However, firms (business agility) and the regulatory environment are rather less competitive in comparison to other countries. For example, Croatia ranked 22nd out of 28 EU Member States in 2018 on Europe's DESI index (Figure 3.20), which tracks the progress made by the EU Member States towards the digitization of their societies (European Commission, 2018).

Figure 3.20. Digital Economy and Society Index (DESI) 2018 - EU Ranking

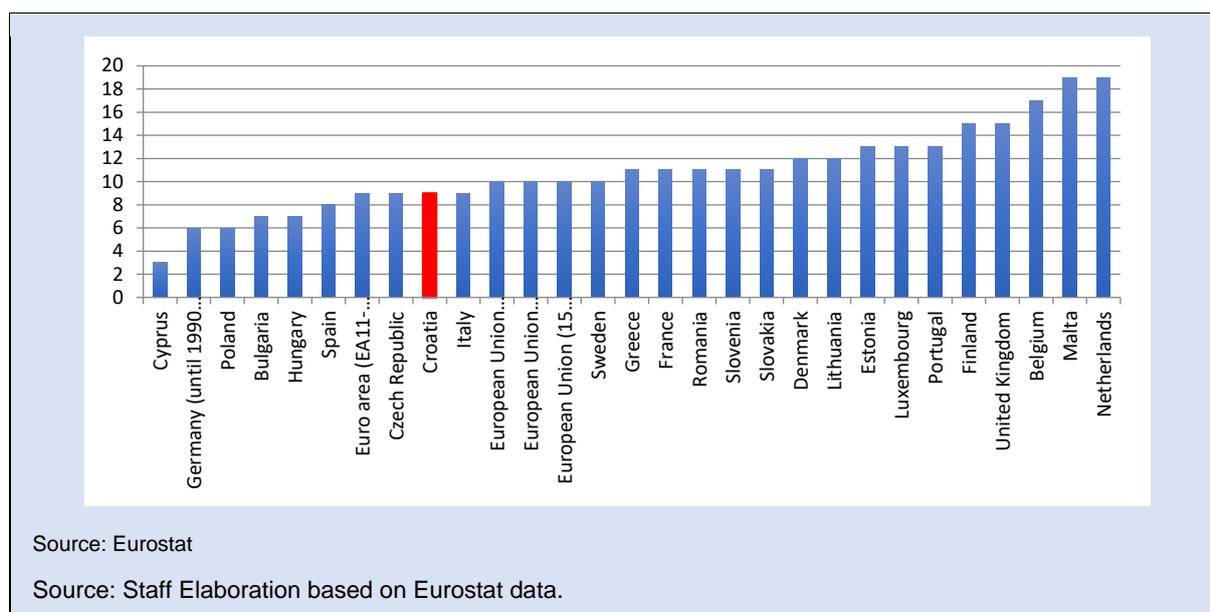


Source: Eurostat

The Internet has given rise to new technologies such as ERP (enterprise resource planning) and CRM (consumer relationship management), which have the ability to improve internal business processes. ERP software applications aim to facilitate information sharing electronically and automatically between different business functions and/or in cooperation with suppliers or customers, while CRM software allows for better management of customer data. In terms of the use of these technologies, Croatia is at the level of New Member States' average, but below the EU-28 average.

Web applications produce large quantities of data, which can be used for enhancing productivity and performance, increasing profitability, strengthening competitive advantage, and enabling innovation. To take advantage of the data, companies need strong computational abilities. Croatian companies show an increasing trend in the usage of cloud computing. As expected, the need for cloud computing increases with firm size, with SMEs exhibiting much less intensive use. Although the usage of cloud technologies is relatively frequent in Croatian firms, it is predominantly used for data backup, information sharing, remote access etc., and not for big data analysis. Croatia is in the bottom half of the EU countries in the percentage of firms that engage in big data analysis (Figure 3.21). The analysis is in the majority of cases (76 percent of firms' transactions), done in-house by own employees. The situation is more complicated for SMEs, who happen to be slow adopters of the new technology of big data analytics.

Figure 3.21. Enterprises analyzing big data from any source (2016)

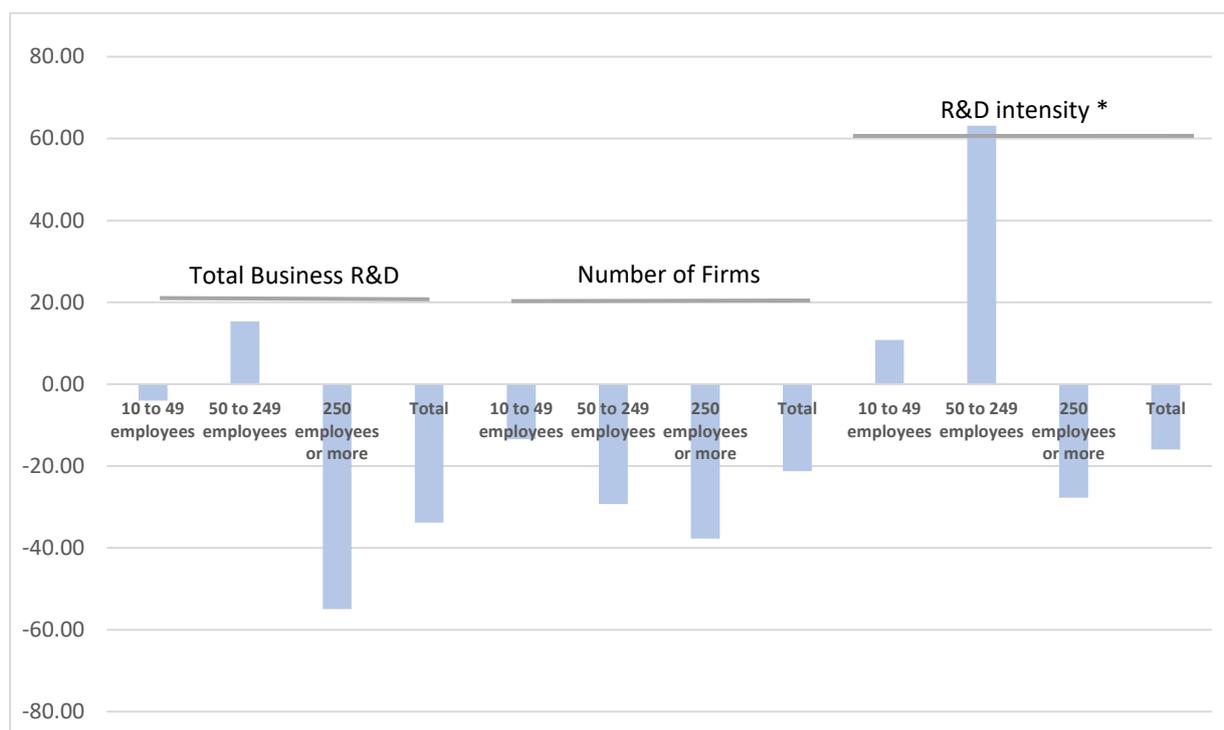


A drop in R&D intensity was the main channel for business R&D decline in 2008-16, especially in large firms.

The performance of Croatia’s business R&D in 2008-16 has two different phases. R&D volumes increased rapidly between 2008 and 2012, reaching the highest value in the period. By the end of this growth phase, Croatia’s R&D structure was highly concentrated in a few large firms: by 2012, the share of large firms’ investments in total R&D corresponded to 95 percent of total business R&D, compared to 63.5 in 2008. Since 2012, business R&D in Croatia declined. By 2016 business R&D investments were 34 percent lower than 2008, as result of lower total investments by large firms due to lower investments per firm (R&D intensity) and less innovative large firm investing in R&D.

The decline in R&D investments in Croatia was driven by large firms, with reductions in both R&D intensity and the number of firms investing in R&D. Total expenditures in R&D by large firms declined 55 percent between 2008-16, compared to an increase in total investments by medium sized firms (15.3 percent) and a slight decline in R&D investments of small firms (4.05 percent). In 2016, Croatian firms invested on average EUR 135.57 thousand, compared to EUR 161.32 thousand EUR in 2008 (-16 percent). In that period, R&D intensity of large firms dropped by 27.7 percent, from EUR 738.34 to EUR 533.72 thousand. In comparison, R&D intensity of small and medium size enterprises raised, with medium sized firms’ intensity growing by 63.1 percent. Meanwhile, the number of large firms investing in R&D also declined (37.7 percent). The number of SMEs investing in R&D also declined in the period, albeit at lower values (Figure 3.22).

Figure 3.22. Croatia Change in Business R&D in 2008-16: Total, number of firms and R&D intensity (%)



*Average investment per firm

Source: Staff elaboration based on CIS data.

The decline in the number of innovative SMEs investing in R&D contrasts with the international experience and may be a limitation for the expansion of business R&D in Croatia

The number of innovative firms investing in R&D increased in many comparable countries, especially in those with visible catchup efforts. In Bulgaria -- a country that, starting from low R&D levels in 2008, showed consistent expansion in volumes of R&D over time -- the number of enterprises investing in R&D almost tripled in the period, led by small and medium-size firms which increased from 146 to 490 and from 114 to 256 enterprises. In Poland, a country with more firms of a bigger size (and also with a consistent increase in business R&D in the period), the increase in the number of firms investing in R&D is less spectacular (12 percent) but the lead is still played by small (11 percent) and medium-sized firms (17 percent), with the number of large firms increasing by 3 percent in the period. This experience matters because the policy instruments to enable more firms investing in R&D often differ from those to enable more investments in R&D by investing firms, with matching grants at earlier stages contributing more to the former objective and tax-breaks to the later (Table 3.4).

Table 3.4: Business R&D Spending 2008-16: Total, number of firms and average investment (var. %)

	Bulgaria	Czech Rep	Croatia	Poland	Slovenia	Slovakia
<i>Total R&D spending by firm size (Var (%) 2008-2016)</i>						
10 to 49 employees	1225.9	-2.58	-4.05	199.07	n.a	564.56
50 to 249 employees	597.2	0.53	15.30	205.72	70.10	116.86
250 employees or more	420.3	40.34	-54.99	194.41	9.19	221.95

Total	546.8	20.53	-33.80	196.71	41.57	227.61
	<i>Number of innovative firms investing in R&D, by size (Var (%) 2008-2016)</i>					
10 to 49 employees	235.6	2.4	-13.4	10.9	-1.8	-27.5
50 to 249 employees	124.6	12.0	-29.3	16.9	-11.7	-12.0
250 employees or more	92.2	0.7	-37.7	3.5	-28.8	-23.4
Total	171.4	5.0	-21.2	11.7	-8.6	-22.4
	<i>Average R&D investment (R&D intensity), by size (var (%) 2008-16)</i>					
10 to 49 employees	295.06	-4.87	10.82	169.75	n.a	816.69
50 to 249 employees	210.46	-10.28	63.12	161.53	92.56	146.52
250 employees or more	170.75	39.36	-27.71	184.54	53.45	320.56
Total	138.34	14.78	-15.96	165.54	54.81	322.13

Source: Staff elaboration based on CIS data

The declining number of firms of SMEs investing in R&D may represent a bottleneck to the rise of business R&D in Croatia. Croatia business R&D in 2016 was less concentrated due to lower investments of large firms rather than an expansion of small and medium-sized firms' investments -- a process that, in turn, brought the overall business R&D investments down. In fact, a striking regularity in data is the systematic decline in the number of firms investing in R&D in Croatia in both phases of R&D evolution in past decade, showing the 'intensive' (more per firm), as opposed to extensive (more firms), nature of business R&D in Croatia. Indeed, analysis of FINA data suggests that it has been difficult to quick-start R&D in firms in Croatia: for instance, less than 2.6 percent of firms that did not invest in R&D in 2016, started doing so one year later.

The lack of progress in R&D expenditures by small and medium-sized firms is related to the policy mix in place, emphasizing tax breaks.

The lack of 'complementary factors' required to make expected returns to private investments adequate, is part of the reason why firms do not invest or invest little in R&D. Conceptually, innovation can be thought of as the accumulation of knowledge capital by firms. It is thus subject to impediments to the accumulation of any type of capital—for instance, thin financial markets, macroeconomic volatility, or obstructive business climates—in addition to those barriers specific to innovation.⁶⁵ The importance of such complementary factors is in part captured by the relationship between the TFP levels and business environment variables if one takes TFP levels as a proxy to firm upgrade (see section 3.2.2). Complementary factors are not only related to broad business environment factors but also to features of a well-developed national innovation system, discussed in Section 3.1. One of

⁶⁵ See Cirera, X., & Maloney, W. F. (2017). The innovation paradox: Developing-country capabilities and the unrealized promise of technological catch-up. The World Bank.

those features is the ‘policy mix’ – which may or may not alleviate markets failures inherent to private investments in R&D.⁶⁶

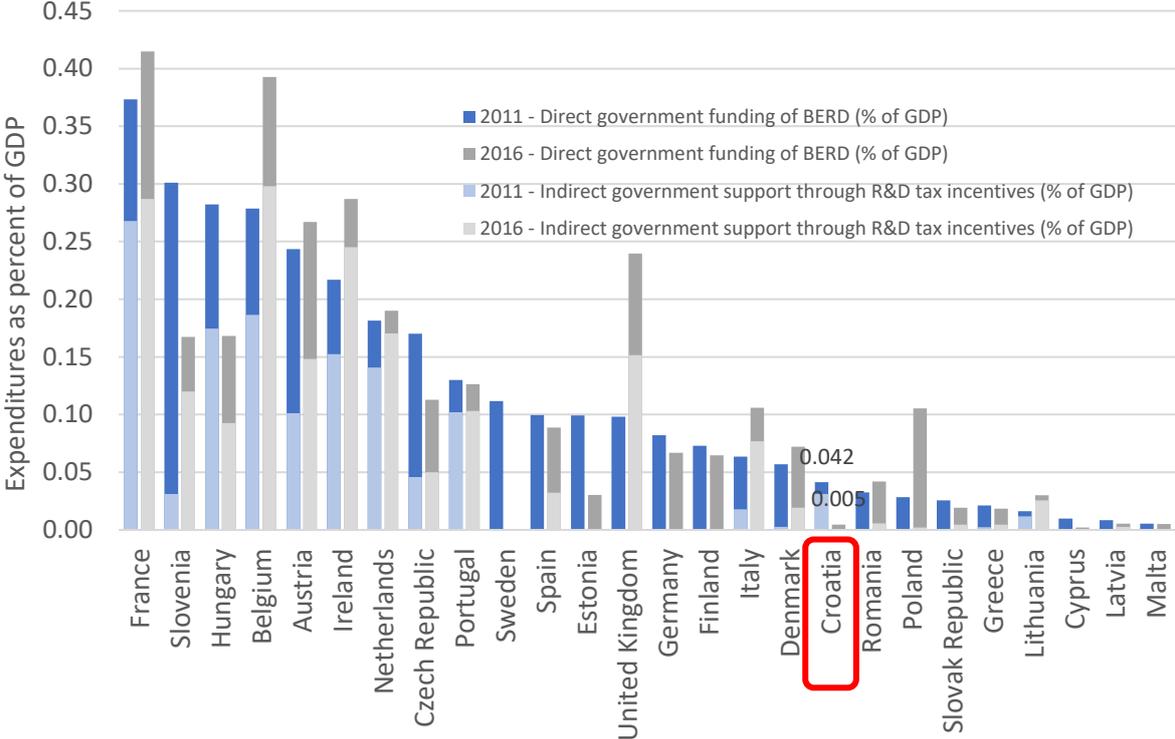
Croatia’s innovation policy mix has placed limited emphasis in supporting business investments in R&D, especially startups and smaller firms. By 2011, government budget appropriations or outlays for R&D (GBAORD), the indication of budgetary allocation of funds, corresponded to less than 0.042 percent of GDP, of which about two-thirds in the form of indirect support (tax-breaks) – an instrument that, by design, tends to favor large incumbent firms. Tax-incentives were provided between 2007-14 based on the Act on Scientific Activity and Higher Education articles, suspended between 2015-17 and reinstated in July 2018. As a result, public support to business R&D in Croatia declined, to reach an estimated value of 0.005 percent of GDP in 2016.⁶⁷ These results contrast with international experience in the period, when most EU countries prioritized the funding of business R&D, including through direct support to young, innovative firms.

Indeed, government funding of business R&D in Croatia is much lower than in most of its peers. GBAORD in Croatia in 2016 was the second lowest level among a sample of 26 European countries (after Cyprus). Slovenia in 2011, for instance, was spending almost eight times more (0.32 of GDP), of which about fourth-fifths in direct support (direct subsidies, e.g. matching grants), an instrument with a better fit to target new and smaller firms. In addition to disparities in the business environment, the difference between policies adopted by the two countries helps to explain the worse R&D performance of smaller firms in Croatia (Figure 3.23).

⁶⁶ For the rationale of using public funding to support business R&D in the private sector, especially at early stages of research commercialization, see Hall, B. H. and J. Lerner (2009) “The Financing of R&D and Innovation”. NBER Working Paper No. 15325.

⁶⁷ Staff estimation.

Figure 3.23. Government funding of business R&D: direct and indirect support (2011 - 16)



Note: 2015 values for Austria, Belgium, Denmark, France, Greece, Slovenia, and the United Kingdom instead of 2016 (last available data)

Source: Staff calculations based on OECD Data.

Direct support to Public funding for business R&D for small and medium firms, and new R&D investors, especially startups, is extremely scarce. Overall, early-stage funding (angel investments and venture capital) is hard to find in Croatia, as discussed in Section 3.3. Previous efforts to promote firm-level R&D through matching grants to finance the proof of concept stage and provide first and second round investments to finance prototyping products through Proof of Concept (PoC) and RAZUM, programs implemented by Croatia’s former Business Innovation agency (BICRO), have shown some encouraging preliminary results (See Box 3.7).

Box 3.7.: Evidence of RAZUM program's behavioral and output additionality

Evidence of RAZUM's behavioral and output additionality was measured by a survey of beneficiaries. When interviewed on what would have happened had they not received the RAZUM grant, six companies (30 percent) reported that they would have abandoned the project entirely. The majority (86 percent) of the rest would have relied on their own resources, while some of them would have tried to obtain financing from banks and venture capital funds. Three firms would have attempted to identify sources of funding through strategic partnerships and some other R&D subsidies. However, the absence of RAZUM money would not have been without consequences—most companies would have proceeded with the project on a smaller budget.

According to responses, RAZUM enabled beneficiary companies to increase their capacity for conducting innovation and R&D and to extend staff knowledge and capability via the hiring of highly educated professionals. In most cases, these changes are likely to be permanent. New product development was positively affected in a large majority of cases, suggesting better innovation capability. For most companies that received RAZUM support, work on the project generated additional ideas for innovations.

A similar pattern is found in the case of nonbeneficiaries. Those firms were either in the evaluation process (passed the preselection phase) or were approved and waiting for financing. In the hypothetical situation of not receiving RAZUM funding, two companies out of 14 would have abandoned the planned project and started another one, whereas all other companies would have proceeded with their projects (no firm declared that it would not continue with that or any other project). However, the absence of a RAZUM grant would have had consequences for the duration, scope, R&D capacity, and overall quality of projects. Without the RAZUM grant, the vast majority of respondents said that they would have proceeded with the project but over a longer time frame (92.9 percent), on a smaller budget (85.7 percent), with reduced scope (85.7 percent), and with inadequate equipment and/or machinery (71.4 percent).

Companies also reported they would not have hired additional employees (71.4 percent), and the innovativeness level of the output would have been lower (42.9 percent).

Source: Aprahamian and Correa (2015) based on Radas et al (2011)

The absence of a dedicated innovation agency hinders the expansion of public funding to R&D in younger and smaller firms.

The merger of HAMAG and BICRO aimed to facilitate absorption of EU funds but did not take fully into account the needs of Croatia's NIS. The creation of a single entity to manage EU funds to support business is understandable – it aimed to save scarce human resources, improve accountability and fiduciary responsibility in the use of EU funds, and facilitate coordination of enterprise development policies. Yet, those essential goals must be balanced against the needs of Croatia's NIS and development strategy. In particular, the potential role that a massive expansion in the number of new, knowledge-intensive firms can play in Croatia's productivity growth, for which larger amounts of government support will be needed.

Given Croatia's growth needs, a dedicated innovation agency could be a useful institution. Direct support of R&D could play an important role in facilitating the emergence of new, innovative firms and knowledge-intensive start-ups. EU funds available for Croatia are enough to promote a robust impact over time. But given the large volume of resources that should be dedicated to the task and the complexities in design (making sure instruments are incentive-compatible) and implementation (nurturing demand, monitoring and evaluating programs), the country would be probably be better served by a dedicated innovation agency – as illustrated by several European experiences, including of the Nordic countries.⁶⁸

⁶⁸ Aprahamian and Correa (2015) estimated that an annual additional amount of EUR 92 million per year between 2015-20 would be necessary to help Croatia achieve the level of business R&D consistent with its Europe 2020 R&D targets.

3.3 Financial Sector

Well-functioning financial markets are crucial for raising aggregate productivity in at least two, often complementary, ways. First, by reallocating capital from loss-making to profit-making projects or firms, well-functioning financial markets provide the basis for a continuous restructuring of the economy, with resources flowing from less to more productive firms which, in turn, increases aggregate productivity. Second, by providing funding for productivity-enhancing projects at the firm level. For example, bank financing of working capital needs may release firms' own resources for investment in training or innovation. As the financial needs of enterprises change significantly throughout their life cycle, a well-functioning financial market is one which provides different funding instruments – from early-stage finance (such as angels and venture capital) to growth-finance (private equity) etc. – for short-term (e.g. banks and working capital) and long-term needs of the real sector at reasonable costs.

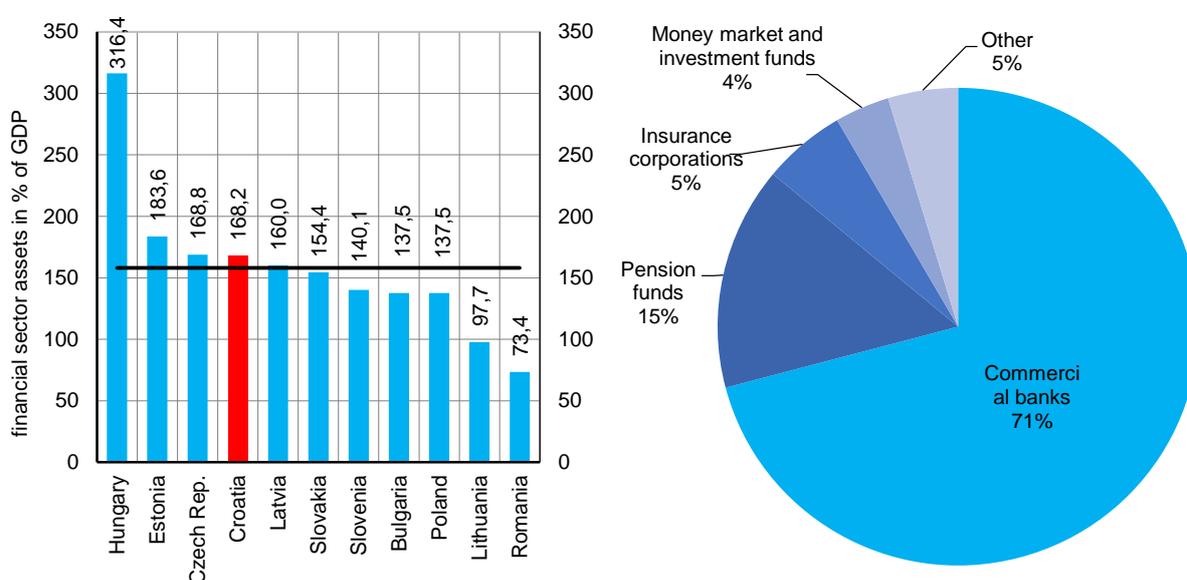
This section addresses the current performance of Croatia's financial sector, which is dominated by a large and solid banking sector that lacks diversification and innovation-oriented finance.

Croatia's financial sector is dominated by a large, solid banking sector with a non-negligible volume of Non-performing Loans.

The Croatian financial sector is sizeable and dominated by the banking sector. With the sizable level of financial assets, the financial sector in Croatia accounts for around 170% of GDP. Compared to the CEE region and excluding Hungary which has noticeably bigger financial sector, Croatia belongs to the group of countries with a relatively higher level of financial sector assets. The sector is dominated by banks – a common feature of financial systems across Europe, especially in Central and Eastern Europe where foreign banks made a strong penetration in the early period of transition. Banks hold about 70 percent of total financial sector assets in Croatia. The role of non-bank financial institutions remains limited and not oriented towards corporate sector funding. Among non-bank financial institutions, pension funds continued to hold the bulk of total assets (15 percent). However, around two-thirds is invested in government securities due to both regulatory requirements and restrained engagement in private capital investments. Neither insurance companies nor money market and investment funds have a significant share of assets invested in the corporate sector.⁶⁹

⁶⁹ By the end of 2017, 17 percent of insurance companies' assets was invested and equity and investment funds units. In the case of investment funds only 3 percent of their total assets were placed in domestic shares and 1 percent in domestic corporate bonds, while the rest was invested in either Government bonds and T-bills or in cash and domestic deposits.

Figure 3.24(a). Financial sectors across the CEE region **Figure 3.24(b). Structure of the financial sector in Croatia**



Note: CEE comparison data refer to 2016, while data on the structure of the financial sector assets in Croatia is for 2017. "Other" includes financial auxiliaries (like stock exchange and brokers), captive financial institutions, money lenders and other financial intermediaries (like leasing and factoring companies).

Source: CNB, Eurostat, staff calculations

The Croatian banking sector remains healthy but NPLs are still on the high side, particularly in low productivity sectors. Current profitability and capitalization of Croatian banks, as well as the central bank's stress tests, confirm that the system is resistant to possible shocks. Capital adequacy of the Croatian banking sector is among the highest in the region, and the total capital ratio at the beginning of 2018 stood at 22.9 percent, compared to 16.4 percent ten years ago. This is a result of the accumulation of capital buffers due to regulatory requirements implemented by the Croatian National Bank in the past, as well as sales and write-offs of non-performing loans that reduced exposure to risky assets. Since the peak in 2014, the NPL ratio for the overall corporate sector dropped more than 12 percentage points, amounting to 22.1 percent by mid-2018. Yet, NPL ratios are still above pre-crisis levels and relatively high when compared to peer countries and the EU average. Most of NPLs are related to construction activity where more than half of loans are classified as non-performing, followed by loans to companies involved in manufacturing and trade activities. Not surprisingly, those are the sectors where firms with low TFP prevailed and little reallocation was observed.

Sustaining high NPL levels can potentially hinder aggregate productivity growth on both 're-allocation' and 'within' components. Pre-crisis levels of NPLs, while not a challenge to the stability of the banking sector as previously stated, indicate that many firms are still unable to achieve profitability levels compatible with their debt servicing. The continuous pattern of default across firms ultimately raises risk-aversion by lenders and the cost of capital and may crowd out growth of more productive firms by locking resources (so-called "congestion effects"), becoming a hazard for the reallocation process. In addition, high NPL dynamics create barriers for the restructuring of indebted but potentially viable firms, concentrating capital in short term cash flows urgencies and impeding productive investment, in turn restricting 'within' TFP growth component.

Figure 3.25(a). The profitability of the Croatian banking sector

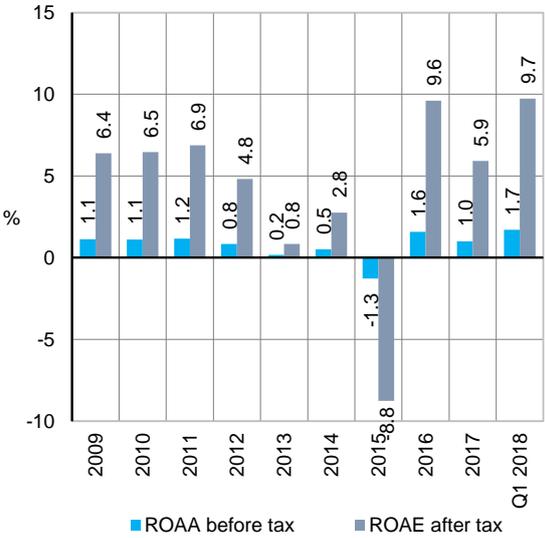
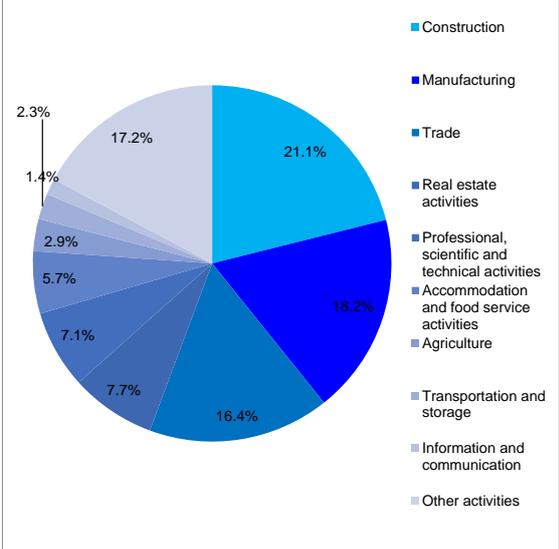


Figure 3.25(b): Non-performing loans to the corporate sector



Source: CNB, staff calculations

Credit conditions improved but appetite from a highly indebted corporate sector remains modest.

Demand for credit, expressed by corporate financing levels, remains modest. The main driver of recent financing is borrowing from domestic banks (0.7 percent of GDP in 2017), although other sources of financing are also positively contributing (0.2 percent of GDP in the same period). This is exclusively driven by stronger loan disbursement of HBOR, and moderate recovery of leasing activity. Domestic credit flows from banks to the corporate sector are gradually picking up, but the recovery of domestic credit activity did not intensify – growing around 3 percent from 2016 to mid-2018. Debt restructuring needs are also positively affecting credit demand, confirming the issue of existing debt that companies are trying to refinance. Credit recovery is spread across different activities, with the biggest contribution coming from service activities, particularly professional, scientific and technical activities, as well as accommodation and food service activities. This especially reflects favorable developments in the tourism sector, but it is noticeable that credit flows are also, to a lesser extent, positive towards manufacturing and agriculture activities. In contrast, construction is the only activity that continuously deleverages.

Figure 3.26(a): Dynamics of non-financial corporations' total financing

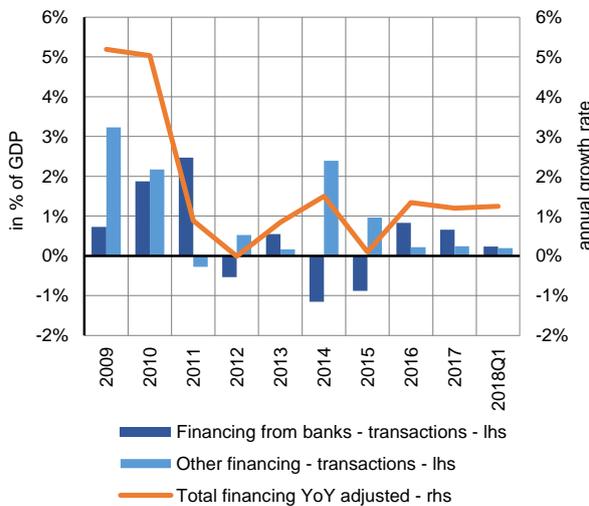
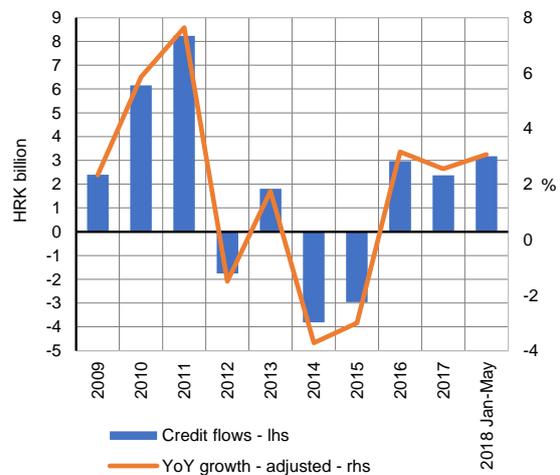


Figure 3.26(b): Evolution of banks' credit activity to corporate sector



Note: Other financing includes corporate borrowing from domestic leasing companies and direct borrowing from the HBOR, as well as borrowing from foreign banks and affiliated enterprises abroad. Adjusted annual growth is based on transactions data and adjusted for various one-off effects that cannot be considered as real credit flows (for example effect of the exchange rate changes, the assumption of loans to the shipyards by the Ministry of Finance, banks bankruptcies, methodological changes etc.).

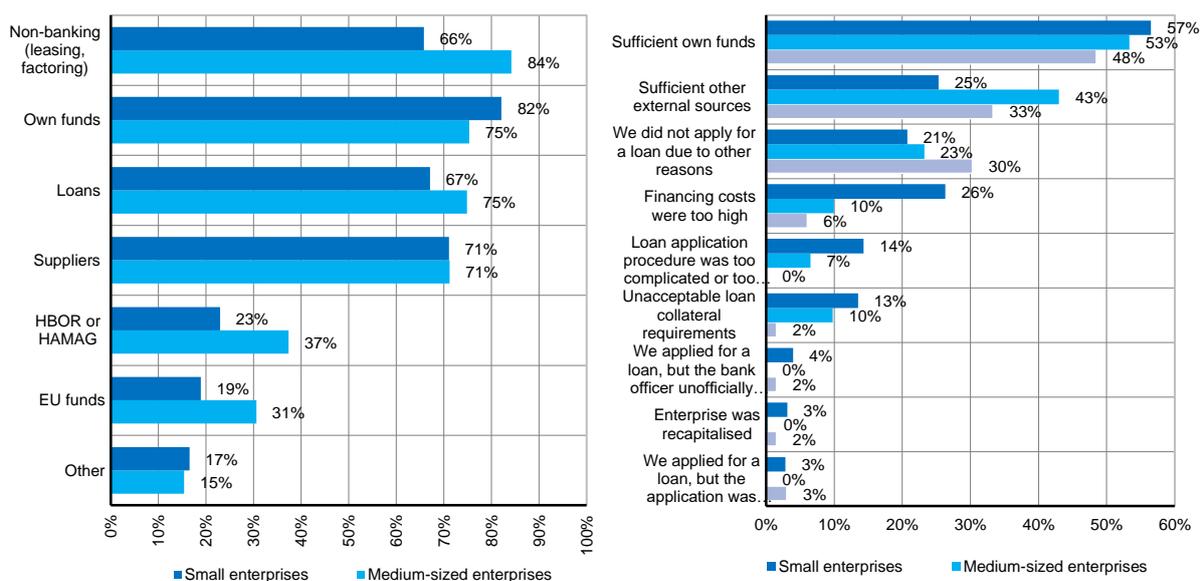
Source: CNB, Eurostat, staff calculations

Yet, access to finance seems to be a more important constraint for business in Croatia than in comparable countries. Access to finance is the most important concern for 7 percent of EU SMEs, while in Croatia this share is 18 percent in the case of small and 13 percent in the case of medium-sized companies. With the assumption that smaller loans, up to 1 EUR million, are more often consumed by small rather than large companies, a difference of almost 100 basis points between interest rates on smaller and bigger loans during the last ten years suggests that smaller companies have a higher cost of financing as well.⁷⁰ Own funds remain the most important source of financing for SMEs in Croatia (four times higher than the EU average), as well as supplier financing (including trade credits and delayed payments). Bank loans are the third most important source of financing. In terms of the reasons why enterprises do not use bank loans, most of the enterprises answered that they did not need a loan, whether because they had enough own funding or because they claimed to have enough access to other external sources. However, a quarter of small enterprises reported that the high costs of obtaining loans prevented them from borrowing.⁷¹

⁷⁰ The findings from the Survey on the access to finance of SMEs conducted in 2017 (SAFE) suggest that SMEs' access to finance is not a prevailing obstacle for doing business, but the share of SMEs responding that access to finance is pressing problem for business operations is significantly higher than the EU average. SMEs also reported they had facilitated access to bank loans, including longer-term loans, overdrafts and credit lines.

⁷¹ The level of interest rates and loan processing costs, refusal by banks and collateral requirements are less frequently mentioned as reasons not to use loans. On the latter, 13 percent of small enterprises raised as an issue unacceptable loan collateral requirement, compared to only 4 percent in the EU.

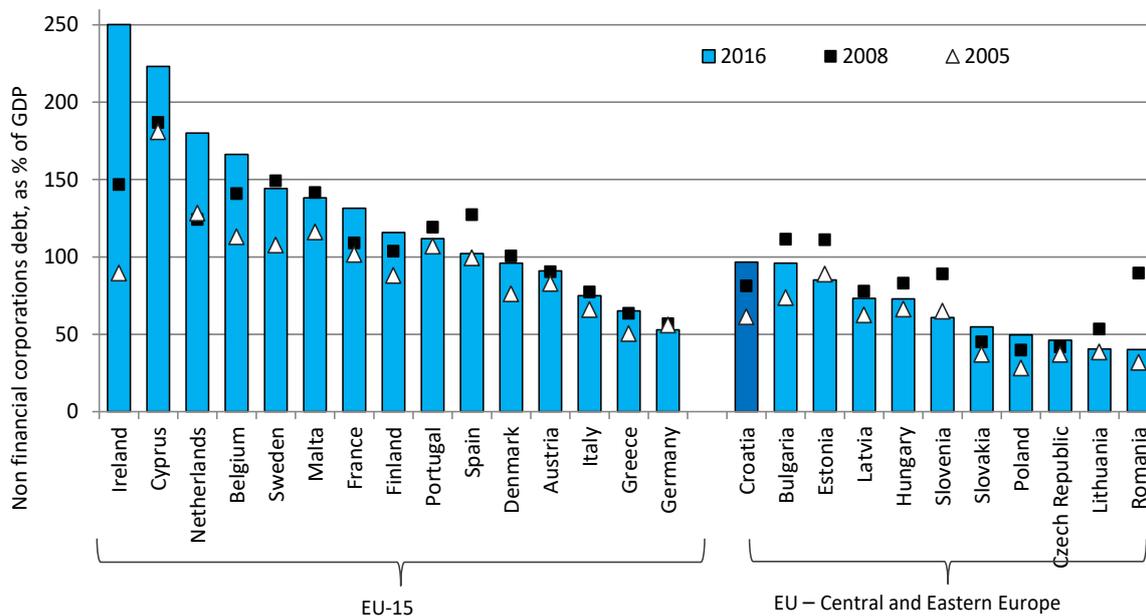
Figure 3.27. Sources of financing



Note: Left figure - the percentage of enterprises that used or have experience with listed source of financing in 2016. Right figure - the share of enterprises that gave a specific reason for not using a loan.

Source: Survey on the access to finance of SMEs, CNB and Ipsos, 2017.

Figure 3.28. Non-financial corporations' debt in EU countries



Note: Corporate debt is the sum of loans and debt securities from non-consolidated financial accounts. Luxembourg (in which corporate debt stood at 356 percent of GDP in 2016) is excluded.

Source: Eurostat, staff calculations

Overall, the Croatian corporate sector remains among the most indebted among CEE countries. Accumulation of debt was especially pronounced in the pre-crisis period when low-risk perception and abundant capital inflows boosted domestic and foreign borrowing. Overall, deleveraging in the corporate sector has never intensified enough to significantly reduce the stock of corporate debt. In fact, by the end of 2016, the share of corporate liabilities including loans and debt securities was relatively

higher than at the end of 2008, reaching the level of 96.6 percent of GDP. As a result, the exposure of Croatian companies to currency risk is relatively high -- especially for unhedged companies in the non-tradable sector without regular foreign currency inflows.⁷² Croatia's debt overhang, concentrated in large and non-exporting firms, creates pressures on firms' performance as overleveraged companies have no financial space to engage in profitable business opportunities, preventing TFP increase at the firm level. It also hinders the reallocation of economic resources from firms with low productivity to more productive and promising firms.

The supply of non-banking financing, especially for early stage and expansion phases of firm growth, continues to be limited.

Capital markets as a source of financing equity or issuing corporate bonds remain relatively underdeveloped. The Croatian capital market is shallow, constrained by small market size and subdued investor appetite, with a small number of listed shares, small turnover, and rare IPOs. Capitalization of Croatian stock market (Zagreb Stock Exchange - ZSE) in 2017 was around 40 percent of GDP, higher than in some of the peer countries, while lower compared to the Euro area average (65 percent of GDP). At the same time, liquidity was very low, and so was the free float of listed companies. When comparing relative turnover of shares included in the official index of stock exchanges across the region, the annual turnover of the Croatian capital market in 2017 was among the lowest, reaching just 0.5 percent of GDP. To improve access to capital by smaller firms, ZSE has recently created Progress Market – a multilateral trading facility in Croatia and Slovenia, with lower transparency requirements for issuers compared to the regulated market (and thus higher risk for investors). The initiative is still in too early a stage of development to have a significant effect on corporate financing.

Table 3.5. Angel Investments by CESEE country, 2016-2017

	No. of invest-ments, 2017	Total BA Inv. 2017, €M	Average deal size in 2017, €	Total BA Inv. 2016, €M
Poland	47	14.5	308,511	12.6
Estonia	225	11.3	50,222	8.82
Bulgaria	42	7	166,667	5
Czech Republic	42	6.1	145,238	5
Hungary	73	4.4	60,274	5.5
Romania	24	3.4	141,667	1.3
Latvia	34	2.9	85,294	2.4
Slovenia	16	2.5	156,250	3.2
Lithuania	9	1.9	211,111	1.1
Slovakia	1	1.8	1,800,000	2.1
Croatia	4	1.1	275,000	1
Macedonia	1	0.02	20,000	1.4
CESEE Total	518	56.9	109,884	49.4

Source: EBAN, 2018

Private equity, venture capital, and angel financing are particularly scarce. In 2010 the Croatian Government launched a tender to seed a domestic institutional private equity (PE) industry

⁷² About 77 percent of total corporate debt (72 percent of GDP) is denominated or indexed to foreign currency (mostly in euro).

through the Economic Cooperation Funds program. In 2011, five (5) funds attracted the necessary co-finance and started operating. There are five fund companies managing a total of 6 ECFs, with total assets of around HRK 1 billion, or 0.3 percent of GDP. HBOR was appointed by the Government as the qualified investor for participation in the establishment of ECFs and participates in the implementation of activities of ECFs in the amount equal to the amount of investment of private investors and committed 1 billion kunas (approximately USD 184 million).⁷³ Assets of venture capital funds are insignificant, at about HRK 20 million by the end of 2017. The European Business Angel Network (EBAN) estimates that total angel investments reached EUR 57 million in 2017 in Central, South and Eastern European countries, of which investments by business angels in Croatia amounted to EUR 1.1 million, with an average size of EUR 275,000 (Table 3.5).

Alternative funding, such as leasing and factoring, and Fintech solutions are gradually improving. A boom in the activity of leasing companies lasted until the end of 2008. From 2009 onwards, the activity of leasing companies dramatically shrank: the total assets of leasing companies almost halved. In the last few years, the activity of leasing companies has been showing some positive trends. However, most new contracts are related to the lease of cars and commercial vehicles, while the increase in financing of machinery, transport machines and equipment is ten times lower. The factoring business was highly compromised during the crisis in the Agrokor Group.⁷⁴ With the escalation of the crisis in Agrokor Group in 2017, this type of financing collapsed reaching a level of only 0.5 percent of GDP in 2018, four times lower than in the peak years. Fintech solutions still reflect sporadic – and isolated – initiatives⁷⁵. Government support or coordination is still missing. Similarly, there is a lack of any strategic orientations on how Fintech could improve the efficiency of the financial sector, improve access to finance and therefore underpin economic growth.

Government initiatives to improve access to finance have emphasized the provision of guarantees to SME lending, with increasing participation of the EU Regional Development Fund.

The Croatian Bank for Reconstruction and Development (HBOR), a state-owned bank originally created to finance Croatia's reconstruction, continues to play an important role in the economy. Over time, its role has expanded to cover, for example, export, SME and innovation financing. There are a few different models of operation: direct lending, indirect lending through banks/leasing houses, risk-sharing models with commercial banks, and subordinated debt lending. Almost all credit lines offered by HBOR have interest rates discounted (subsidized) by 200 basis points for entities investing in areas of special state concern or supported areas – local government units located in specific regions, hill and mountain areas, or islands. By the end of 2017, more than half of HBOR's loan portfolio

⁷³ The funds are registered as open-ended investment funds with private offering under the management of investment companies. While those funds are often referred to as venture capital funds, an analysis of the portfolio of those funds indicated a focus on the firms' expansion phase (rather than early stages) in non-technological sectors where construction and commercial risks were better known by fund managers. According to the analysis, PE fund managers agreed that those resources will not 'trickle' down to support technology driven startups. See World Bank (2013): Venture Capital Program for Croatia. Background paper for the preparation of the Croatia Innovation and Entrepreneurship Venture Capital Project Appraisal Document (PAD1360). For example, in June 2013, Quaestus Private Equity has invested in the company called Spačva Wood Industries Inc., while in April 2012 Nexus has invested in the largest floor boards' factory in Croatia called Požgaj.

⁷⁴ Agrokor Group strongly relied on shadow financing through bills of exchange when exposure to banks and international financial institutions reached its limit. Bills of exchange were extensively issued by the Agrokor Group as a means of paying liabilities to various domestic suppliers of goods and services. After that, some of the suppliers were transferring bills of the exchange to factoring companies to obtain liquidity. Assets of factoring companies were growing in the years when nominal assets of other banking and non-banking institutions were declining.

⁷⁵ A promising innovation example is the development of comprehensive credit reporting techniques (such that company operating in Croatia can extract information on the creditworthiness of possible borrower much faster and besides official credit registry). This has the potential to lower the cost of credit risk assessment for all lenders and reduce the need for entrepreneurs to provide personal guarantees and collateral.

(53 percent) was placed directly with companies, and the share of loans to banks fell to 47 percent. In that year, HBOR's assets amounted to EUR 3.8 billion, which is equivalent to 8 percent of the Croatian GDP and 7 percent of the Croatian banking sector's assets (and equivalent to the sixth largest bank).

In addition to regular programs, HBOR currently manages one financial instrument earmarked for SMEs – a loan program “growth and development”. The instrument was launched in October 2017 and three banks intermediate the resources: Zagrebačka banka, Privredna banka Zagreb, and Erste & Steiermärkische Bank. The total allocation of the fund is EUR 200 million (50 percent provided by the European Regional Development Fund (ERDF) and 50 percent provided by financial intermediaries). The targeted beneficiaries are SMEs with a business track record of at least two years. The objective is to finance investments in fixed assets, but up to 30 percent of the loan amount may be used for working capital financing. The loan amount can range from EUR 100,000 to EUR 3 million, while for the tourism sector the loan amount can reach EUR 10 million. The interest rate ranges from 1 to 2 percent, thanks to the ERDF contribution at a 0 percent interest rate and competitive pricing from the selected banks. As for maturity, the loans have a tenor of up to 12 years, including a two-year grace period (with an exception for the tourism sector (a 17-year maturity with a 4-year grace period).

The Croatian Agency for SMEs, Innovations, and Investments (HAMAG-BICRO) is another source of funding for local enterprises, especially SMEs⁷⁶. HAMAG-BICRO's financing activities include providing loans and issuing guarantees, but also allocating grants, including for early-stage innovation finance, and micro-lending. Guarantees are the main financial instrument in HAMAG-BICRO's activities. Guarantees are issued for loans approved by financial institutions under the terms of the Credit Institutions Act and other legal entities approving loans/leasing in Croatia. Depending on the guarantee program, HAMAG-BICRO charges or accrues guarantee issuance fees.⁷⁷ The programs are financed through budgetary sources and EU funding for regional and rural development, with the latter becoming gradually dominant. In 2017, a total number of 183 guarantees were issued under different HAMAG-BICRO-operated guarantee programs, compared to 217 issued in the previous year. The portfolio of total issued guarantees by HAMAG-BICRO as of end-2017 reached HRK 1.8 billion, the equivalent to 0.5 percent of GDP. HAMAG-BICRO also operated a microcredit program that was introduced in 2013 as a pilot scheme, prior to the introduction of the EU-funded loan scheme.⁷⁸

Enabling equity, rather than debt financing, through the development of the domestic capital market, venture capital, and angel investors will foster the creation and expansion of new and more productive firms – contributing to aggregate productivity growth in Croatia.

There does not seem to exist a shortage of liquidity in Croatia's financial market but rather a misalignment for productive capital allocation. Credit demand is not catching up due to the high indebtedness of the corporate sector and the corresponding level of NPLs in the banking sector. Coupled with higher risk aversion and more stringent prudential regulatory requirements, banks will likely ration the supply and increase the costs of credit, especially for enterprises with less transparent financial statements, unclear credit history and poor collateral – which is typically the case of SMEs. This credit rationing of Croatia's banking sector, in turn, inhibits the capacity of the corporate sector to restructure its debt and then borrow for productivity-enhancing investments – which inhibits aggregate productivity

⁷⁶ The main modalities are described in Box 9.1 in the Annex.

⁷⁷ By providing first-class collateral for financial institutions, since they cover losses on the first call, HAMAG-BICRO, expects to be improving access to bank financing by SMEs.

⁷⁸ Microcredits were offered at a subsidized interest rate of 0.99 percent with a 5-year-repayment period with the option of a 6 month-grace period. The program lasted for 3 years (2013-2015) and financed 32 SMEs. Eligible expenditures included fixed assets and working capital. The maximum loan amount was HRK 70,000, which was later on increased to HRK 120,000. Eligible applicants were start-ups in their first 2 years of operations.

growth. So, to support credit expansion, capital relief products may be better suited than liquid support. On the other hand, the scarcity of capital to finance firm expansion and risk-capital to finance early stages of firm creation and innovation reflects a structural limitation of the current stage of development of Croatia's financial market.

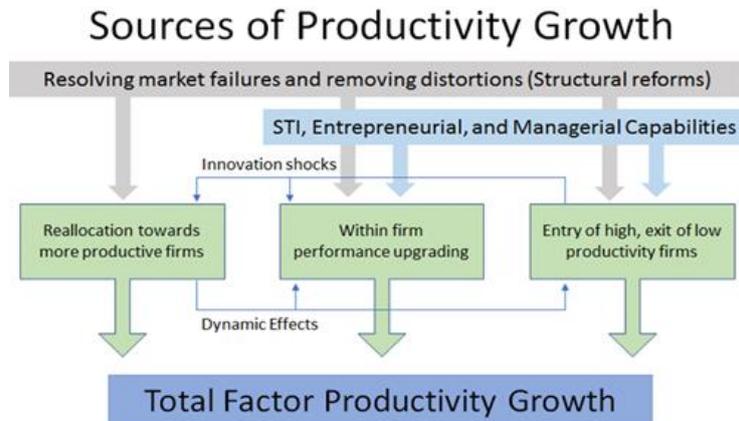
3.4 Conclusion

To accelerate growth and diversify exports, Croatia should reduce the misallocation of resources and promote innovation. Croatia needs to reignite the process of dismantling long-standing unproductive practices in order to make way for innovation. To achieve this, the government will need to develop an ambitious strategy combining structural reforms with policies to strengthen firm capabilities, innovation, and entrepreneurship, as illustrated by Figure 3.29. The next section explores how this could be achieved by addressing the main policy challenges and opportunities faced by the country. The main messages are as follows:

- I) **Overall.** Croatia's economic convergence stalled in recent years due to subdued performance of aggregate (total factor) productivity, rather than as a result of theoretically possible reasons such as an aging population. Trade performance in recent years, while improved by a more competitive exchange rate and decreasing labor costs, is still constrained by the limited availability of new products to be sold in new foreign markets. Limited export diversification, in turn, is closely related to the 'modest' innovative performance of the country.
- II) **Decomposing TFP growth.** The low aggregate TFP growth is explained by a large and negative effect of reallocation of resources from less to more productive surviving firms (corresponding to almost 80 percent the firm-level ('within' firm) productivity growth in the period). The effect of firm exit, despite being positive, is driven by few firm 'outliers' and becomes negative once those outliers are removed from the sample. Firm-level productivity growth, while responsible for the bulk of the positive aggregate TFP growth in the period, is comparatively modest. Entry also generates a comparatively low effect.
- III) **The role of firm characteristics, business environment, and innovation.** State-owned enterprises (SOEs) and larger firms showed productivity levels systematically below their peers. Evidence of negative (non-neutrality) effects of SOEs were found. Six business environment factors presented statistically significant impacts on TFP levels and dispersion: red tape, informality, and access to credit seem to be affecting both firm-level TFP (which we interpret as a proxy to firm-level productivity) and TFP dispersion (which, with the appropriate caveats, we treat as evidence of misallocation). On innovation, data showed that firms compare relatively well on non-R&D innovation expenditures, including, albeit to a lesser degree, on marketing and organization innovation. Data also showed a major gap in R&D-driven innovation caused by a relatively low and declining share of firms investing in R&D (especially small firms) and a massive decline on R&D intensity of those firms that invest (especially large firms).
- IV) **Financial markets.** Financial markets in Croatia, currently concentrated in debt-financing, need to develop the segments of equity finance and risk capital (venture and angel investment) to enable entry and expansions of new, more productive firms, thereby contributing more to aggregate TFP growth. Pre-crisis levels of non-performing loans, while not a challenge to the stability of the banking sector, indicate that many firms are still unable to achieve profitability levels compatible with debt servicing – raising risk aversion and cost of capital

for new loans to more productive firms and even for restructuring of indebted but potentially viable firms.

Figure 3.29. An Integrated View of Policy Drivers of Productivity Drivers



Source: Cusolito and Maloney (2018)

4 Assessment of the main developmental challenges and opportunities for Croatia

As we saw in the previous chapter, Croatia has a comprehensive set of development challenges regarding growth and productivity; trade and competitiveness; and innovation and technological progress. In the following section, we describe more specific challenges as well as opportunities for the country.

A full assessment of the development challenges faced by Croatia in the topics covered by this Policy Note is beyond the scope of the current exercise. Yet, we identify four main challenges closely related to Growth, Competitiveness and Innovation, namely: (i) the aging of Croatia's society; (ii) a trade performance concentrated in the export of tourism services; (iii) potentially negative effects of recent technological progress on labor markets and (iv) the need to improve the process of dismantling long-standing unproductive practices and raise productivity in Croatia. This section focuses on (iv). Productivity growth will relax the restrictions imposed by an aging society on the country's potential output. As argued before, higher productivity and more market dynamism are likely to increase the basket of exportable goods. The potential effects of technological progress on labor markets will be addressed in a separate Policy Note.

In the remainder of this section, the challenges and opportunities for improving the process of dismantling long-standing unproductive practices in order to make way for innovation and productivity growth are grouped in three main goals: improving resource allocation; promoting technology adoption, innovation and entrepreneurship; and strengthening state capacity for implementation.

4.1 Main Challenges

Improving the reallocation of resources

To improve the process of reallocation of resources in the economy, Croatia will need to address challenges in the following five policy areas: (i) the privatization process/corporate governance of SOEs; (ii) the regulation of product and service markets; (iii) competition policy and state aid; (iv) red tape for firm entry and operation; and (v) insolvency regime. The corresponding policy measures should be aimed at reducing state presence in the economy, improving rivalry, reinvigorating entry and exit, and cutting red tape, thus contributing to the improvement of overall resource allocation and market dynamism.

Challenge 1: Privatization and corporate governance of SOEs

SOEs and larger companies are hindering aggregate productivity growth in Croatia. SOEs play an important role in the Croatian economy. They account for over 10 percent of employment, a fifth of total turnover and a third of total assets, operating in numerous sectors including rail, road and air transport, hotels and restaurants, food processing, pharmaceuticals, water supply, financial services and services of motor vehicles. Over 600 companies report to sub-national, regional and municipal authorities. SOEs contribute directly to government deficits, with a net average borrowing of 0.6 percent of GDP between 2011-2014.

Box 4.1.: The SOEs footprint

As discussed, the presence of SOEs in Croatia is still more pronounced than in peer countries, including in transport (air, roads, railway and maritime transport, airports and ports), energy (generation, distribution and storage), post and communications, forestry, agribusiness and manufacturing. SOE corresponded to about 11 percent of total value added in 2017, compared to and employed 7 percent of total workforce. Croatian SOEs are economically and financially less efficient than its peer in Central and Eastern European countries. Efficiency improvements or privatization can raise budgetary revenues or reduce subsidies helping to improve fiscal consolidation and resource allocation.⁷⁹

To further illustrate the potential effect of privatization in firm level productivity, Figure 4.1 compares the evolution of annual average TFP in firms for which ownership status in FINA database changed (ownership change) in relation to those for which ownership was the same (either fully private or state-owned) in the 2008-17 period, which is market as period (T). It shows two interesting results. First, it corroborates the major gap between those firms and SOEs after ownership change happens. Second, and perhaps more interestingly, it shows that most of the catch up occurs two years before ownership change (t-2 and t-1). This is not unique to Croatia. Indeed, the improvement in performance of SOEs already before privatization is consistent with international experience.⁸⁰

Figure 4.1: TFP evolution of TFP between 2008-16 according to firm status: private firms, changing ownership and state-owned enterprises



Source: Own elaboration based on FINA data.

Source: Staff Elaboration based on FINA data

Challenge 2: Product and service market regulations

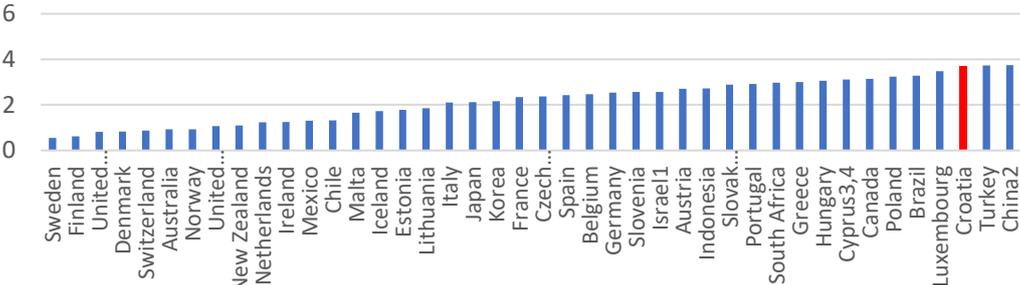
Restrictive regulation distorts basic incentives and market functioning. According to the OECD Product Market Regulation (PMR) index, Croatia has one of the most restrictive regulations of product and service markets among OECD economies – corresponding to the levels of Hungary two decades ago (1998). Poor regulation in the logistics sector markets helps explain why Croatia underperforms all EU peers in the World Bank Logistics Performance Index, despite being the country with the highest density of motorway networks in Central and Eastern Europe.

⁷⁹ EBRD (2018). Croatia: Background Study on State-Owned Enterprises. Mimeo. February.

⁸⁰ See for instance, Gupta, N., Ham, J. C. and Svejnar, J.: 2008, Priorities and Sequencing in Privatization: Evidence from Czech Firm Panel Data, *European Economic Review* 52(2), 183–208.

Restrictions appear particularly burdensome in the services sector, notably in network economies and professional services. The level of restrictiveness of regulations in the professional sector in Croatia is only comparable to Turkey and falls behind all CEE countries (Figure 4.2). Prices are regulated for professional services, international wholesale roaming rates, and local loop unbundling. Advertising and marketing are prohibited for legal services, and while the same restrictions existed for engineering and architecture professions, these restrictions have been removed now. The regulations on these two sectors have eased since the PMR scores were collected in 2013 due to changes to laws on the conduct of engineers and architects between 2013 and 2016. Reduction in the level of restriction to the regulation of services would have a sizable impact – the reduction of overall restrictions in the service sector in Croatia would result in over 5.7 percent productivity gains – the largest compared to any other EU peer⁸¹ (Figure 4.3).

Figure 4.2. High restrictiveness in the professional services sector



Source: OECD PMR, WB EU RER, Van Der Marel, Kren and Iooty (2016)

Figure 4.3. Estimated impact of reduction in service regulatory barriers on TFP level (percent)



Source: OECD PMR, WB EU RER, Van Der Marel, Kren and Iooty (2016)

⁸¹ Source: OECD PMR, WB EU RER, Van Der Marel, Kren and Iooty (2016).

Box 4.2.: Regulated professions: The case of architects and construction engineers

Apart from architects, three types of engineers are involved in the design and supervision of construction, namely, civil, mechanical, and electric engineers. In 2017, Croatia had about 2,400 architects and 5,700 engineers with an active professional license. Similarly to many OECD countries, architects and engineers are the only professionals entitled to design constructions, check applications for construction permits, and supervise construction. However, the rights of engineers are fragmented. Civil, mechanical and electrical engineers hold exclusive rights over their own domains of responsibilities. In the case of simple construction objects, such as single-family buildings, one professional can design and supervise construction, but for most new constructions in Croatia the regulations require the cooperation of different professionals from each of these fields. Membership in the construction chambers is mandatory for these professionals. In addition, and depending on work experience, these professionals can also obtain specialist licenses such as work managers, design auditors, and project managers, increasing market concentration and monopolistic power even further.

In total, 3 laws and 37 by-laws regulate the provision of architects and engineers' services. Most restrictions stem from rules that reinforce dominance or limit entry, in particular registration and licensing by the construction chambers. The fragmentation of exclusive rights in engineering harms competition by limiting rivalry between different types of engineers. Requiring several professionals to participate in construction projects increases costs and reduces the pool of competitors.

In practice, such restrictions derive in an inherent conflict of interest between supervision and representation. Mandatory chamber membership and specific licenses harm the competition as they favor incumbents over new entrants, and make it easier for providers to collude on strategic variables (such as price and construction location). Chambers set prices in the past and currently provide guidance to its members in standardizing fees. In addition to that, chamber's regulation is discretionary and open room for discrimination. This general provision can be used against new entrants even in the case of minor violations of the law that are unrelated to the organization oversight.

There are already solutions in place to assure public quality and reduce market distortions. The qualification requirements for architects and engineers are more demanding in Croatia than in most other countries. For example, these professionals generally hold master's degrees in their fields, and complex constructions have to be checked by engineers with over ten years of experience. Taking into account current qualification, professional liability and supervision (by the Ministry of Construction and Spatial Planning), requirements could be reduced and still be in accordance with OECD best practices.

Source: World Bank (Forthcoming). Croatia Review of entry and conduct requirements in regulated professions.

Challenge 3: Competition Policy and State Aid

The total amount of state aid allocated by Croatian authorities has declined. The 2005 State Aid Act and related bylaws were adopted as preparation for EU accession. The unwinding of support for and restructuring of the shipbuilding industry carried out as a condition for Croatia's accession to the EU is the main reason for the decline in state aid since the early 2000s. However, the railways sector has received increasing support in recent years. The use of state aid in specific sectors should be reviewed, with the goal of minimizing distortions to competition.

Box 4.3.: State Aid in Croatia

State aid has increased in the past years, becoming more concentrated in regional development and SME support policies. Between 2002-10, Croatia's state aid volumes were among the highest in the EU (1.2 percent vs 0.5 percent of GDP in the EU-12), with a dominant share of sectoral aid, notably to the shipbuilding and transport sectors, followed by a continuous increase in fishing and agriculture support.⁸² Between 2013-17, total state aid in Croatia (excluding railway) rose from EUR 259.9 million to EUR 597.7 million, corresponding to 1.23 percent of GDP, compared to 0.78 percent in EU-28 – the eighth highest among EU members. In that period, state aid for rescue and restructuring declined from 0.19 to 0.07 of GDP, reflecting the advancement of shipbuilding and steel reforms; while support to regional development, SMEs and culture raised steadily. By 2017, 33 percent of Croatia's state aid was allocated for regional development (0.41 percent of GDP), 17 percent for SME support including risk capital (0.21 percent of GDP) and 10 percent for culture (0.13 percent of GDP).⁸³

The concentration of state aid resources on regional development and SME support in Croatia differs from the overall EU trend. Between 2013-17, state aid resources were mainly allocated to environmental protection and energy saving, reaching 52 percent of total aid by 2017. By contrast, the objective of regional development declined from 0.10 to 0.07 percent of the GDP, reaching 8 percent of total state aid and the second most important objective. The third largest objective for the EU-28 was research and development, for which resources were more or less stable during the period to reaching 0.06 percent of GDP (7 percent of total aid) in 2017. State aid for SME support, including risk capital, came next, with 0.04 percent of GDP (5 percent of the total). An increase in the use of funds for regional development and SME support, including risk capital, between 2016-17 was, nevertheless, detected by the 2018 EC State Aid Scoreboard.

The contribution of current state aid expenditures to aggregate productivity growth is unclear to say the least. The main risk is that resources allocated to regional development or SME support end up postponing reallocation of resources by artificially extending the survival of less productive firms. This possibility is not negligible. Very often such policies aim to help less productive, smaller firms to survive - rather than enabling young innovative firms to grow. Also, State Aid Regulations are conceived to mitigate the distortionary effects of member state policies on the European market but not the distortions that may occur in the domestic market and sources of misallocation. Moreover, most state aid programs currently fall under the general block exemption regulation – which, by eliminating ex-ante approval by the EC, may weaken the capacity of EC state aid rules to minimize distortions on competition.⁸⁴ Not surprisingly, a recent study has shown that reduced financial pressure, in part, but not only, related to lower interest rates, has increased the number of 'zombie' firms in Europe.⁸⁵

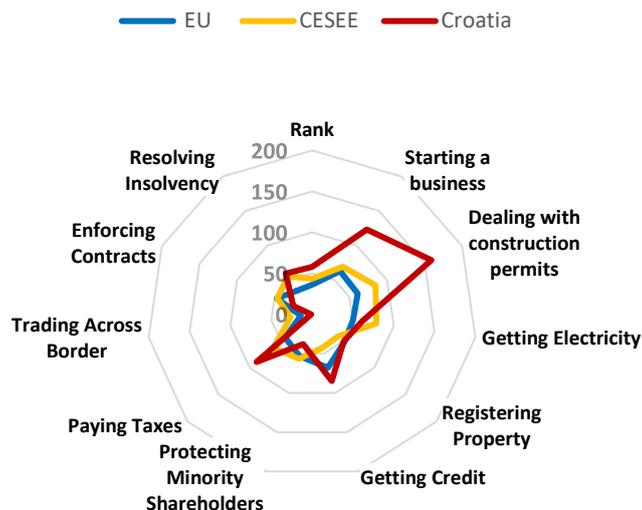
Addressing the potentially distortionary effects of state aid will require more than just changing the institution in charge of policy oversight and report. The competence over state aid regulations in Croatia shifted from the Croatian Competition Agency to the Ministry of Finance in mid-2014. The new model, followed by seven member states, aims to increase policy effectiveness and efficiency, including by creating a database and cohesive state aid registry. To make those objectives more likely, the government could, in addition:

- Consider the use of state aid for organized restructuring and, if necessary, closure of firms in selected sectors, eliminating programs and policies that may be postponing reallocation.
- Monitor and analyze the impact of state aid on aggregate productivity in Croatia (through the relocation and innovation effects), in addition to fiscal costs and compliance with EU state aid rules.
- Develop a comprehensive data strategy, consolidating firm level databases such as FINA, customs, state aid registry, etc.

Source: Staff Elaboration based on State Aid Database – European Commission

Challenge 4: Red tape for firm entry and operation

Figure 4.4. Croatia lags regional peers in the ease of doing business



Source: Doing Business 2019

Comparison with peer countries reveals slow pace of business environment reforms in Croatia, and consequently lagging performance. The 2018 WEF Global Competitiveness Report ranks Croatia at the 68th place, the lowest among EU Member States. Croatia also continues to lag CESEE countries in key Doing Business indicators, including starting a business, dealing with construction permits, access to credit and resolving insolvency. Croatia's overall ranking on Doing Business 2019 is 58th, falling 7 places compared to last year. This is despite the increase in its DTF score, but this can be explained by the fact that peer countries are simply reforming faster than Croatia. Firm entry is poorly ranked, in 123rd place, with 8 procedures that typically last 22.5 days and costs of 6.6 percent of income per capita. This is more burdensome than what is required in the ECA region and double the average of OECD countries. A recent study of the World Bank suggests that business registration reform in Serbia increased the number of new firms by up to 34 percent, and that the effect of the reform is larger in regions with high distrust in courts than in regions with low distrust in courts⁸⁶.

Challenge 5: Insolvency regime

Croatia is not doing as well as its CESEE peers on resolving insolvency matters. Its still inefficient insolvency framework obstructs exit and re-entry of businesses into markets, which is an important contributing factor to the significant misallocation of capital displayed in Croatia. Well-structured and simple bankruptcy/insolvency regimes are important to enable market re-entry of entrepreneurs who have previously failed in their business activity. According to the Doing Business Report 2019, Croatia ranks 59th out of 190 economies on the ease of resolving insolvency and has improved marginally compared to its 2018 rank (60), but is still below its 2017 and 2016 ranks (54 and 57 respectively). Resolving

⁸² See Kresner-Skreb, M. What will happen to state aid in Croatia after the EU accession? Newsletter 70. Institute of Public Finance, Zagreb.

⁸³ State Aid Database. DG Competition – European Commission

⁸⁴ According to the 2018 EC State Aid Scoreboard, member states spent almost half of their total spending on general block exemption measures, an increase of 13 percent in comparison to 2013.

⁸⁵ Banerjee, R. and Hofman, B.: The rise of zombie firms: causes and consequences". BIS Quarterly Review, September 2018.

⁸⁶ Courts and Business Registration, Evidence from Serbia, World Bank, Working Paper

a sample insolvency case at the Zagreb Commercial Court takes 3.1 years and costs 14.5 percent of the claim value. Croatia scores 12 out of 16 points in the Quality of Judicial Processes Index. The insolvency law in Croatia has been amended recently in response to the financial crisis, and while there is room for improvement, there seems to be a consensus that it could be better not to reform in the immediate term, to avoid reform fatigue.

Promoting innovation and entrepreneurship

To promote innovation and stimulate entrepreneurship, the Croatian government will need to address challenges in the three policy areas: (i) reforms of the public research sector to improve research excellence; (ii) the quality and access to inputs: human capital, and research infrastructure; and (iii) institutional capacity for the development of policy evaluation, implementation, and monitoring. The combination of such policy measures aims to enhance human capital and infrastructure to foster a productive environment for entrepreneurs. Institutionalizing procedures for innovation development will require the coordination of multiple stakeholders.

Challenge 6: Reforms of the public research sector to improve research excellence

The process of restructuring and consolidation of public research organizations is unfinished. The partial restructuring of the research sector has resulted in an unsustainable fragmentation of research institutes, with negative effects on research infrastructure and fund allocation. There are more than 30 research institutes in Croatia, compared to fewer than 5 in most Scandinavian countries. In its efforts to address this issue, the Ministry of Science and Education is working on a proposal (law) which should be up for public consultation very soon. Command and control type of structures, cost-based budgeting, limited autonomy (including the definition of career track and compensation) and accountability of management, and inadequate legal status are some of the challenges public research organizations face in order to improve performance. In addition to addressing these incentive issues, a more rational strategy for investing, maintaining and using key research infrastructure is needed.

Challenge 7: Quality and access to inputs: human capital, and research infrastructure

The lack of structural reforms in the research sector and innovation policy mechanisms are the underlying constraints for advancing the innovation agenda. More generally, allocative efficiency can be improved by revising the design criteria for credit policies and strengthening accountability. Market discipline should bear on incentive programs. Conditionality, sunset clauses, built-in program monitoring, and reviews are all desirable features of incentive programs. As part of the Operational Program funding, Croatia has available more than EUR 1.4 billion allocated for Priority Axis 1 (Strengthening the Economy through Research and Innovation) and Priority Axis 3 (Business Competitiveness) for the period 2014-20 – or about EUR 200 million per year. However, the utilization and effectiveness of funds are low, indicating that program design, criteria, monitoring and evaluation, and accountability are as important as the availability of funds. The capacity to strategically use these funds may, for example, fundamentally change the dynamic of the enterprise sector in Croatia if it helps to increase firm investments in R&D or the emergence of knowledge-driven startups.

Recruitment, career development, and remuneration should emphasize transparency and academic performance. Making science careers attractive through clear, transparent, and merit-based recruitment policies is also necessary. Croatia can improve conditions for research excellence by slowing down the brain drain and supporting a “brain gain”. While quality research infrastructure is paramount to good research, improving access to modern research facilities is also necessary. Investment in

and management of research infrastructure should be rationalized to avoid duplication and to ensure that public funds are not wasted.

Challenge 8: Institutional capacity: policy evaluation, implementation, and monitoring

Improved system performance requires more effective mechanisms for “horizontal” coordination, including country-level research and innovation councils, as well as a fully institutional role for organizations focused on business innovation (“vertical” coordination). The National Council for Science, Higher Education, and Technological Development was established in 2014 as the highest professional body in charge of development and quality of overall scientific activities and has the role of the national research council. The National Innovation Council was established more recently, in 2018, to address the insufficient coordination between the business sector and scientific institutions. Yet, effective coordination remains an issue, as elaborated by many development partners (and as referenced in many reports in this note). Improved coordination should be complemented by greater accountability of public policies, with improved functionality of public consultation and feedback mechanisms. The capacity to manage innovation policy for results should be strengthened, including through better management of the quality of public spending in R&D. The same applies to the capacity to design, implement and monitor innovation policy, which is partly related to Challenge 7 as well.

Implementation challenges

Croatia will face implementation challenges in its reform path. Specifically, the country will need to manage a complex and politically charged process. The political negotiation for the social best interest will likely encounter resistance of public and private interest groups.

Challenge 9: Managing a complex and politically charged process⁸⁷

A comprehensive reform program is essential to raise income levels, support the sustainability of the economic and social system, and resume convergence towards EU living standards. Such profound reforms will require careful timing and sequencing and the establishment of a broad national consensus. Commitment mechanisms and credibility devices that allow the survival of the reform process beyond the political cycle will be necessary for implementation. Some strategic objectives, such as ensuring macroeconomic stability through unquestionable solvency of the state should be implemented immediately while broader reforms towards more government effectiveness and efficiency would take longer.

Given the distributive impact of some of the reforms proposed, interest groups are likely to try to obstruct structural reforms. A substantial number of autonomous, self-organized groups have considerable ability to prevent generally beneficial changes that threaten their privileges. The deep politicization of the civil service, the prevalence of the SOE sector and weak governance structures provide a terrain favorable to clientelism and capture. A few large economic groups benefit from the

⁸⁷ World Bank (2018). Systematic Country Diagnostic. Washington DC.

current regulations in product and service markets, state aid regime and other policies. Moreover, public support to market-oriented reforms is historically low.⁸⁸

4.2 Opportunities

Improving the reallocation of resources

Opportunity 1: Enabling entry and growth of more productive and innovative firms

Policy reforms aiming to improve the reallocation of resources will create much better opportunities for entry and expansion of more productive, innovative firms. Firms tend to start small and grow substantially as they age. In the United States, the average 40-year-old plant employs more than seven times as many workers as the typical five-years-or-younger plant. This will enable the growth of new sectors, such as the digital economy and niches in the field of robotics, clean energy, marine culture, pharmaceuticals, and biology⁸⁹. These opportunities will be further strengthened by the availability of horizontal innovation and entrepreneurship policies.

Promoting innovation and entrepreneurship

Opportunity 2: Improving technology transfer and research commercialization

The sustainable impact of public R&D expenditures on economic development depends on how effectively the research results of public investment are commercialized. Yet, commercialization and collaboration do not evolve effortlessly from the research stage to commercialization. The issue is whether the conditions for massive and systemic (as opposed to rare and occasional) research commercialization are in place. Such conditions include an institutional framework that incentivizes economic agents (researchers, research organizations, and businesses) to engage in commercialization efforts (see Challenge 6) and partnerships that promote the availability of intermediary organizations dedicated to commercialization, such as technology transfer offices and science and technology parks. Some steps in this direction have been made, by adopting the Act on State Aid for R&D projects, which provides tax deductions to businesses for eligible costs related to R&D projects. However, Croatia can further promote research-industry collaboration and technology transfer by⁹⁰:

- Improving the incentive regime for collaboration between research institutes and the private sector, which extends beyond funding to other mechanisms that encourage collaboration (e.g. career development of researchers, performance-based funding etc.);
- Providing “soft” support for collaboration and technology transfer; and
- Rationalizing access to, and enhancing the performance of, science and technology parks and incubators.

⁸⁸ The 2016 Life in Transition III survey, for example, suggests that public support for a market economy is among the lowest in Europe, and the Global Entrepreneurship Monitor for Croatia 2016 (GEM) finds that successful entrepreneurs do not hold high social status and their activities are mostly not covered by the media. These attitudes may play a role in undermining support for reform.

⁸⁹ See Aprahamian and Correa (2015).

⁹⁰ Based on World Bank (2013): Western Balkans Regional R&D Strategy for Innovation. Washington DC

Opportunity 3: Promote business investment in R&D and knowledge-driven startups

Enabling the efficient reallocation of resources between declining and ascending sectors is critical for the development of an entrepreneurial economy. An expanding sector of “high-potential growth firms” can play a critical role in generating growth and jobs, including through the establishment of synergies between sectors such as ICT and agriculture for instance. Yet, it is widely recognized that a “funding gap” exists between available inventions and private investment in innovative projects. The reasons for this gap are related mainly to the difference between the external and internal cost of capital in an R&D investment. This differential arises from the asymmetric information between inventor and investor and the moral hazard on the part of the inventor due to the separation of ownership and management.⁹¹ Therefore, in addition to the implementation of reforms to promote resource reallocation, Croatia has the unique opportunity to use a significant amount of EU funds to gradually extend investments in R&D (and knowledge assets) by smaller, young and innovative firms – mirroring the experience of Slovenia in 2002-2010.

Opportunity 4: Unleashing the potential of the digital economy, especially in the Fintech sector

The expansion of the digital economy offers great opportunities for Croatia, especially in the Fintech space. Connectivity and fast broadband coverage are identified as one of the greatest weaknesses that impact the digital agenda. Regulation is partially to blame for the high price and limited availability of broadband internet, especially in rural areas. Improving the regulatory framework and adopting a more stringent approach to market concentration could be effective in invigorating the telecom market, improving investments (including in next-generation networks) and consequently increasing broadband coverage, lowering prices, and improving fast internet adoption. This is one of the basic preconditions for the advancement of the digital economy agenda.

Other policy areas need to be taken into account for the opportunities of the digital economy to flourish. Proper use of antitrust enforcement and regulation is necessary to avoid abuse of dominance by owners of large platforms. The regulation of data and data privacy issues will have to be addressed – big data analytics represents a huge opportunity for digital entrepreneurship but requires that data to be broadly accessible. Digital entrepreneurship would not only benefit from overall innovation policies but also from targeted instruments such as training. The development of the Fintech industry in particular requires a careful balance between openness to innovation and prudential regulation, to guarantee the stability of the financial sector.

Implementation Opportunities

Opportunity 5: Potential availability of resources – knowledge and funding

One of the most remarkable challenges in implementing broad policy reforms, like those discussed in this Policy Note, is access to information and funding. Good diagnostics, careful assessment of distributional effects and careful design (sequencing and timing) of reforms depend upon the availability of good analytics. Croatia has benefited from technical assistance and collaboration with a number of

⁹¹ Hall and Lerner 2009. In addition, the lack of collateral to secure bank loans makes R&D riskier than other types of investment, which turns debt financing into an inappropriate mechanism for this type of financing. As a result, retained earnings and equity tend to play an important role in financing private R&D investment. Moreover, business R&D and innovation tend to be procyclical, declining in periods of economic downturn.

organizations – from the OECD to the EU, EBRD, EIB, and the World Bank precisely in the areas of market-oriented reforms and innovation.

Moreover, access to EU funds may be helpful to finance some of these reforms, mitigating the distributional impact and financing new programs. Croatia has a significant amount of funding available for innovation through Operational Programs (about EUR 200 million per year, see Challenge 7). The capacity to strategically use these funds may fundamentally change the dynamic of the enterprise sector in Croatia if it helps to increase firm investments in R&D or the emergence of knowledge-driven startups. An issue that ought to be addressed, however, is how the logic of ‘investment projects’, which tends to permeate the S3 strategy and the use of EU funds, can be adjusted to fit the purpose of financing the reforms.

Opportunity 6: The Euro adoption

The Euro adoption also represents an interesting opportunity for the country in at least two ways. First and foremost, it will eliminate the currency risk and reduce borrowing costs, stimulating private sector investments. Secondly and less obviously, the adoption strategy may spearhead reforms that could be much less legitimate. These include several reforms advocated by this Policy Note.

5 Prioritized policy recommendations

a) Short-term (1-3 years)

Privatization and corporate governance of SOEs

Title – Reducing and optimizing the presence of the state – analytical stage

Problem – The average return on equity for private companies is higher than for SOEs. SOEs affect returns, influence output prices through product market equilibrium, and impair market incentives to become more competitive. There is some indication that high SOE presence undermines growth, as productivity and allocative efficiency are higher in sectors with low state presence. Finally, rigid wage setting practices in SOEs, where wages are higher (controlling for employee characteristics) than in private sector firms, may distort wage setting in the private sector.⁹²

Approach – Optimizing or reducing the role of the state by (i) improving corporate governance in SOEs, and (ii) intensifying the restructuring and privatization process. To advance the privatization agenda, it is necessary to fill analytical and knowledge gaps which will serve as the basis for the implementation stage. The government has already initiated some actions in this regard and is currently developing SOE restructuring guidelines in cooperation with EBRD. Reducing the footprint of the state in the economy will ultimately contribute to improving the productivity performance of Croatia, while reducing fiscal risks stemming from SOEs.

Required actions –

- I) Undertake an analysis to select SOEs that will be subject to privatization; Analyze necessary changes to the regulatory framework and competition policy prior to privatization; Prepare a privatization plan outlining appropriate transaction types, sequencing, timeline, post-privatization control, and public outreach;
- II) Carry out assessment of corporate governance in SOEs that are not earmarked for privatization, identifying necessary legal and regulatory reforms, reforms of state ownership policy and governance, appointment and functioning of Board of Directors, performance monitoring systems, transparency, disclosure, and controls, and protection of minority shareholders.

Risks management – Resistance from interest groups may hinder progress on reducing the role of the state. At the analytical stage, it is necessary to have not only strong political commitment, but also a robust and comprehensive consultation process with key stakeholders to achieve broad consensus prior to implementation.

Competition Policy and State Aid

Title – Redirecting state aid towards ascending knowledge-driven sectors

Problem – State aid is creating market distortions by propping up declining sectors, at the detriment of high-potential growth sectors which are facing funding constraints.

Approach – Freeing resources to support knowledge-driven sectors.

⁹² Croatia Systematic Country Diagnostic, The World Bank Group, 2018

Required actions – Review the use of state aid in specific sectors and analyze distortions to competition; Develop and implement a plan to wind down state aid to declining sectors and minimize market distortions; Prepare support programs that will incorporate elements of relevance to knowledge-driven sectors.

Risks management – Resistance from interest groups. Progress on this recommendation is conditional upon firm political commitment and broader societal buy-in, which could be secured through a commitment to transparency and a robust communication strategy.

Product and service market regulations

Title – Deregulation of the services sector

Problem – Restrictive and anti-competitive regulations (there are more than 300 regulated professions in Croatia).

Approach – Streamlined processes for entry and practice of professions. This should be an ongoing exercise (recurring every six months), which would consider almost all professional services in Croatia. Based on the criteria of i) relevance for the Croatian economy, ii) restrictiveness of existing requirements, and iii) reform ownership, the following professions have been identified as good candidates to start a reform process to reduce restrictiveness – Architect/Urban Planner, Civil Engineer, Electrical Engineer, Mechanical Engineer, Project Manager, Site Manager, Works Manager, Pharmacist, Pharmaceutical Technician, Physiotherapist-Bachelor, Physiotherapist-Graduated Physiotherapist or Master of Physiotherapy, Physiotherapy Technician. This work should be scaled up and extended to all services in cycles of reviews and streamlining lasting 6 months each. Deregulation efforts will ultimately increase competition in regulated professional services to the benefit of their customers, both private citizens and businesses.

Required actions – Review the requirements to work in services; Streamline and simplify requirements; Reduce the number of regulated professions.

Risks management – Resistance from interest groups, particularly incumbents, may obstruct reform progress. To increase the chance of reform success, reviews and streamlining cycles should be sequenced carefully, with each cycle covering multiple regulators.

Red tape for firm entry, operation and exit

Title – Facilitating business registration

Problem – Business entry is hampered by a highly fragmented registration process involving many agencies and disparate technology platforms.

Approach – Foster integration and interoperability among the agents involved in the business registration process. This should lead to a more streamlined business registration process, thus facilitating the entry of new businesses in the market.

Required actions – Adjust the legal framework (such as the Company Act and Court Registry Act) to allow the initiation of the START project for business registration. Beyond the anticipated, the reform should include:

- D) Developing an integrated registration process of LLCs and simple LLCs with a single point of contact and participation of all involved agencies – Courts, Statistics, Tax, Pension and Health Fund;

- II) Introducing interoperability of business registers and unique application form, with the capability of attaching documents and paying fees electronically, and the implementation of the once-only principle, in accordance with the e-Government Action Plan;
- III) Integrating the remaining registries (e.g. craft registry, agricultural establishments – OPG, free professions), to establish a single integrated registry of all business types using the state interoperability platform.

Risks management – Lack of capacity for coordination, and resistance to change from involved agents. Working groups should be established at the technical level to ensure continuity and a structured coordination process.

Title – Facilitating the process of business entry and operation

Problem – Burdensome, costly and fragmented processes to enter and practice in certain business activities.

Approach – Reduce the number of interactions between businesses and government agencies to eliminate and streamline unnecessary licensing requirements.⁹³ This would benefit new market entrants by facilitating access to business licenses, thus reducing the burden of business registration.

Required actions – Map licenses/ex-ante authorizations required to start and conduct a business activity; Analyze ex-ante approvals in priority sectors with a view to elimination and/or simplification and streamlining; Assess ICT readiness for automation of select priority sectors ex-ante authorizations and integration into the business registration platform; Facilitate the access for licenses to businesses and regulated professions through e-information licensing portal.

Risks management – Resistance from interest groups, lack of capacity for coordination. A structured process should be put in place to ensure sufficient coordination among key stakeholders.

Title – Institutional arrangements to ensure reform progress on firm entry, operation, and exit

Problem – Lack of a high-level commitment to reform, clarity on reform champions, and reluctance of vested interests could stall progress on the reform path to cut red tape for business entry, operation, and exit.

Approach – Assign a clear responsibility and mission to champion business environment reforms to a high-level working group composed of political decision-makers supported by a technical level body. Improvements in the business environment would benefit new entrants, young firms looking to scale up operations, as well as mature firms.

Required actions – Form an inter-ministerial working group at the highest political level charged with championing business environment reforms in the areas of business entry, operations, and exit; Form a technical unit that will support the inter-ministerial working group, conduct analytical work and provide recommendations for improving the business climate.

⁹³ This work is expected to start mid-2019 as part of the SRSS-financed project Business Environment Reform II led by the Ministry of Economy, Entrepreneurship and Crafts.

Risk management – Lack of political consensus. The inter-ministerial coordination body of top policy makers should adopt an accountability mechanism (e.g. through a government decision denoting the responsibilities and obligations of each member).

Increasing value added in tourism

Title – Improving linkages between the tourism sector and rest of the economy

Problem – Positive tourism spillovers towards Croatia’s domestic sector are limited, as evidenced by its heavy reliance on imports and lower-than-expected permanent employment. This is mainly due to the characteristics of the economy which does not always allow for the right inputs (products or services) to be procured by those carrying the tourism industry.

Approach – Add value to the tourism offer in Croatia by developing authentic products, services, and experiences. This should be coupled with encouraging the establishment of more forward (customer) and backward (supplier) linkages in the local economy.

Required actions – Prioritize the analysis to streamline requirements for tourism-related professions (see *Deregulation of the services sector* recommendation); Support integration of tourism value chains through a Supplier Development Program in tourism focusing on raising the quality of supplier goods and services, reliable delivery, customization, variety, and similar.

Risks management – Lack of progress on broader reforms addressing deregulation of the services sector and fragmentation of agricultural production may dampen the ability to create additional value in tourism. Proper sequencing and coordination of reforms in critical areas (regulated professions, agriculture, etc.) is necessary to mitigate such risks.

Title – Improving the management of court cases, especially in restructuring procedures

Problem – Lack of qualified insolvency practitioners with a good understanding of the financial and legal aspects of the insolvency system. Lack of a transparent mechanism for appointment and well-established incentives aligned with the outcome that maximizes value for the parties.

Approach – Strengthen the regulation of insolvency practitioners, in practice and law. The ultimate objective of this is to facilitate firm exit, thus improving market efficiency.

Required actions – Review in depth the legal and regulatory aspects of the insolvency practitioner profession, and re-design exams to ensure qualified bankruptcy administrators; Allow for more tailored appointment of practitioners, including appointing more than one insolvency practitioner for complex cases; Strengthen the qualifications of insolvency practitioners by introducing additional requirements in the law or the rulebook, if permitted (such as requirement of certain experience or profession).

Risks management – Setting additional requirements for insolvency practitioners may provoke resistance from incumbents. Such resistance could be minimized through frequent engagement and a good outreach strategy.

Title – Reducing the cost of voluntary liquidation

Problem – Firm exit is hampered by the costly and lengthy procedure in the event of voluntary liquidation.

Approach – Undertake an analysis of the liquidation process with a view to reduce the cost and time necessary to voluntarily wind down firms. This would facilitate market exit for existing firms but also potentially encourage new firms to enter the market.

Required actions – Conduct a comprehensive diagnostic assessing the current costs and time of voluntary liquidation and proposing measures for their reduction.

Risks management – Improving the voluntary liquidation process would require review of the Companies act that was recently amended. Understandably, low interest for further changes may be anticipated, which should be mitigated by a good justification for the necessity of the analysis (as a first step).

Quality and access to inputs: human capital, and research infrastructure

Title – Improving the quality of support programs for research and innovation

Problem – Lack of targeted approach to design, improper or no incentives in place, burdensome procedures to implement and protracted application approval process.

Approach – Reconsider the design, implementation, and evaluation mechanisms in place for support programs, with the objective of improving the country’s innovation performance. The Ministry of Science and Education and other relevant stakeholders have already initiated activities in this respect. Ultimately, improving the quality of support programs would improve outcomes for innovation actors and thus contribute to improving the performance of the Croatian National Innovation System.

Required actions – Conduct systematic review of all the research and innovation public support. This entails:

- I) Analyzing the quality and coherence of the policy mix by taking stock of all support instruments, assessing the allocations, overlaps, gaps, redundancies, diversification, etc., and assessing the link between the demand and the supply of support programs;
- II) Conducting an in-depth assessment on the design, implementation and governance of support programs;
- III) Monitoring and evaluation of programs by developing a framework to track and analyze inputs, activities, outputs and outcomes.

Risks management – There is a tendency for relying on EU financing for support of research and innovation, even though not all support programs may be compatible with this source of financing. The systematic review of public support for research and innovation will indicate whether the current policy mix adequately responds to the needs of the National Innovation System, and what are the gaps that should be covered by sources other than EU financing.

Title – Stimulating and supporting researchers

Problem – Lagging research and innovation performance and insufficient conditions for research excellence.

Approach – Introduce short-run plans to stimulate “brain gain” (per the efforts of the Ministry of Science and Education).

Required actions – Improving research performance can be achieved in the short term by attracting talent from leading research hubs and leveraging connections with the scientific diaspora. At the same time, improving the incentive framework for research excellence and investing more in young

researchers will provide a sound basis for developing sustainable research excellence for the future. This entails:

- I) Posting, in English, research positions on EURAXESS to enhance the selection of scientific talent. With the broad integration into the ERA and the global scientific community, Croatia could also promote collaboration with the scientific diaspora as a short-term mechanism for increasing research productivity and research excellence.
- II) Base career progress on the assessment of research impact and, when pertinent, of technology transfer and teaching achievements. Examples of ways to make research careers more attractive can be found in the European Charter for Researchers and the Code of Conduct for the Recruitment of Researchers;
- III) Review the policies and regulations of the research sector to eliminate any bias against young researchers that may exist, for example, in career development in comparison with the EU countries;

Risks management – This is a novel approach that requires interrupting long-term practices. Resistance to change is expected. Clear political commitment, coupled with good justification may facilitate the implementation of the recommendation.

Improve technology transfer and research commercialization

Title – Creating better conditions for technology transfer

Problem – Lack of incentives for technology transfer and research commercialization.

Approach – Strengthen technology transfer activities.

Required actions – Provide “soft” support for collaboration and technology transfer. Encourage the development of dedicated technology transfer organizations. Such organizations should have staff skilled in managing IP that will encourage patenting and licensing and promote spin-off companies. Ultimately, this would lead to the establishment of long-term consortia between the public sector (research providers) and the private sector (research users) which can ensure financial sustainability, a stronger link between research and commercialization, and long-term alignment between research output and the needs of the economy.

Risks management – Unfinished reforms of public research institutes and universities could hamper their ability and willingness to get involved more actively in technology transfer and commercialization. It is therefore imperative that institutional reforms be completed on time and provide a solid incentive framework for engaging in such activities.

Promote business investment in R&D and knowledge-driven startups

Title – Creating bridges between ideas and capital

Problem – Enabling the efficient reallocation of resources between declining and ascending sectors is critical for the development of an entrepreneurial economy. It is widely recognized through the existence of a “funding gap” between inventions and capital for innovation.

Approach – Facilitating investment and business environment for start-ups. The Ministry of Economy, Entrepreneurship and Crafts has already undertaken certain actions to support innovation (i.e. grants for startups, commercialization, R&D tax incentive scheme etc.) Substantial resources have been invested, however this is yet to yield results.

Required actions – Facilitate start-up investments, which would include:

- I) Matching grant schemes for pre-seed financing -- proof of concept, prototype development and co-investment programs combining with investment readiness programs to enable entrepreneurs/ship;
- II) Study the potential impact of the return to tax breaks for firms' expenditures on R&D;
- III) Review capital depreciation rules and reducing the cost of "knowledge" assets, aiming at reducing the cost of investments (the acquisition of capital goods);
- IV) Adopting technology services, or, more broadly, manufacturing extension services.

Risks management – Creating moral hazard for innovation investment. Good monitoring in place would allow for informed decision to allocating support in most productive sectors.

Title – Stimulating and supporting entrepreneurs, by providing education, technical assistance, guidance, and mentoring

Problem – Deficiencies in management practices (financial management, business planning, etc.), value chain integration, product quality, informality and lack of financial transparency poses constraints to TFP growth.

Approach – Support firms' abilities to increase productivity and integrate into value chains by developing managerial capabilities, including financial management and transparency, business planning, quality assurance, accessing and utilizing market intelligence, and accessing diverse, fit-to-purpose sources of finance.

Required actions – Tailored support programs focused on improving management capabilities that would entail support for financial management, quality management, people management, and similar. The support should be customized by providing expert advice in identifying and addressing the main areas for improvement in each firm, as well as mentoring support throughout the implementation period.

Risks management – Lack of awareness of the benefits of soft programs. Any support program for raising managerial capabilities should incorporate awareness-raising activities, which should not only present the benefits of the program, but also collect preliminary information on the specific needs of interested firms.

b) Medium-term (4-7 years)

Privatization and corporate governance of SOEs

Title – Reducing and optimizing the presence of the state – implementation stage

Problem – The dominance of SOEs creates market distortions and may be a source of fiscal risks.

Approach – Optimizing or reducing the role of the state by (i) improving corporate governance in SOEs, and (ii) intensifying the restructuring and privatization process, based on inputs from the analytical stage. This should contribute to improving the allocation of resources in the Croatian economy towards more productive economic actors.

Required actions – Introduce reforms identified in the assessment of corporate governance in SOEs, including but not limited to: state ownership policy and governance, appointment and functioning of Board of Directors, performance monitoring systems, transparency, disclosure, controls, and protection of minority shareholders; Introduce necessary changes to the regulatory framework and competition policy; Review the extent and scope of restructuring of SOEs prior to privatization (e.g. capital structure,

pension rights of employees, etc.); Adopt a privatization plan outlining appropriate transaction types, sequencing, timeline, post-privatization control, and public outreach; Initiate privatization in a limited set of SOEs; Scale up privatization to remaining SOEs.

Risks management – Resistance from interest groups. The work on consensus-building initiated at the analytical stage should be continued in the implementation stage. Additionally, there should be a strong commitment to transparency and a carefully crafted public communication strategy.

Product and Service Market Regulations

Title – Removing barriers to competition in selected sectors

Problem – Suboptimal approach to state interventions and sectoral policies may cause market distortions and inefficiencies, allowing less productive agents to remain in the market, and preventing more productive agents from entering.

Approach – Analyze policies in selected sectors to determine whether and how they limit competition and propose alternative approaches. This would improve market efficiency in selected sectors, to the benefit of incumbent firms that are held back by competition restrictions, as well as new entrants.

Required actions – Conduct in-depth competition assessments of selected sectors that would: (i) identify market failures which justify government regulatory intervention, (ii) determine whether and how the regulatory intervention limits competition, and (iii) propose regulatory alternatives that may have a less negative impact on competition; Implement reforms to regulations as proposed by the in-depth competition assessment.

Risks management – Resistance from incumbents benefiting from restrictions on competition. In-depth competition assessments should provide sufficient evidence of the detrimental effects of restrictions to competition and quantify the benefits of removing such restrictions. The results of the assessment should be publicized to raise awareness and increase accountability in case of inaction.

Title – Streamlining the regulatory framework to facilitate deployment of broadband infrastructure.

Problem – High market concentration allowing high price setting, burdensome and complex administrative procedures that make investments in new infrastructure difficult.

Approach – Facilitate access to new entrants and streamline administrative burden through business environment reforms to stimulate a more competitive price-point for consumers, and new investments in infrastructure (e.g. next-generation networks, which are a precondition for 5G mobile technology).

Required actions – Review administrative procedures for investing in new infrastructure; Review restrictions on broadband connectivity; Provide recommendations for simplification; Streamline the regulatory framework in line with recommendations.

Risks management – Must be part of structural reform related to the business environment.

Red tape for firm entry, operation and exit

Title – Reducing the burden of parafiscal fees

Problem – Horizontal and sector-specific parafiscal charges and rigid fee payment process are a burden to business operations

Approach – Increase transparency and predictability, reduce the number of charges and facilitate payment. Advance the undertaken but stalled activities for streamlining parafiscal charges which represent a burden to existing and new businesses.

Required actions – Compile an inventory of all parafiscal charges levied by all levels of government (central, county, local) and state-owned enterprises including the frequency of collection and amount of each fee, and legal basis; Conduct a validation test for each parafiscal charge by assessing the legality, necessity (rationale for existence) and ease of payment; Phase out parafiscal charges that lack a clear rationale or where overlaps exist; Streamline and automate the system for payment of parafiscal charges.

Risks management – Unwillingness to forgo revenues from parafiscal fees. Clear government commitment is necessary to push the reform forward strongly.

Title – Improving the insolvency system

Problem – Lengthy and expensive insolvency system.

Approach – Update the insolvency legislation to facilitate firm exit.

Required actions – Conduct a thorough review of the main practical shortcomings in insolvency processes to identify room for improvement; Make the use of technology in insolvency cases more widespread to minimize personal court interactions; Create legal amendments to the insolvency act to deal with the main shortcomings of the insolvency system.

Risks management – Resistance to insolvency procedures could be moderated by creating a less costly and time-consuming insolvency system. Further, the intervention should be timed for the medium term in order to allow time for thorough analysis and build reform momentum.

Institutional capacity: policy evaluation, implementation, and monitoring

Title – Upgrading institutional capacity

Problem – Uninspiring innovation performance, despite significant EU funds dedicated to advance the research and innovation agenda, partly due to suboptimal capacity to manage innovation policy and managing public spending in R&D, as elaborated in section 3 (Challenge 8).

Approach – Strengthening the institutional capacity for planning and implementation of innovation policy. This should help optimize public support programs for research and innovation and improve their effectiveness.

Required actions – Support recently established mechanisms for horizontal coordination such as national councils and other similar bodies; Create a specialized institution with core focus to support business innovation in Croatia; Build the capacity to manage research and innovation policy - design, implementation, monitoring and evaluation; Strengthen impact evaluation.

Risks management – Lack of capacity for implementation and need for long-term perspective and consistency over time. Creating a dedicated institution for innovation policy with operational independence and credible long-term financing would allow for accumulating capacity for management and implementation of the innovation agenda.

Reforms of the public research sector to improve research excellence

Title – Enhancing public research centers

Problem – Lack of incentives for technology transfer and research commercialization.

Approach – Consolidate the public research institutional landscape to be more conducive to research excellence.

Required actions – Advance the activities undertaken by the Ministry of Science and Education to consolidate the research institutes; Introduce performance-based budgeting; Review legal status of public research institutes, increase the autonomy and accountability of directors (including by establishing performance-based contracts and giving more flexibility for defining staff compensation).

Risks management – Political constraints to review the legal framework. Firm political consensus will likely need to be secured before initiating institutional reforms. A gradual approach, with an extended roll-out period could also be considered.

Quality and access to inputs: human capital, and research infrastructure

Title – Creating a proper environment for research infrastructure investment

Problem – Deficiencies in research infrastructure and possible waste of public funds.

Approach – Strategic approach to development of research infrastructure to optimize usage by both researchers and the private sector.

Required actions – Encourage common ownership based on, for example, the Common Legal Framework for European Research Infrastructure Consortium (ERIC).⁹⁴; Investment planning should be strengthened with sound “infrastructure roadmaps” to increase the selectivity of investments, in line with the priorities of national strategies; Increase transparency and accessibility to research infrastructure; Set out clear guidelines for use of research infrastructure by third parties.

Risks management – Change of longstanding practices that would allow joint use and sharing of research infrastructure. This should be a continuous effort involving key stakeholders (infrastructure owners, managers, and the private sector) to raise awareness of the opportunities and synergies that could be achieved by increasing access to research infrastructure.

Improve technology transfer and research commercialization

Title – Developing proper business and research support

Problem – Investment in physical infrastructure (science and technology parks and incubators) is often wasteful and not properly managed.

Approach – Incentivizing the development of technological parks and incubators to adequately serve the needs of start-ups.

Required actions – Rationalize access to and enhance the performance of science and technology parks and incubators. Once science and technology parks and incubators are established, their management should employ best practices, including private management and self-sufficiency targets. The regional dimension in infrastructures is particularly relevant and a first step could be to also establish a regional roadmap for infrastructure development.

Risks management – Bias towards locations not driven by actual demand. Before embarking on large-scale investments, financial backers need to assess the regional demand for science and technology parks and incubation services and the current supply. The establishment of new science and technology parks

⁹⁴ European Commission 2009.

and incubators should result from transparent criteria, such as an unmet demand from the private sector and a solid local research base.

Promote business investment in R&D and knowledge-driven startups

Title – Consolidating funding sources to business investment in R&D

Problem – The existence of a “funding gap” between inventions and capital for innovation.

Approach – Creating and enforcing capital instruments for business investment in R&D. Enabling the efficient reallocation of resources away from declining and towards ascending sectors is critical for the development of an entrepreneurial economy.

Required actions – Promote legal reforms for the development of early-stage funding, particularly seed and venture capital; Continued promotion of FDI in industries with a global orientation; Promotion of R&D-intensive FDI.

Risks management – Contraction of liquidity on FDI. To mitigate this, Croatia will need to keep advancing business environment reforms and enact business-friendly policies to increase its competitiveness vis-à-vis FDI attraction.

Unleashing the potential of the digital economy, especially in the Fintech sector

Title – Broadening the finance options available and accessible to enterprises

Problem – Equity-based instruments are practically nonexistent in Croatia. New and innovative firms lacking collateral have very limited financing options.

Approach – Raising awareness of all possible sources of financing, from loans to guarantees, EU funding, capital markets, and fintech is necessary. This approach should involve increasing the confidence of smaller businesses to apply for external funding and to ensure that when they do, they receive the most appropriate products. EU-funded financial instruments such as loans, guarantees, and equity finance schemes are increasingly viewed as a central mechanism for improving the effectiveness of policy interventions, particularly those aimed to enhance the performance of the corporate sector (SMEs in particular).

Required actions – Prepare a tailor-made guide that sets out the main aspects to consider and outlines sources of finance available to businesses – ranging from start-ups to smaller businesses and growing mid-sized companies; Expand the use of financial instruments through EU funds.

Risks management – Lack of awareness and lack of experience with fit-to-purpose sources of financing. The guide on financing available to businesses should be combined with a comprehensive public awareness campaign and complementary capacity building activities.

Title – Institutional support for fintech

Problem – Lack of institutional support and coordination to nurture Fintech solutions.

Approach – Opening channels of communication between regulators and the private sector, specifically fintech start-ups. The resulting dialogue should shed light on opportunities and possibilities where fintech solutions could be viable.

Required actions – Introduce regulatory sandboxes in coordination with the Croatian National Bank, non-bank supervisors, and relevant ministries.

Risks management – Overabundance of caution in regulation to manage financial stability risks. The regulatory sandboxes should be structured in such a manner to bring sufficient attention to financial stability concerns, which should be adequately addressed in proposed fintech solutions.

c) Long-term (8-10 years)

Quality and access to inputs: human capital, and research infrastructure

Title – Pushing in the development of digital skills

Problem – According to Eurostat data, there is an increasing demand for ICT specialists across the board, which is particularly pronounced in SMEs. At the same time, the percentage of highly skilled ICT specialists in Croatian firms is steadily decreasing over time, so that in 2017 Croatia was ranked as 25th in the EU-28. This lack of skills slows down the adoption of digital technologies and its integration into the economy and society.

Approach - Introduce a scheme to co-finance the training of firms and individuals via online courses to raise the level of digital skills. There should be the maximal use of existing infrastructure: use the existing digital hubs to run the practical aspects of the program (overseeing and educating).

Required actions – Implement a scheme of co-payments (where the government pays at least half of the cost) or vouchers. The co-payment can be determined by household income, where the largest support would be allocated to people who are unemployed. Moreover, if an unemployed person decides to get a degree as opposed to just take individual courses, the cost could be covered to a much larger extent (or completely). Financial support could be given to companies as well, with the idea that they organize and coordinate employee education in the direction that is most beneficial for their business. The specific design of the scheme should be determined in a separate study by a methodology like conjoint analysis.

Risks management – Lack of awareness of the challenges and opportunities of the digital agenda, lack of immediate results. The scheme should be accompanied by a comprehensive public awareness campaign that would inform the public and businesses about the existence of the training scheme and its benefits.

Improve technology transfer and research commercialization

Title – Fostering science-industry collaboration

Problem – Lack of incentives for technology transfer and research commercialization.

Approach – Stimulating industry-science collaboration by providing incentives to researchers and PROs, as well as financing to the private sector.

Required actions – Incentivizing industry-science collaboration is part of a long-term process which should entail three distinct lines of action:

- I) Improve the incentive regime for collaboration between research institutes and the private sector. As illustrated by international experience, transferring IP management responsibilities to public research organizations (PROs) is a crucial step. Legislation regulating the management of intellectual property (IP) generated from publicly funded research is crucial, since uncertainty about the ownership of research results can limit the incentives of PROs, individual researchers, and businesses to generate and use research for commercial purposes.
- II) In parallel, revising the criteria for the career advancement of researchers to reward technology transfer activities would augment the flow of research susceptible to commercialization.

- III) Other important measures include devising effective mechanisms for financing research-in-industry collaboration (such as vouchers and matching grants) and facilitating the institutional provision of contract research.

Risks management – Lack of interest from the private sector towards research projects. Actions to support collaboration should be accompanied by networking events where researchers and firms can get to know their respective capabilities and constraints, and explore possible avenues of cooperation.

Promote business investment in R&D and knowledge-driven startups

Title – Improving the “digital maturity” of Croatian industry

Problem - In order to advance the digital economy, Croatian companies need to raise their level of “digital maturity”. The problem is that companies may not know what their level is in comparison to other firms, either nationally or internationally. Even if a firm knows that it is not among the most digitally advanced enterprises, it may not know where exactly it falls short and what it should do to rectify the situation.

Approach – Three-pronged approach to raise competitiveness through improving “digital maturity” in firms - by increasing awareness among firms, motivating their management and monitoring the change. The aim is to prepare Croatian firms to seize the opportunities provided by the technological innovations and new business models, and to expand knowledge-intensive activities.

Required actions – Develop an online assessment tool, freely available to every company. The tool determines firm’s level of digitalization and delivers recommendations for improvement; Motivate and educate management of firms (particularly small ones) to realize the benefits of digitalization. Show how much more they could earn if they adopt digital technology; Monitor improvement on a representative sample of firms, and through in-depth study (interviews), expand the learning to the entire industry.

Risks management – Some digital hubs are private enterprises and as such may be tempted to skew these activities to suit their interests even in situations when they are not aligned with the public interest. On the other hand, digital hubs should be able to operate independently and with a lot of flexibility, so that they can react faster and be more adaptable to changing conditions in society and the economy. The role of digital hubs should be safeguarded through clear and effective operational policies.

Title – Facilitating capital to entrepreneurship

Problem – Enabling the efficient reallocation of resources between declining and ascending sectors is critical for the development of an entrepreneurial economy.

Approach – Facilitate and stimulate entrepreneurship through access to capital.

Required actions – Tax policy may affect the propensity of individuals to engage in entrepreneurial activities, especially those with high risk and potentially high returns that could have a transformational impact. Assessing the effect of marginal taxation on entrepreneurship is a measure worth considering; Continuing improvements in access to finance (deepening local financial markets) would be beneficial for business innovation, especially in the context of the global financial crisis. Better access to credit for routine activities frees up internal resources for investment in riskier businesses, including R&D and innovation.

Risks management – Misuse of credit incentives. A rigorous monitoring and evaluation framework should be in place to assess the effectiveness of incentives and to fine-tune policy measures.

6 Cross-cutting issues and their implications for policy

High debt levels reduce fiscal space and limit the scope to leverage fiscal policy for productivity and innovation. The level of public debt, which has doubled since 2008, peaked at 86.7 percent of GDP in 2015. While the reduction of the fiscal deficit and economic recovery are reducing the debt-to-GDP ratio, the projected level of 81 percent in 2018 would remain well above the 60 percent statutory ceiling. Although currency risk exposure is mitigated by the tightly managed float of the kuna's exchange rate against the euro, the bulk of the debt accumulated during the crisis was either issued abroad or issued domestically in or indexed to the euro. Medium-term bonds carry a premium over the German bund of about 300 basis points, indicating the precariousness of Croatia's sovereign borrowing conditions. The recently adopted strategy for debt management ignores the financing needs of extra-budgetary entities and local governments, which have contributed to a large extent to the build-up of debt. Croatia's debt position could be eased, and growth-supporting expenditures increased, by a reduction in the levels of subsidies and public wages.

Poor policy coordination, public service delivery and SOE governance impair the efficient allocation of resources. Changes in technical staff that follow the frequent changes in government make it difficult to carry through with consistent policies, thus reducing the ability of the authorities to exercise their oversight functions over SOEs. Insufficient coordination and cooperation between agencies and levels of government impair policy coherence. The high fragmentation of local government units raises costs and reduces the quality, effectiveness, and sustainability of public services delivery. Low quality of management in SOEs results in lower rates of return on assets than in other CEE countries, and a higher rate of state subsidies than the EU average.

A high marginal tax rate for the lowest income bracket and significant losses in social transfers when taking up employment create disincentives to participate in the labor force. The compound effect of paying additional income taxes and social security contributions when taking up employment and losing various benefits – including social assistance, housing, and family benefits – is broadly in line with the EU average⁹⁵. However, for potential low-wage single earners with children, the marginal effective tax rate is high, which reduces incentives for labor force participation and creates an inactivity and unemployment trap for this segment of the labor market (mostly contributing to losses associated to social assistance benefits).⁹⁶

The double demographic challenge of an aging population and net negative migration flows undermines productivity growth. As Croatia is aging rapidly, the working age population is declining: by 2050, the working age population, aged 15 to 64, is expected to decline by 30 percent. In addition, the significant outflow of young and skilled labor has reduced the size of the labor force and productivity, adversely affecting growth and slowing down GDP per capita convergence. The counterfactual analysis shows that between 1995 and 2012 in the absence of skilled emigration, real labor productivity growth and per capita income would have been ten percentage points higher. The increase of elderly dependency ratio and emigration of young skilled workers also impose additional pressure on public finances – as they tend to raise social spending without a corresponding increase in tax revenues. Between 1990 and 2008, the elderly dependency ratio increased from 17 percent to almost 26 percent and

⁹⁵ Results are based on simulations using de-jure tax rates for different types of households. See: OECD (2016): Tax and Benefit Systems: <http://www.oecd.org/social/benefits-and-wages.htm>, accessed 5/25/2017

⁹⁶ European Commission (2016): Country Report Croatia 2016.

by 2050, the share of the elderly (aged 65 and over) will increase by 41 percent, and the very elderly (aged 80 and over) will double.

Significant skill gaps, low employment rates, and high unemployment reduce households' ability to participate in inclusive economic growth. The bottom 40 percent, and in particular the poor and vulnerable in Croatia show significantly lower levels of educational attainment compared to the rest of the population. According to data from 2014, over 20 percent of the top 60 (of adults 25 and older) have reached tertiary education, but only 6 percent of the bottom 40 have completed tertiary studies. Meanwhile, employment rates are substantially lower among the bottom 40 as compared to the top 60: only 22 percent of the working-age population in the former is employed, compared to 50 percent in the latter. The unemployment rate is disproportionately higher among poor and vulnerable households, and largely affects young individuals.

Deficiencies in education and training systems hamper the development of human capital and contribute to slow productivity growth. The lack of knowledge-intensive startups also reflects limitations in the quality of its human capital. There is a consensus that science, technology, engineering and mathematics (STEM) education is crucial in the development of skills for the digital economy, which also includes information technology (de Groen et al., 2017). Low PISA and TIMSS scores compared to some peer countries, particularly in mathematics and science, reflect quality gaps in schooling. The number of tertiary education graduates in STEM is low due to limited attention to STEM classes in the curriculum throughout the education pipeline and deficits in training for teachers. Only 29 percent of 30-34-year-olds had a tertiary education in 2016, far below the EU average of 39 percent. While participation in post-secondary vocational training (TVET) is high, the training curricula do not always reflect employers' demand for skills, so that nearly half of those with vocational training work outside of their field of specialization. The limited private sector input magnifies the gap between the skills demanded by firms and those provided by the workforce in programming and funding for TVET programs. Only 3 percent of adults between 25 and 64 years participate in some form of workforce education or training, far below many peers in the EU, which limits employability in a quickly changing labor market.

Croatia shows deficits in the accumulation of skills related to low enrollment rates in early childhood education care (ECEC). Only 11.8 percent of children younger than three are in childcare. With regards to children aged between 3 and the compulsory school age of 6, only 6.5 percent are in childcare for less than 30 hours a week (EU average is 33.9 percent), and 46.4 percent for more than 30 hours a week (EU average is 49.4 percent). Low enrollment rates in ECEC limit access to opportunities, deepen disparities depending on family background and reduce social mobility between generations in Croatia.

The impact of recent labor market liberalization efforts is debatable. Recent labor market reforms have deregulated the labor market and increased the demand for temporary contracts, which brought new people into employment. Between 2010 and 2014, the share of individuals with temporary contracts has increased for all segments of the income distribution and reached 19.3 percent of those employed between 15 and 64 years in 2016 (EU average: 12.0 percent). The share of temporarily employed persons was the highest among relatively poorer working-age individuals, and was most frequent for the age group between 15 and 24 years (61.7 percent) and for individuals with secondary schooling or less. More than 60 percent of all unemployed who transitioned into a job worked under temporary

contracts⁹⁷, which illustrates how labor market deregulation can provide an entry path into permanent employment but also bears a risk of segmenting the labor market and could have a detrimental effect on labor productivity.⁹⁸

Earnings from labor markets constitute the most important source of income for most households. In fact, more than 70 percent of those who get a job also escape from poverty in Croatia (the highest rate in the EU and well above the regional average of 55 percent). Yet, almost half of the working-age population in Croatia are either out of work (39 percent) or show weak attachment to labor markets (7 percent). Even though the picture has changed slightly during the most recent recovery after 2013, the large majority of individuals are out of work (either inactive or unemployed) for a variety of reasons, including early retirement, disability, care of dependents, or domestic responsibilities. As part of the tax reform in early 2017, the basic personal allowance and the allowance coefficient for dependent members of the family and children were increased, which also reduced the marginal effective tax rate for low-wage earners with children. Generous eligibility criteria and the co-existence of multiple pension schemes reduce labor force participation among early retirees. Early retirement pensions, survivor's pensions, long-career or disability pensions trigger an early exit from the labor market, and high payments through disability insurance reduce the participation in the labor market.

⁹⁷ European Commission 2016 ESDE report.

⁹⁸ Mislav Brkic, 2015. "Labor Market Duality and the Impact of Prolonged Recession on Employment in Croatia," Croatian Economic Survey, The Institute of Economics, Zagreb, vol. 17(1), pages 5-45, June.

7 Proposed implementation roadmap

The following Roadmap will detail actions, and a timeline to implement the prioritized policy recommendations (also dealing with cross-cutting issues) identified in Chapter 5:

Privatization and corporate governance of SOEs

1) Reducing and optimizing the presence of the state – analytical stage

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> Undertake analysis to select SOEs that will be subject to privatization. Analyze necessary changes to the regulatory framework and competition policy prior to privatization. Prepare privatization plan outlining appropriate transaction types, sequencing, timeline, post-privatization control, and public outreach. Carry out an assessment of corporate governance in SOEs that are not earmarked for privatization, identifying necessary legal and regulatory reforms, reforms of state ownership policy and governance. 	<p>2020 Q1: SOEs for privatization selected.</p> <p>2020 Q4: Analysis of regulatory framework and competition policy completed.</p> <p>2020 Q4: Assessment of corporate governance in SOEs completed.</p> <p>2020 Q4: Assessment of corporate governance in SOEs completed.</p> <p>2021 Q3: Privatization plan drafted.</p>	EU funds, national funds	Competition policy

2) Reducing and optimizing the presence of the state – implementation stage

Starting from	Sub-actions	Milestone	Resource(s)	Area
2022	<ol style="list-style-type: none"> Adopt a privatization plan outlining appropriate transaction types, sequencing, timeline, post-privatization control, and public outreach. Introduce reforms identified in the assessment of corporate governance in SOEs. Introduce necessary changes to the regulatory framework and competition policy. Review the extent and scope of restructuring of SOEs prior to privatization. Initiate privatization in a limited set of SOEs. Scale up privatization to remaining SOEs. 	<p>2022 Q2: Privatization plan adopted.</p> <p>2022 Q4: Amendments to regulation or new regulation drafted.</p> <p>2023 Q2: Amendments to law or new regulation adopted.</p> <p>2024 Q1: Analysis of restructuring measures for SOEs selected for privatization completed.</p> <p>2024 Q3: Privatization plan adopted.</p> <p>2024 Q4: Privatization of selected SOEs completed.</p> <p>2025 Q4: Restructuring measures implemented.</p> <p>2026 Q2: Privatization of additional SOEs completed.</p>	EU funds, national funds	Competition policy

Competition Policy and State Aid

1) Redirecting state aid towards ascending knowledge-driven sectors

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> Review the use of state aid in specific sectors and analyze distortions to competition. Develop and implement a plan to wind down state aid to declining sectors and minimize market distortions. Prepare support programs that will incorporate elements of relevance to knowledge-driven sectors. 	<p>2020 Q2: Analysis of state aid and distortions to competition in specific sectors completed.</p> <p>2020 Q4: Plan to wind down state aid to declining sectors and minimize market distortions adopted.</p> <p>2021 Q2: Support programs for knowledge-driven sectors launched.</p>	EU funds, national funds	Competition policy

Increasing value added in tourism

1) Improving linkages between the tourism sector and the economy

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> Prioritize the analysis to streamline requirements for tourism-related professions. Support integration of tourism value chains through a Supplier Development Program in tourism focusing on raising the quality of supplier goods and services, reliable delivery, customization, variety, and similar. 	<p>2020 Q1: List of regulated professions to be analyzed and streamlined including tourism-related professions adopted.</p> <p>2021 Q1: Analysis and recommendations for streamlining requirements for tourism-related professions completed (including in-depth competition policy assessment for tourism sector conducted).</p> <p>2021 Q3: Amendments to regulations for tourism-related professions drafted.</p> <p>2022 Q1: Amendments to regulations for tourism-related professions adopted.</p> <p>2020 Q2: Supplier Development Program for the tourism sector launched.</p>	EU funds, national funds	Tourism

Product and service market regulations

1) Deregulation of the services sector

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> Review the requirements to work in services. 	2019 Q4 (recurring): Analysis of requirements to work in services completed.	EU funds, national funds	Competition policy

Starting from	Sub-actions	Milestone	Resource(s)	Area
	<ul style="list-style-type: none"> 2. Streamline and simplify requirements. 3. Reduce the number of regulated professions. 	<p>2020 Q2 (recurring): Amendments to regulations for services drafted.</p> <p>2020 Q4 (recurring): Amendments to regulations for services adopted.</p>		

2) Removing barriers to competition in selected sectors

Starting from	Sub-actions	Milestone	Resource(s)	Area
2022	<ul style="list-style-type: none"> 1. Conduct in-depth competition assessments of selected sectors. 2. Implement reforms to regulations as proposed by the in-depth competition assessment. 	<p>2022 Q3: In-depth assessments of selected sectors completed.</p> <p>2023 Q2: Amendments to regulations as proposed by the in-depth competition assessment drafted.</p> <p>2023 Q4: Amendments to regulations as proposed by the in-depth competition assessment adopted.</p>	EU funds, national funds	Competition policy

3) Streamlining the regulatory framework to facilitate deployment of broadband infrastructure

Starting from	Sub-actions	Milestone	Resource(s)	Area
2022	<ul style="list-style-type: none"> 1. Review administrative procedures for investing in new infrastructure. 2. Review restrictions on broadband connectivity. 3. Provide recommendations for simplification. 4. Streamline the regulatory framework in line with recommendations. 	<p>2022 Q2: Review of administrative procedures for investing in new infrastructure completed.</p> <p>2022 Q4: Review of restrictions on broadband connectivity completed.</p> <p>2023 Q1: Action plan to implement the recommendations of the reviews adopted.</p> <p>2023 Q4: Amendments to the regulatory framework adopted.</p>	EU funds, national funds	Competition policy

Red tape for firm entry, operation, and exit

1) Facilitating business registration

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ul style="list-style-type: none"> 1. Adjust the legal framework (such as the Company Act and Court Registry Act) to allow the initiation of the START project for business registration. 	<p>2020 Q2: Amendments to the legal framework related to business registration completed.</p>	EU funds, national funds	Business environment

	<ol style="list-style-type: none"> 2. Develop an integrated registration process of LLCs and simple LLCs with a single point of contact and participation of all involved agencies. 3. Introduce interoperability of business registers and single application form. 4. Establish a single integrated registry of all business types using the state interoperability platform. 	<p>2021 Q1: Integrated registration process of LLCs and simple LLCs with a single point of contact developed.</p> <p>2021 Q3: Integrated registration process of LLCs and simple LLCs with a single point of contact launched.</p> <p>2022 Q4: Interoperability of business registers and single application form implemented.</p> <p>2023 Q2: Single integrated registry of all business types established.</p>		
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2) Facilitating the process of business entry and operation

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Map licenses/ex-ante authorizations required to start and conduct a business activity. 2. Analyze ex-ante approvals in priority sectors with a view to eliminate and/or simplify and streamline approvals. 3. Assess ICT readiness for automation of select priority sectors ex-ante authorizations and integration into the business registration platform. 4. Facilitate the access for licenses to businesses and regulated professions through the e-information licensing portal. 	<p>2020 Q1: Mapping of licenses/ex-ante authorizations required to start and conduct a business activity completed.</p> <p>2020 Q4: Analysis of ex-ante approvals in priority sectors with a view to eliminate and/or simplify and streamline approvals completed.</p> <p>2021 Q2: Assessment of ICT readiness for automation of select priority sectors ex-ante authorizations and integration into the business registration platform completed.</p> <p>2022 Q1: Access to licenses for businesses and regulated professions through e-information licensing portal launched.</p>	EU funds, national funds	Business environment

3) Institutional arrangements to ensure reform progress on firm entry, operation, and exit

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Form an inter-ministerial working group at the highest political level charged with championing business environment reforms in the areas of business entry, operations, and exit. 2. Form a technical unit that will support the inter-ministerial working group, conduct analytical work and provide recommendations for improving the business climate. 	<p>2020 Q1: Inter-ministerial working group for business environment established.</p> <p>2020 Q1: Technical unit to support the inter-ministerial working group for business environment established.</p>	EU funds, national funds	Business environment

4) Improving the management of court cases, especially in restructuring procedures

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Review in depth the legal and regulatory aspects of the insolvency practitioner profession, and re-design exams to ensure qualified bankruptcy administrators. 2. Allow for more tailored appointment of practitioners, including appointing more than one insolvency practitioner for complex cases. 3. Strengthen the qualifications of insolvency practitioners by introducing additional requirements in the law or the rulebook, if permitted (such as the requirement of certain experience or profession). 	<p>2019 Q4: In-depth review of the legal and regulatory aspects of the insolvency practitioner profession completed.</p> <p>2020 Q2: Insolvency practitioner exams redesigned.</p> <p>2020 Q4: Amendments to regulations on insolvency practitioner appointments and qualifications adopted.</p>	EU funds, national funds	Business environment

5) Reducing the cost of voluntary liquidation

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Conduct a comprehensive diagnostic assessing the current costs and time of voluntary liquidation and proposing measures for their reduction. 	2020 Q2: Comprehensive diagnostic on cost and duration of voluntary liquidation completed.	EU funds, national funds	Business environment

6) Reducing the burden of parafiscal fees

Starting from	Sub-actions	Milestone	Resource(s)	Area
2022	<ol style="list-style-type: none"> 1. Compile an inventory of all parafiscal charges levied by all levels of government (central, county, local) and state-owned enterprises. 2. Conduct a validation test for each parafiscal charge by assessing the legality, necessity (rationale for existence) and ease of payment. 3. Phase out parafiscal charges that lack a clear rationale or where overlaps exist. 4. Streamline and automate the system for payment of parafiscal charges. 	<p>2022 Q3: Inventory of parafiscal charges at all levels of government completed.</p> <p>2023 Q2: Validation test for all parafiscal charges completed.</p> <p>2024 Q3: Amendments to regulations for phasing out selected parafiscal charges adopted.</p> <p>2024 Q3: Procedure for payment of parafiscal charges streamlined and automated.</p>	EU funds, national funds	Business environment

7) Improving the insolvency system

Starting from	Sub-actions	Milestone	Resource(s)	Area
2022	<ol style="list-style-type: none"> 1. Conduct a thorough review of the main practical shortcomings in insolvency processes to identify room for improvement. 2. Make the use of technology in insolvency cases more widespread to minimize personal court interactions. 3. Create legal amendments to the insolvency act to deal with the main shortcomings of the insolvency system. 	<p>2022 Q3: Review of the main practical shortcomings in insolvency processes completed.</p> <p>2022 Q3: Analysis of potential areas for use of technology in insolvency processes completed.</p> <p>2023 Q4: Amendments to insolvency legislation adopted.</p>	EU funds, national funds	Business environment

Quality and access to inputs: human capital, and research infrastructure

1) Improving the quality of support programs for research and innovation

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Conduct a systematic review of all the research and innovation of public support programs. 	2020 Q2: Systematic review of all research and innovation public support completed.	EU funds, national funds	Innovation policy

2) Stimulating and supporting researchers

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Posting, in English, research positions on EURAXESS to enhance the selection of scientific talent. 2. Base career progress on the assessment of research impact and, when pertinent, of technology transfer and teaching achievements. 3. Review the policies and regulations of the research sector to eliminate any bias against young researchers that may exist, for example, in career development in comparison with the EU countries. 	<p>2020 Q1: Research positions posted on EURAXESS.</p> <p>2020 Q1: Programs designed to stimulate collaboration with the scientific diaspora launched.</p> <p>2020 Q2: Requirements to base career progress on research impact, technology transfer and teaching achievements introduced.</p> <p>2020 Q2: Review of policies and regulations that affect young researchers completed.</p> <p>2020 Q4: Policies and regulations that put young researchers at a disadvantage revised.</p>	EU funds, national funds	Innovation policy

3) Creating a proper environment for research infrastructure investment

Starting from	Sub-actions	Milestone	Resource(s)	Area
2020	<ol style="list-style-type: none"> 1. Encourage common ownership based on, for example, the Common Legal Framework for European Research Infrastructure Consortium (ERIC). 2. Strengthen investment planning with sound “infrastructure roadmaps” to increase the selectivity of investments, in line with the priorities of national strategies. 3. Increase transparency and accessibility to research infrastructure. 4. Set out clear guidelines for the use of research infrastructure by third parties. 	<p>2020 Q4: Establishment of an ERIC type framework in Croatia completed.</p> <p>2023 Q2: Infrastructure roadmap completed.</p> <p>2023 Q4: Public research infrastructure usage policy amended.</p> <p>2023 Q4: Guidelines on the use of research infrastructure by third parties adopted.</p>	EU funds, national funds	Innovation policy

4) Pushing in the development of digital skills

Starting from	Sub-actions	Milestone	Resource(s)	Area
2020	<ol style="list-style-type: none"> 1. Conduct a study based on a methodology like conjoint analysis to inform the design of a support scheme for training. 2. Implement a scheme of co-payments (where the government pays at least half of the cost) or vouchers. 3. Launch a public campaign that would inform the public and businesses about the existence of the training scheme. 	<p>2021 Q2: Study to inform the design of a support scheme for digital skills training completed.</p> <p>2021 Q4-2030 Q4: Support scheme for digital skills training launched (co-payment or vouchers).</p> <p>2021 Q4-2030 Q4: Public awareness campaign implemented.</p>	EU funds, national funds	Digital economy

Improve technology transfer and research commercialization

1) Creating better conditions for technology transfer

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Provide “soft” support for collaboration and technology transfer. 2. Encourage the development of dedicated technology transfer organizations. 	<p>2020 Q1: Support program for collaboration and technology transfer launched.</p> <p>2020 Q1: Funding for dedicated technology transfer organizations secured.</p> <p>2020 Q3: Capacity building program for IP management and spin-off facilitation launched.</p>	EU funds, national funds	Innovation policy

2) Developing proper business and research support

Starting from	Sub-actions	Milestone	Resource(s)	Area
2020	<ol style="list-style-type: none"> 1. Rationalize access to and enhance the performance of science and technology parks and incubators. 2. Assess the regional demand for science and technology parks and incubation services and the current supply. 3. Establish a regional roadmap for infrastructure development. 	<p>2020 Q4: Analysis of the performance of science and technology parks and recommendations for improvement completed.</p> <p>2023 Q4: Recommendations for improvement of the performance of science and technology parks implemented.</p> <p>2022 Q4: Assessment of regional demand for science and technology parks and incubation services and the current supply completed.</p> <p>2023 Q2: Criteria for the establishment of new science and technology parks and incubators adopted.</p> <p>2023 Q2: Guidelines for the management of business support organizations adopted.</p> <p>2023 Q4: Regional roadmap for infrastructure development completed.</p>	EU funds, national funds	Innovation policy

3) Fostering science-industry collaboration

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Improve the incentive regime for collaboration between research institutes and the private sector. 2. Reward technology transfer activities and stimulate research susceptible to commercialization. 3. Devise effective mechanisms for financing research-industry collaboration (such as vouchers and matching grants) and facilitating the institutional provision of contract research. 	<p>2020 Q2: Criteria for career advancement of researchers for technology transfer and collaboration with the private sector revised.</p> <p>2020 Q4 (ongoing): Support programs for research-industry collaboration launched.</p>	EU funds, national funds	Innovation policy

Promote business investment in R&D and knowledge-driven startups.

1) Creating bridges between ideas and capital

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Facilitate matching grant schemes for pre-seed financing. 	2020 Q1: Matching grant schemes for pre-seed financing launched.	EU funds, national funds	Innovation policy

Starting from	Sub-actions	Milestone	Resource(s)	Area
	2. Study the potential impact of the return to tax breaks for firms' expenditures on R&D. 3. Review capital depreciation rules and reduce the cost of "knowledge" assets, aiming at reducing the cost of investments (the acquisition of capital goods). 4. Adopt technology services, or, more broadly, manufacturing extension services.	2020 Q2: Study on the potential impact of the return on tax breaks for firms' R&D expenditures completed. 2020 Q2: Analysis of capital depreciation rules completed. 2020 Q4: Recommendations of the study on the impact of tax breaks and analysis of capital depreciation rules implemented. 2019 Q4: Support program for technology extension launched.		

2) Stimulating and supporting entrepreneurs, by providing education, technical assistance, guidance, and mentoring

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	1. Tailor support programs focused on improving management capabilities.	2019 Q4: Support program for improving management capabilities launched.	EU funds, national funds	Competition policy

3) Consolidating funding sources to business investment in R&D

Starting from	Sub-actions	Milestone	Resource(s)	Area
2020	1. Promote legal reforms for the development of early-stage funding, particularly seed and venture capital. 2. Implement continued promotion of FDI in industries with a global orientation and development of R&D-intensive FDI. 3. Strengthen institutional capacity for FDI promotion and introduce mechanisms concerning targeted investor aftercare, leveraging economic diplomacy for investment attraction and strengthening the articulation of value propositions for investors. 4. Enhance collaboration on the regional level.	2020 Q4: FDI strategy adopted. 2021 Q2: Legal reforms facilitating the development of early-stage funding drafted. 2021 Q2: Support program to assist institutional capacity for FDI promotion launched. 2021 Q4: Legal reforms facilitating the development of early-stage funding adopted. 2022 Q4: Institutional mechanisms to promote collaboration between the national and regional level introduced.	EU funds, national funds	Competition policy

4) Improving the "digital maturity" of Croatian industry

Starting from	Sub-actions	Milestone	Resource(s)	Area
2020	1. Develop an online assessment tool, freely available to every company.	2021 Q4: Online assessment tool developed.	EU funds, national funds	Competition policy

Starting from	Sub-actions	Milestone	Resource(s)	Area
	<ol style="list-style-type: none"> 2. Motivate and educate management of firms (particularly small ones) to realize the benefits of digitalization. 3. Monitor improvement on a representative sample of firms, and through in-depth study (interviews), expand the learning to the entire industry. 	<p>2021 Q4-2023 Q4: Training scheme for SMEs on the benefits of digitalization implemented.</p> <p>2024 Q4: Study on the effects of the training scheme completed.</p> <p>2025 Q2-2030 Q4: Training for digitalization based on the findings of the study expanded.</p>		

5) Facilitating capital to entrepreneurship

Starting from	Sub-actions	Milestone	Resource(s)	Area
2022	<ol style="list-style-type: none"> 1. Assess the effect of marginal taxation on entrepreneurship. 2. Continuing improvements in access to finance (deepening local financial markets). 	<p>2021 Q4: Access to finance spending review completed.</p> <p>2021 Q4: Strategy to raise awareness of funding options in the private sector comted.</p> <p>2022 Q3: Assessment of the effect of marginal taxation on entrepreneurship completed.</p> <p>2023 Q4: Recommendations of access to finance spending review completed.</p>	EU funds, national funds	Competition policy

Institutional capacity: policy evaluation, implementation, and monitoring

1) Upgrading institutional capacity

Starting from	Sub-actions	Milestone	Resource(s)	Area
2019	<ol style="list-style-type: none"> 1. Support recently established mechanisms for horizontal coordination such as national councils and other similar bodies. 2. Create a specialized institution with a core focus to support business innovation in Croatia. 3. Build the capacity to manage research and innovation policy - design, implementation, monitoring, and evaluation. 4. Strengthen impact evaluation. 	<p>2019 Q4: Capacity for supporting coordination bodies improved.</p> <p>2022 Q2: Roadmap for capacity building in management of research and innovation policy adopted.</p> <p>2022 Q2: Roadmap for capacity building in impact evaluation adopted.</p> <p>2022 Q4: Institution with a core focus to support business innovation in Croatia established.</p>	EU funds, national funds	Innovation policy

Reforms of the public research sector to improve research excellence

1) Enhancing public research centers

Starting from	Sub-actions	Milestone	Resource(s)	Area
2022	<ol style="list-style-type: none"> Advance the activities undertaken by the Ministry of Science and Education to consolidate the research institutes. Introduce performance-based budgeting. Review legal status of public research institutes, increase the autonomy and accountability of directors (including by establishing performance-based contracts and giving more flexibility for defining staff compensation). 	<p>2022 Q2: Targets for consolidation of research institutes established.</p> <p>2022 Q3: Performance-based budgeting introduced.</p> <p>2022 Q4: Review of legal status of public research institutes completed.</p> <p>2023 Q2: Performance-based contracts for directors introduced.</p> <p>2023 Q2: Flexible staff compensation rules introduced.</p> <p>2024 Q4: Targets for consolidation of research institutes met.</p>	EU funds, national funds	Innovation policy

Unleashing the potential of the digital economy, especially in the Fintech sector

1) Broadening the finance options available and accessible to enterprises

Starting from	Sub-actions	Milestone	Resource(s)	Area
2022	<ol style="list-style-type: none"> Prepare a tailor-made guide that sets out the main aspects to consider and outlines sources of finance available to businesses – ranging from start-ups to smaller businesses and growing mid-sized companies. Expand the use of financial instruments through EU funds. 	<p>2022 Q3: Guide for financing options for businesses published.</p> <p>2022 Q4: Calls for financial instruments launched.</p>	EU funds, national funds	Competition policy

2) Institutional support for fintech

Starting from	Sub-actions	Milestone	Resource(s)	Area
2020	<ol style="list-style-type: none"> Introduce regulatory sandboxes in coordination with the Croatian National Bank, non-bank supervisors, and relevant ministries. 	<p>2020 Q1: Consultations with fintech companies on regulatory sandboxes held.</p> <p>2020 Q4: Guidelines for regulatory sandboxes drafted.</p> <p>2021 Q2: Guidelines for regulatory sandboxes adopted.</p>	EU funds, national funds	Competition policy

Starting from	Sub-actions	Milestone	Resource(s)	Area
		2021 Q3 (recurring annually): Call for applications for participation in regulatory sandboxes launched. 2022 Q2 (recurring annually): Participants to regulatory sandbox selected.		

8 Proposals for strategic (“Flagship”) projects

Note: These 1-2 pagers on flagship projects should not be viewed as standalone proposals. The Policy Note on Growth, Competitiveness and Innovation presents detailed analysis for each of the thematic areas addressed by the proposed projects and should be taken into account for completeness.

8.1 Improving reallocation: Driving competition policy and business environment reforms forward

- a) **Description of flagship project:** This project is considered as TA. The project envisages creating a delivery unit that will support a coordination body of top policy-makers⁹⁹ to push forward structural reforms to improve reallocation and raise aggregate productivity, especially in the areas of competition policy and business environment.¹⁰⁰ This so-called Task Force should be a technical team of knowledgeable staff or consultants which would provide information, analytical background, and specific policy proposals to address competition policy and cutting red tape issues. Depending on the topic, the parts of the delivery unit will be placed at different Ministries, but should work as one.
- (i) In the area of competition policy, the Task Force would work on: i) reviewing and assessing state aid measures. This would involve ex-ante evaluation of the effects of the planned measures (and ex-post when possible and needed). It will be best if this part of the Task Force is placed in the Ministry of Finance, due to the state budget implications that are expected, ii) removing barriers to competition in selected sectors, including proposing the design of measures that can facilitate adjustment and mitigate short term social costs. This can be done as continuation to the work started by MoEEC to deregulate the services sector and would allow scaling up so that strong impact can be achieved. Currently, efforts have been undertaken, but pace and scale can be increased.
 - (ii) In the area of cutting red tape, the Task Force would be responsible for proposing reforms to facilitate business entry, operation, and exit. It will focus particularly on simplifying government requirements for firm operations, aiming to release managers’ time to invest in productivity-enhancing activities. In particular, the Task Force would be preparing bi-annual action plans (measures for deregulation of services sector to be included as well) which will contain measures to facilitate business registration and access to licenses, reduce the burden of parafiscal fees, as well as provide solutions for improving the insolvency regime and facilitating voluntary liquidation.

Besides the preparation of the proposed measures, the Task Force will be conducting regular monitoring and will be interacting with relevant bodies at technical level. The top policy maker from the coordination body will have the key responsibility of following the implementation of the measures proposed within their remit. However, before this takes place, the bi-annual action plans will have to be

⁹⁹ The recently created Working Group led by Ministry of Economy, Entrepreneurship and Crafts and comprised of State Secretaries from key ministries may be leveraged for this purpose.

¹⁰⁰ As discussed in the Policy Note, SOE reforms are crucial to improving reallocation and aggregate productivity in Croatia. In this respect, there is already ongoing assistance provided by the EBRD.

approved on a government session with clear commitment from the highest government level. In addition to this, one must make sure this work is well coordinated with the existing government activities related to regulatory impact assessment.

See the Policy Note on Growth, Competitiveness and Innovation for further details.

- b) **Project's relevance to national strategic framework:** The proposed project is directly connected to the National Reform Program, it supports some of the reforms planned (business registration, deregulation of services etc.) but also provides systematic approach to improving product and service market regulation. It is also compliant with the proposed strategic goals 6 and 8 for NDS 2030.
- c) **Economic potential and exploitation:** Misallocation of resources is one of the main reasons for Croatia's muted growth performance. By reallocating resources towards more productive agents and creating a business-friendly environment, the economy can achieve the productivity gains necessary to boost long-term growth. By creating a Task Force that would be explicitly responsible for feeding the reform agenda and closely monitoring progress, the project will ensure reform momentum is kept and commitment to implementation is at the highest level.
- d) **Sustainability:** The Task Force as a modality and the coordination body of top policy makers will be enshrined in a government decision noting their responsibilities and obligations, thus giving them high political support and visibility.
- e) **Duration:** 5 years.
- f) **Estimated amount of funding required:** The work is primarily an advisory one, which depending on recommendations for implementation may involve more substantial investments (for instance for software, in order to digitalize and streamline certain procedures). All in all, if set up as a strategic project, EUR 5-10 million may be sufficient funding.
- g) **Preconditions - points for consideration before the project can begin:** There needs to be clear government commitment for the prioritization of this subject matter. Strong political will is the starting point, followed by clear understanding of the mandate by those involved. In addition, Terms of Reference need to be prepared for the work anticipated by the Task Force, as well as the coordination body.
- h) **Project leader:** Ministry of Finance and MoEEC in the lead, but office of the Prime Minister to have a key oversight role.
- i) **Beneficiaries:** All ministries that will be part of the coordination body.

8.2 Harnessing the opportunities of the digital economy: advancing the digital maturity of Croatian industry through Digital Innovation Hubs

- a) **Description of flagship project:** This project is primarily considered as TA, with the possibility to have a financing mechanism as well. The project proposes improving the digital maturity of the Croatian industry through: (i) a network of Digital Innovation Hubs (DIHs), (ii) raising awareness for digitalization of firms and the benefits of improving it, (iii) conducting activities to raise the digital maturity of firms financed through a voucher scheme and (iv) strengthening the capacity to enable innovation in the financial sector (fintech).
 - (i) DIHs are envisaged as ecosystems that consist of SMEs, large industries, startups, researchers, accelerators, and investors. The role of DIHs is to act as one-stop-shops where companies,

especially SMEs and startups, can get access to technology-testing, financing advice, market intelligence and networking opportunities. For that reason, DIHs are often affiliated with universities or research institutions. In order to provide guidance to SMEs and help them to upgrade their ICT capabilities, proximity and regional representation are considered crucial. Croatia needs to establish a network of high quality DIHs in all geographic areas¹⁰¹. Instead of creating new infrastructure from scratch, which would be expensive and time consuming, the network of DIHs should be expanded by using the existing network of business support organizations, which could provide ICT-related services. The DIHs should be integrated in the network of EU-wide DIHs in order to ensure quality and share knowledge and best practices.

- (ii) Firms could assess the level of digitalization through a free online diagnostic tool hosted and maintained by the network of DIHs. Firms would fill out a questionnaire on their ICT habits and be given a diagnosis, followed by recommendations for improvement. Further, for a change to happen, firm management needs to understand the benefits of digitalization. This can be accomplished through education targeted to upper management, and can be particularly effective with small privately-owned companies, where owners can be powerful drivers of change. DIHs would conduct awareness-raising activities targeting firm management to explain the benefits of digital transformation.
 - (iii) Starting from the results of the diagnostic tool, the DIH can further specify what is needed to upgrade the firm's digital maturity. Based on the results, firm management together with the DIH plans the way forward and follows through. DIHs would provide services to firms based on the results of the digital maturity diagnostic. Digital improvement activities would be financed through a voucher, which would be designed as very accessible and flexible. The application form and process to obtaining the voucher should be very simple.
 - (iv) Work with the financial sector authorities to provide technical assistance to complement existing efforts and strengthen their capacity to regulate and spur the development of the fintech sector in Croatia.
- b) Project's relevance to national strategic framework:** The digital agenda stands prominently in government plans. The MoEEC and the Central office for Digital society play a key role. Technological innovations globally present an opportunity for innovating, creating new business models, and penetrating new markets. The project would help the private sector in Croatia to take advantage of such opportunities through digitalization, thus expanding knowledge-intensive activities and boosting its overall competitiveness. The project is also compliant with the proposed strategic goal 32 for NDS 2030.
- c) Economic potential and exploitation:** In order to remain competitive in the digital age, Croatian firms need to raise their level of digital maturity. However, many are not aware of their level of digital maturity compared to other firms, either nationally or internationally, or may not know where exactly they fall short and how to advance. Combining diagnostic activities with accessible financing for investment in knowledge assets will help raise the productivity of Croatian firms and enhance their competitiveness.
- d) Sustainability:** By using the infrastructure of existing BSOs, the DIHs would help transfer ICT skills and expand the base of knowledge providers. At the same time, the project seeks to achieve

¹⁰¹ As of now, there are only six DIHs in Croatia, and only two of them are offering a wider range of services.

behavioral change by educating business leaders on the importance and advantages of digital transformation.

- e) **Duration:** 7-10 years.
- f) **Estimated amount of funding required:** Depending on the state of the current DIHs, the budget for the project may vary quite a bit. The project should start with budget of at least EUR 20 million for the first 3-4 years, and be scaled up later, depending on progress.
- g) **Preconditions - points for consideration before the project can begin:** The network of DIHs would play a central role in the project by facilitating the access to the digitalization diagnostic tool and providing services to address identified shortcomings. The quality of and state of play in these DIHs would have to be assessed to ensure they will have sufficient resources at their disposal to be able to respond to project requirements.
- h) **Project leader:** MoEEC.
- i) **Beneficiaries:** SMEs, large companies, BSOs, fintech entrepreneurs

8.3 Business innovation: supporting firm investments in R&D and knowledge-based startups

- a) **Description of flagship project:** This project is considered as TA and financing, noting that the TA part would be critical for successful implementation of the financing part. The project proposes to establish an Innovation Agency that could enable better design, monitoring and evaluation of Croatia's national innovation system. The Agency would be responsible for implementing innovation policy and supporting investment at different stages of the innovation chain. The mission of the Agency would be to stimulate business investment in R&D, facilitate the collaboration between science and industry, and address the funding gap that exists at the early stages of innovation. Direct support for R&D would play a critical role in facilitating the emergence of new, innovative firms and knowledge-intensive start-ups. The Agency should develop a framework defining inputs, activities, outputs, and outcomes which would guide its strategy and related operational documents. The Agency should have capacity to respond to the needs of the NIS, including functioning as a technical secretariat for the national coordination body on science, technology and innovation. In addition to financing, the agency would be responsible for taking stock of the pipeline of innovation projects, interaction with the various innovation support organizations and implementing soft measures, such as technology transfer, investment readiness programs to prepare entrepreneurs for receiving additional funding etc. This project would assist the agency with the design and implementation of pilots, including the design of future impact evaluation.

The innovation agency could be a joint implementing body of MoSE and MoEEC, where the two agendas (Business and public R&D and innovation) would be coordinated, under the guidance of the high-level national coordination body. It would allow for a comprehensive approach to implementing innovation policy mix, following the innovation ideas as they progress towards commercialization.

See the Policy Note on Growth, Competitiveness and Innovation for further details.

- b) **Project's relevance to national strategic framework:** The project aims to address the issue of low and declining R&D investments in firms and overall inability of the Croatian national innovation system to transform innovation inputs into tangible results. The impaired innovation system

hampers the country's ability to increase its long-term productivity, competitiveness, and growth potential. This is directly related to the EU 2020 targets and is compliant with the proposed strategic goal 7 for NDS 2030.

- c) **Economic potential and exploitation:** The project would allow turning towards a knowledge-based economy. New knowledge-intensive businesses and start-ups would emerge. The existing ones would progress. New products would be developed, the export basket would diversify, new markets would be penetrated, and the resilience of the economy would be increased.
- d) **Sustainability:** The merger of the guarantee agency (HAMAG) with the innovation agency (BICRO) was the result of an attempt to rationalize resources and streamline business support. Since then, it has become clear that the performance of the Croatian national innovation system has regressed and will require strong and focused leadership to set it back on track. At the same time, all efficiency considerations made at the time of the merger of HAMAG and BICRO should be addressed when setting up the new Innovation Agency. It is critical that the Innovation Agency falls under the remit of MoEEC and MoSE, with clear reporting lines, and at the same time be given a lot of room for independent operation. Only in such a way would a true innovation agency emerge, with the right capacities in place.
- e) **Duration:** total 5 years; 2 years to set up the Agency and 3 years for full operation.
- f) **Estimated amount of funding required:** The idea of this project is that all the innovation financing is channeled through a single Innovation Agency. Currently, most of the project financing is coming from European Structural and Investment Funds. Besides financing, the Agency should provide soft support: investment readiness, technology transfer, etc. The amount of financing is probably determined by the availability of funds under the respective programming period, while for the soft support, there should be at least EUR 10 million EUR available in the first 2 years.
- g) **Preconditions - points for consideration before the project can begin:** Revamping the Croatian national innovation system by setting up a dedicated Innovation Agency requires a strong political commitment to continuity and long-term reforms. Political consensus would need to be secured before embarking on a change in the institutional landscape.
- h) **Project leader:** The Innovation Agency could be a joint implementing body of MoSE and MoEEC.
- i) **Beneficiaries:** MoEEC, MoSE, entrepreneurs, angel investors, SMEs, PROs, researchers.

8.4 Research: reforming the public research sector for innovation

- a) **Description of flagship project:** Provide advisory and financing support to the advancement of reforms promoting research excellence, research commercialization and science-industry collaboration. The project could be divided in two phases: formulation and implementation. The formulation phase aims to develop a "Research for Growth Agenda", to be adopted at the government level, which would set a timeline of activities necessary to boost research excellence and science-industry collaboration. The project would build on the ongoing plans for higher education reforms and reforms of public research organizations. It should address remaining governance and regulatory bottlenecks for research excellence, commercialization and collaboration science-industry, including the legal framework related to the career advancement of researchers. The formulation phase would encompass the following components:
 - (i) Support to higher education reform (research component) and reform of public research organizations. This component will provide technical assistance for ongoing initiatives in both areas, with an emphasis on governance and regulatory issues. A major focus will be on strengthening

the incentive regime for cost-effective research, including emphasizing meritocratic allocation of funds and career progress, mission-orientation of research and performance-based budgeting, as well as improving the legal capacity of public research organization to ‘manage for results’. It will also include designing and implementing pilots to strengthen the integration of Croatian researchers to the European Research Area.

- (ii) **Research infrastructure** – this component will help rationalize the investment in new infrastructure, including proper budgeting (e.g. maintenance costs) and regulating access. Activities will include reviewing and improving the research infrastructure roadmap and proposing policies and develop guidelines for usage of research infrastructure by third parties to increase access to existing infrastructure, taking inspiration from the ERIC legal form existing in the EU. This technical assistance will assist the development of research infrastructure projects, emphasizing the development of ‘niche’, global level research facilities integrated to the EU research strategy.
- (iii) **Technology transfer and commercialization** – includes reviewing the legal framework, institutional and material resources for research commercialization and science-industry collaboration in Croatia, from the perspective of public research organizations and higher education institutions, with consensus building for the preparation of necessary reforms and programs. Those include: (a) a thorough reform of existing legislation governing the management of intellectual property rights in public research affecting their commercialization (e.g. the capacity of research institutes to own and manage spinoff companies) and (b) strengthening technology transfer offices in public research institutions.

All the aforementioned activities are advisory support and ideally, these would be coupled with “financial rewards” for those progressing together with the reform agenda. For instance, to stimulate the PROs to progress with adopting IPR framework, focusing on technology transfer and so on, certain financial incentives would be useful. One may call this results-based financing. This would fit well to ensure proper implementation of the policy reforms envisaged.

See the Policy Note on Growth, Competitiveness and Innovation for further details.

- b) **Project’s relevance to national strategic framework:** The project contributes to the long-term alignment between research outputs and the needs of the economy, by establishing favorable conditions for connecting research providers in the public sector to research users in the private sector. This is directly related to the EU 2020 targets and is compliant with the proposed strategic goal 7 for NDS 2030.
- c) **Economic potential and exploitation:** The project contributes to improving the ability of the Croatian NIS to transform innovation inputs into outputs. By opening the access to research infrastructure, facilitating technology transfer, and incentivizing the production of innovation outputs, Croatia could achieve more value for its investment in R&D. Ultimately, this would lead to increased economic growth and export volumes¹⁰².
- d) **Sustainability:** The Research for Growth Agenda will be adopted at the government level to ensure political buy-in. The Agenda will have built-in monitoring and accountability mechanisms, with annual milestone targets and progress reviews.
- e) **Duration:** 4 years.

¹⁰² As elaborated in section 3, increasing R&D investment to 3 could raise GDP by 5.8 percent and exports by 12 percent, should Croatia improve its efficiency in transforming innovation inputs into outputs.

- f) **Estimated amount of funding required:** EUR 100 million, consisting of EUR 15 million for advisory support and EUR 85 million for implementation.
- g) **Preconditions - points for consideration before the project can begin:** Completing the reform of the public research institutional landscape, as well as the incentive framework for public research (career advancement which would reward research excellence and commercialization, compensation, performance-based financing) are necessary preconditions for the project to be impactful.
- h) **Project leader:** MoSE with regular reporting to the national level coordination bodies on this subject matter.

Beneficiaries: MoSE, PROs, researchers.

9 Annex

Table 9.1: Sectors' effect on total TFP decomposition

Accumulated TFP (in log percent) – Value-Added Share Weights

Within			Between			Entry			Exit		
Sector	Marginal Effect	Sector Decomposition	Sector	Marginal Effect	Sector Decomposition	Sector	Marginal Effect	Sector Decomposition	Sector	Marginal Effect	Sector Decomposition
Wholesale trade	-1.33	7.23	Civil engineering	-1.81	-48.64	Telecommunications	-0.17	-0.08	Electricity, gas, steam and air conditioning	-0.21	-0.16
Retail trade	-1.17	4.47	Telecommunications	-1.72	-7.04	Wholesale trade	-0.06	0.44	Retail trade	-0.14	0.03
Animal production	-0.94	-8.08	Financial service activities	-0.53	53.29	Financial service activities	-0.06	0.07	Wholesale trade	-0.11	0.00
Real estate activities	-0.67	12.63	Construction of buildings	-0.47	-21.51	Manuf. coke & ref. petroleum	-0.06	0.00	Real estate activities	-0.10	-0.14
Wholesale and retail trade of motor vehicles	-0.60	5.41	Activities of head offices	-0.36	-13.19	Manuf. food	-0.05	-0.22	Accommodation	-0.07	-0.09
Land transport	-0.43	3.79	Other personal service activities	-0.35	-10.49	Land transport	-0.04	-0.31	Manuf. food	-0.05	0.01
Manuf. food	-0.28	2.94	Extraction of petroleum and gas	-0.29	-32.55	Retail trade	-0.03	0.28	Wholesale and retail trade of motor vehicles	-0.02	-0.04
Electricity, gas, steam and air conditioning	-0.23	-10.72	Manuf. pharmaceutical	-0.26	-22.23	Manuf. fabricated metal products	-0.03	0.14	Forestry	-0.02	-0.02
Accommodation	-0.20	17.11	Specialised construction activities	-0.25	-11.91	Water collection, treatment and supply	-0.03	-2.73	Animal production	-0.02	-0.02
Food and beverage service activities	-0.15	23.89	Manuf. coke & ref. petroleum	-0.25	-19.29	Manuf. beverages	-0.02	0.03	Manuf. fabricated metal products	-0.02	0.03
Rental and leasing activities	-0.15	5.56	Accommodation	-0.22	-2.36	Civil engineering	-0.02	0.42	Gambling and betting activities	-0.01	0.19
Warehousing and support activities for transportation	-0.14	-5.41	Architectural and engineering activities	-0.15	-5.09	Manuf. pharmaceutical	-0.02	0.01	Water collection, treatment and supply	-0.01	0.13
Travel agency	-0.14	3.14	Manuf. tobacco	-0.14	21.90	Waste collection	-0.02	-0.45	Civil engineering	-0.01	0.00
Legal and accounting activities	-0.13	3.75	Other professional, scientific and technical activities	-0.14	-6.88	Manuf. machinery and equipment	-0.02	-0.29	Land transport	-0.01	0.05
Printing	-0.11	1.97	Human health activities	-0.09	-13.70	Manuf. other non-metallic mineral pds.	-0.01	0.02	Manuf. other transport equipment	-0.01	-2.04
Sports activities	-0.10	14.56	Fishing	-0.09	-43.49	Manuf. computer, electronic and optical	-0.01	-0.02	Manuf. wood	-0.01	-0.01
Publishing activities	-0.08	2.23	Activities auxiliary to financial services	-0.08	-96.36	Extraction of petroleum and gas	-0.01	0.00	Manuf. other non-metallic mineral pds.	-0.01	0.01
Manuf. fabricated metal products	-0.07	11.69	Computer programming	-0.07	-7.83	Security and investigation activities	-0.01	-1.15	Food and beverage service activities	-0.01	-0.17
Manuf. beverages	-0.06	5.93	Repair of computers	-0.05	-12.12	Manuf. electrical equipment	-0.01	0.32	Manuf. electrical equipment	-0.01	-0.36
Manuf. chemicals	-0.05	-3.13	Water transport	-0.05	-32.62	Human health activities	-0.01	-0.14	Manuf. wearing apparel	-0.01	-0.05
Manuf. computer, electronic and optical	-0.05	4.38	Manuf. basic metals	-0.05	-8.50	Programming and broadcasting activities	-0.01	0.01	Mining support	-0.01	0.00
Manuf. other non-metallic mineral pds.	-0.05	9.16	Manuf. motor vehicles	-0.04	-7.34	Manuf. wood	-0.01	0.02	Other manufacturing	-0.01	-2.99
Manuf. machinery and equipment	-0.05	6.89	Waste collection	-0.03	-14.66	Architectural and engineering activities	-0.01	-0.22	Manuf. furniture	-0.01	0.00

Forestry	-0.04	19.61	Postal and courier activities	-0.03	2.56	Wholesale and retail trade of motor vehicles	-0.01	0.38	Manuf. machinery and equipment	-0.01	0.00
Financial service activities	-0.04	-42.82	Water collection, treatment and supply	-0.02	-2.27	Advertising and market research	-0.01	-1.28	Postal and courier activities	-0.01	0.00
Water collection, treatment and supply	-0.04	7.94	Activities of membership organisations	-0.02	-348.66	Scientific research and development	-0.01	0.11	Specialised construction activities	-0.01	0.00
Veterinary activities	-0.04	-3.27	Libraries, archives, museums	-0.02	-223.36	Accommodation	-0.01	0.31	Printing	-0.01	-0.01
Manuf. furniture	-0.03	14.31	Manuf. beverages	-0.02	-7.85	Warehousing and support activities for transportation	-0.01	1.20	Manuf. rubber and plastic	-0.01	0.00
Manuf. wood	-0.03	17.11	Services to buildings and landscape activities	-0.01	-13.92	Creative, arts and entertainment activities	-0.01	-30.33	Waste collection	0.00	0.00
Fishing	-0.03	16.26	Social work activities without accommodation	-0.01	14.35	Information service activities	-0.01	-0.58	Air transport	0.00	0.14
Manuf. rubber and plastic	-0.03	10.76	Food and beverage service activities	-0.01	-21.28	Repair of computers	-0.01	-4.22	Other mining	0.00	-0.48
Water transport	-0.03	20.96	Scientific research and development	-0.01	-1.26	Manuf. rubber and plastic	-0.01	0.30	Services to buildings and landscape activities	0.00	-0.56
Manuf. paper	-0.03	1.98	Publishing activities	0.00	-3.83	Printing	-0.01	-0.09	Manuf. leather	0.00	0.00
Programming and broadcasting activities	-0.03	3.98	Insurance, reinsurance and pension funding	0.00	45.79	Education	0.00	-0.04	Manuf. chemicals	0.00	-0.03
Other mining	-0.03	1.71	Security and investigation activities	0.00	5.02	Office administrative	0.00	-3.53	Water transport	0.00	-0.23
Manuf. other transport equipment	-0.03	2.47	Manuf. electrical equipment	0.00	-8.92	Services to buildings and landscape activities	0.00	0.04	Manuf. paper	0.00	0.01
Office administrative	-0.02	-3.25	Creative, arts and entertainment activities	0.00	24.88	Manuf. tobacco	0.00	0.00	Manuf. motor vehicles	0.00	0.01
Sewerage	-0.02	-28.84	Public administration	0.00	44.44	Manuf. basic metals	0.00	-0.10	Fishing	0.00	0.01
Services to buildings and landscape activities	-0.02	7.43	Remediation activities	0.00	-12.06	Veterinary activities	0.00	-0.12	Manuf. pharmaceutical	0.00	0.00
Motion picture, video and television programme production	-0.02	-2.90	Manuf. leather	0.00	-5.97	Manuf. textiles	0.00	0.06	Manuf. textiles	0.00	-0.09
Manuf. leather	-0.02	3.29	Manuf. textiles	0.01	-5.82	Manuf. leather	0.00	-0.02	Sports activities	0.00	-0.08
Manuf. motor vehicles	-0.02	-1.92	Residential care activities	0.02	8.46	Residential care activities	0.00	-1.72	Rental and leasing activities	0.00	-0.11
Other manufacturing	-0.01	11.67	Office administrative	0.02	-9.01	Postal and courier activities	0.00	0.40	Manuf. coke & ref. petroleum	0.00	0.00
Security and investigation activities	-0.01	-5.13	Sewerage	0.02	41.49	Manuf. motor vehicles	0.00	0.07	Repair of machinery and equipment	0.00	-0.11
Manuf. electrical equipment	-0.01	10.81	Other mining	0.02	-0.68	Other mining	0.00	-0.07	Manuf. computer, electronic and optical	0.00	-0.02
Manuf. basic metals	-0.01	6.58	Education	0.02	-5.04	Air transport	0.00	0.29	Manuf. beverages	0.00	0.00
Architectural and engineering activities	-0.01	3.63	Manuf. machinery and equipment	0.02	-6.30	Manuf. furniture	0.00	0.64	Travel agency	0.00	-0.36
Civil engineering	-0.01	14.00	Programming and broadcasting activities	0.03	0.67	Manuf. chemicals	0.00	0.85	Sewerage	0.00	0.00
Manuf. pharmaceutical	-0.01	5.55	Manuf. rubber and plastic	0.03	-6.93	Water transport	0.00	0.96	Libraries, archives, museums	0.00	0.00

Extraction of petroleum and gas	0.00	-45.55	Other manufacturing	0.03	1.12	Public administration	0.00	0.42	Insurance, re-insurance and pension funding	0.00	0.00
Manuf. tobacco	0.00	-46.36	Veterinary activities	0.04	13.66	Other manufacturing	0.00	1.01	Social work activities without accommodation	0.00	0.03
Postal and courier activities	0.00	-7.13	Manuf. furniture	0.05	-2.54	Sewerage	0.00	-0.44	Activities of membership organisations	0.00	0.00
Mining support	0.00	-11.92	Air transport	0.07	-6.04	Manuf. wearing apparel	0.00	1.00	Office administrative	0.00	0.05
Manuf. coke & ref. petroleum	0.00	28.26	Manuf. computer, electronic and optical	0.07	-2.25	Mining support	0.00	0.00	Creative, arts and entertainment activities	0.00	0.00
Residential care activities	0.00	-4.97	Manuf. other non-metallic mineral pds.	0.07	-6.28	Libraries, archives, museums	0.00	-0.03	Manuf. basic metals	0.00	0.10
Public administration	0.00	-9.16	Manuf. wearing apparel	0.07	-9.37	Social work activities without accommodation	0.00	0.64	Remediation activities	0.00	-0.16
Insurance, re-insurance and pension funding	0.00	-18.95	Forestry	0.08	6.68	Activities of membership organisations	0.00	0.00	Manuf. tobacco	0.00	0.00
Manuf. textiles	0.01	18.34	Manuf. wood	0.10	3.98	Manuf. paper	0.00	0.69	Security and investigation activities	0.00	0.00
Activities of membership organisations	0.01	-6.70	Manuf. chemicals	0.11	11.50	Insurance, re-insurance and pension funding	0.00	-4.87	Residential care activities	0.00	0.00
Telecommunications	0.01	2.66	Manuf. paper	0.11	18.45	Other personal service activities	0.00	-0.46	Other personal service activities	0.00	-0.14
Air transport	0.01	46.12	Printing	0.11	-0.14	Rental and leasing activities	0.00	0.98	Programming and broadcasting activities	0.00	0.01
Creative, arts and entertainment activities	0.01	15.40	Repair of machinery and equipment	0.12	7.05	Motion picture, video and television programme production	0.00	-3.92	Veterinary activities	0.00	0.01
Libraries, archives, museums	0.01	128.57	Manuf. other transport equipment	0.12	18.24	Activities auxiliary to financial services	0.00	2.60	Public administration	0.00	0.00
Remediation activities	0.01	19.11	Motion picture, video and television programme production	0.12	29.07	Forestry	0.00	0.11	Other professional, scientific and technical activities	0.00	-0.06
Manuf. wearing apparel	0.01	18.90	Advertising and market research	0.12	2.41	Publishing activities	0.00	1.01	Information service activities	0.00	0.02
Social work activities without accommodation	0.02	26.06	Travel agency	0.13	-16.00	Other professional, scientific and technical activities	0.01	-0.22	Motion picture, video and television programme production	0.00	0.04
Gambling and betting activities	0.02	41.16	Mining support	0.16	18.52	Remediation activities	0.01	4.96	Publishing activities	0.00	0.10
Activities auxiliary to financial services	0.02	10.58	Legal and accounting activities	0.18	-4.27	Legal and accounting activities	0.01	-0.76	Activities auxiliary to financial services	0.00	0.00
Information service activities	0.03	3.13	Rental and leasing activities	0.18	-1.44	Manuf. other transport equipment	0.01	2.40	Education	0.00	-0.02
Scientific research and development	0.03	18.94	Information service activities	0.19	31.85	Sports activities	0.01	3.41	Scientific research and development	0.01	0.00
Repair of machinery and equipment	0.04	10.35	Land transport	0.20	-9.56	Animal production	0.01	0.97	Extraction of petroleum and gas	0.01	0.00
Waste collection	0.04	17.27	Manuf. fabricated metal products	0.20	-3.49	Construction of buildings	0.01	0.65	Repair of computers	0.01	0.03
Education	0.05	1.03	Warehousing and support activities for transportation	0.22	3.12	Food and beverage service activities	0.01	3.29	Warehousing and support activities for transportation	0.01	-0.09
Employment activities	0.07	44.90	Sports activities	0.28	36.66	Travel agency	0.01	2.95	Employment activities	0.01	0.30

Repair of computers	0.07	14.11	Manuf. food	0.33	-2.70	Gambling and betting activities	0.02	3.13	Construction of buildings	0.01	-0.12
Construction of buildings	0.15	19.34	Gambling and betting activities	0.46	-9.60	Specialised construction activities	0.02	1.47	Human health activities	0.01	0.00
Advertising and market research	0.16	2.50	Wholesale and retail trade of motor vehicles	0.64	5.50	Activities of head offices	0.04	-5.07	Advertising and market research	0.02	0.09
Human health activities	0.19	-0.80	Animal production	0.79	6.02	Real estate activities	0.04	2.64	Activities of head offices	0.02	0.11
Other professional, scientific and technical activities	0.20	10.85	Employment activities	1.01	34.26	Fishing	0.05	23.92	Computer programming	0.02	0.01
Specialised construction activities	0.40	20.56	Real estate activities	1.27	17.87	Computer programming	0.07	1.83	Legal and accounting activities	0.03	0.01
Other personal service activities	0.42	17.99	Electricity, gas, steam and air conditioning	1.28	45.95	Repair of machinery and equipment	0.08	10.27	Architectural and engineering activities	0.05	-0.01
Computer programming	0.66	11.20	Wholesale trade	1.70	0.22	Electricity, gas, steam and air conditioning	0.10	0.81	Financial service activities	0.05	-0.01
Activities of head offices	0.94	21.88	Retail trade	1.78	14.98	Employment activities	0.24	58.63	Telecommunications	0.14	0.00
All Sectors	14.81		All Sectors	-13.19		All Sectors	1.06		All Sectors	0.52	

Note 1: Sectors partial effects are calculated as the difference between the TFP using all sectors and TFP excluding the respective sector. Sectors are weighted by value added share.

Note 2: Sector decomposition is calculated as the aggregation of firms' contribution components to overall TFP by sector.

Source: Staff elaboration based on FINA data

Table 9.2: Sectors' effect on total TFP decomposition

Accumulated TFP (in log percent) – Employment Share Weights

Sector	Within		Between		Entry			Exit			
	Marginal Effect	Sector Decomposition	Sector	Marginal Effect	Sector Decomposition	Sector	Marginal Effect	Sector Decomposition	Sector	Marginal Effect	Sector Decomposition
Wholesale trade	-1.33	7.23	Activities of head offices	-0.49	-13.19	Food and beverage service activities	-0.22	3.29	Retail trade	-0.23	0.03
Retail trade	-1.17	4.47	Civil engineering	-0.48	-48.64	Legal and accounting activities	-0.22	-0.76	Real estate activities	-0.17	-0.14
Animal production	-0.94	-8.08	Telecommunications	-0.43	-7.04	Water collection, treatment and supply	-0.19	-2.73	Electricity, gas, steam and air conditioning	-0.13	-0.16
Real estate activities	-0.67	12.63	Manuf. food	-0.41	-2.70	Gambling and betting activities	-0.10	3.13	Wholesale trade	-0.09	0.00
Wholesale and retail trade of motor vehicles	-0.60	5.41	Specialised construction activities	-0.35	-11.91	Employment activities	-0.07	58.63	Animal production	-0.07	-0.02
Land transport	-0.43	3.79	Manuf. coke & ref. petroleum	-0.33	-19.29	Other personal service activities	-0.06	-0.46	Warehousing and support activities for transportation	-0.07	-0.09
Manuf. food	-0.28	2.94	Manuf. other transport equipment	-0.29	18.24	Wholesale and retail trade of motor vehicles	-0.05	0.38	Accommodation	-0.06	-0.09
Electricity, gas, steam and air conditioning	-0.23	-10.72	Postal and courier activities	-0.28	2.56	Telecommunications	-0.05	-0.08	Land transport	-0.03	0.05
Accommodation	-0.20	17.11	Other personal service activities	-0.27	-10.49	Human health activities	-0.04	-0.14	Forestry	-0.03	-0.02
Food and beverage service activities	-0.15	23.89	Computer programming	-0.24	-7.83	Financial service activities	-0.03	0.07	Other manufacturing	-0.03	-2.99
Rental and leasing activities	-0.15	5.56	Security and investigation activities	-0.23	5.02	Rental and leasing activities	-0.03	0.98	Wholesale and retail trade of motor vehicles	-0.02	-0.04

Warehousing and support activities for transportation	-0.14	-5.41	Construction of buildings	-0.21	-21.51	Sports activities	-0.02	3.41	Manuf. other transport equipment	-0.02	-2.04
Travel agency	-0.14	3.14	Manuf. leather	-0.15	-5.97	Accommodation	-0.02	0.31	Manuf. wood	-0.02	-0.01
Legal and accounting activities	-0.13	3.75	Manuf. electrical equipment	-0.14	-8.92	Education	-0.02	-0.04	Food and beverage service activities	-0.02	-0.17
Printing	-0.11	1.97	Other professional, scientific and technical activities	-0.12	-6.88	Advertising and market research	-0.02	-1.28	Water collection, treatment and supply	-0.01	0.13
Sports activities	-0.10	14.56	Manuf. pharmaceutical	-0.12	-22.23	Security and investigation activities	-0.02	-1.15	Civil engineering	-0.01	0.00
Publishing activities	-0.08	2.23	Architectural and engineering activities	-0.11	-5.09	Manuf. machinery and equipment	-0.02	-0.29	Manuf. furniture	-0.01	0.00
Manuf. fabricated metal products	-0.07	11.69	Services to buildings and landscape activities	-0.11	-13.92	Architectural and engineering activities	-0.01	-0.22	Fishing	-0.01	0.01
Manuf. beverages	-0.06	5.93	Financial service activities	-0.10	53.29	Other professional, scientific and technical activities	-0.01	-0.22	Manuf. wearing apparel	-0.01	-0.05
Manuf. chemicals	-0.05	-3.13	Waste collection	-0.07	-14.66	Manuf. chemicals	-0.01	0.85	Manuf. food	-0.01	0.01
Manuf. computer, electronic and optical	-0.05	4.38	Manuf. rubber and plastic	-0.06	-6.93	Services to buildings and landscape activities	-0.01	0.04	Water transport	-0.01	-0.23
Manuf. other non-metallic mineral pds.	-0.05	9.16	Scientific research and development	-0.06	-1.26	Manuf. coke & ref. petroleum	-0.01	0.00	Sports activities	0.00	-0.08
Manuf. machinery and equipment	-0.05	6.89	Repair of computers	-0.05	-12.12	Information service activities	-0.01	-0.58	Other mining	0.00	-0.48
Forestry	-0.04	19.61	Programming and broadcasting activities	-0.04	0.67	Manuf. wood	-0.01	0.02	Mining support	0.00	0.00
Financial service activities	-0.04	-42.82	Human health activities	-0.04	-13.70	Scientific research and development	-0.01	0.11	Manuf. basic metals	0.00	0.10
Water collection, treatment and supply	-0.04	7.94	Manuf. tobacco	-0.04	21.90	Veterinary activities	-0.01	-0.12	Manuf. other non-metallic mineral pds.	0.00	0.01
Veterinary activities	-0.04	-3.27	Publishing activities	-0.04	-3.83	Office administrative	-0.01	-3.53	Manuf. textiles	0.00	-0.09
Manuf. furniture	-0.03	14.31	Advertising and market research	-0.03	2.41	Programming and broadcasting activities	-0.01	0.01	Services to buildings and landscape activities	0.00	-0.56
Manuf. wood	-0.03	17.11	Manuf. furniture	-0.03	-2.54	Manuf. computer, electronic and optical	-0.01	-0.02	Air transport	0.00	0.14
Fishing	-0.03	16.26	Manuf. machinery and equipment	-0.03	-6.30	Travel agency	-0.01	2.95	Manuf. motor vehicles	0.00	0.01
Manuf. rubber and plastic	-0.03	10.76	Manuf. wood	-0.03	3.98	Manuf. furniture	0.00	0.64	Rental and leasing activities	0.00	-0.11
Water transport	-0.03	20.96	Manuf. wearing apparel	-0.02	-9.37	Waste collection	0.00	-0.45	Sewerage	0.00	0.00
Manuf. paper	-0.03	1.98	Extraction of petroleum and gas	-0.01	-32.55	Repair of computers	0.00	-4.22	Social work activities without accommodation	0.00	0.03
Programming and broadcasting activities	-0.03	3.98	Manuf. chemicals	-0.01	11.50	Residential care activities	0.00	-1.72	Printing	0.00	-0.01
Other mining	-0.03	1.71	Public administration	-0.01	44.44	Manuf. textiles	0.00	0.06	Manuf. paper	0.00	0.01
Manuf. other transport equipment	-0.03	2.47	Sewerage	-0.01	41.49	Public administration	0.00	0.42	Repair of machinery and equipment	0.00	-0.11
Office administrative	-0.02	-3.25	Social work activities without accommodation	-0.01	14.35	Publishing activities	0.00	1.01	Libraries, archives, museums	0.00	0.00

Sewerage	-0.02	-28.84	Libraries, archives, museums	-0.01	-223.36	Activities of membership organisations	0.00	0.00	Insurance, re-insurance and pension funding	0.00	0.00
Services to buildings and landscape activities	-0.02	7.43	Creative, arts and entertainment activities	-0.01	24.88	Extraction of petroleum and gas	0.00	0.00	Creative, arts and entertainment activities	0.00	0.00
Motion picture, video and television programme production	-0.02	-2.90	Remediation activities	-0.01	-12.06	Manuf. tobacco	0.00	0.00	Construction of buildings	0.00	-0.12
Manuf. leather	-0.02	3.29	Manuf. textiles	-0.01	-5.82	Activities of head offices	0.00	-5.07	Activities of membership organisations	0.00	0.00
Manuf. motor vehicles	-0.02	-1.92	Veterinary activities	-0.01	13.66	Creative, arts and entertainment activities	0.00	-30.33	Extraction of petroleum and gas	0.00	0.00
Other manufacturing	-0.01	11.67	Activities of membership organisations	-0.01	-348.66	Libraries, archives, museums	0.00	-0.03	Manuf. rubber and plastic	0.00	0.00
Security and investigation activities	-0.01	-5.13	Air transport	-0.01	-6.04	Insurance, re-insurance and pension funding	0.00	-4.87	Manuf. chemicals	0.00	-0.03
Manuf. electrical equipment	-0.01	10.81	Land transport	0.00	-9.56	Other manufacturing	0.00	1.01	Activities auxiliary to financial services	0.00	0.00
Manuf. basic metals	-0.01	6.58	Insurance, re-insurance and pension funding	0.00	45.79	Social work activities without accommodation	0.00	0.64	Office administrative	0.00	0.05
Architectural and engineering activities	-0.01	3.63	Manuf. fabricated metal products	0.00	-3.49	Manuf. pharmaceutical	0.00	0.01	Manuf. tobacco	0.00	0.00
Civil engineering	-0.01	14.00	Fishing	0.00	-43.49	Motion picture, video and television programme production	0.00	-3.92	Manuf. leather	0.00	0.00
Manuf. pharmaceutical	-0.01	5.55	Manuf. computer, electronic and optical	0.01	-2.25	Fishing	0.00	23.92	Gambling and betting activities	0.00	0.19
Extraction of petroleum and gas	0.00	-45.55	Manuf. paper	0.01	18.45	Sewerage	0.00	-0.44	Motion picture, video and television programme production	0.00	0.04
Manuf. tobacco	0.00	-46.36	Printing	0.01	-0.14	Manuf. motor vehicles	0.00	0.07	Public administration	0.00	0.00
Postal and courier activities	0.00	-7.13	Mining support	0.01	18.52	Air transport	0.00	0.29	Travel agency	0.00	-0.36
Mining support	0.00	-11.92	Residential care activities	0.01	8.46	Manuf. beverages	0.00	0.03	Remediation activities	0.00	-0.16
Manuf. coke & ref. petroleum	0.00	28.26	Manuf. beverages	0.01	-7.85	Manuf. electrical equipment	0.00	0.32	Manuf. beverages	0.00	0.00
Residential care activities	0.00	-4.97	Manuf. other non-metallic mineral pds.	0.02	-6.28	Other mining	0.00	-0.07	Manuf. electrical equipment	0.00	-0.36
Public administration	0.00	-9.16	Other manufacturing	0.02	1.12	Activities auxiliary to financial services	0.00	2.60	Manuf. machinery and equipment	0.00	0.00
Insurance, re-insurance and pension funding	0.00	-18.95	Motion picture, video and television programme production	0.02	29.07	Manuf. paper	0.01	0.69	Specialised construction activities	0.01	0.00
Manuf. textiles	0.01	18.34	Water transport	0.03	-32.62	Remediation activities	0.01	4.96	Veterinary activities	0.01	0.01
Activities of membership organisations	0.01	-6.70	Education	0.03	-5.04	Printing	0.01	-0.09	Postal and courier activities	0.01	0.00
Telecommunications	0.01	2.66	Activities auxiliary to financial services	0.03	-96.36	Manuf. rubber and plastic	0.01	0.30	Manuf. pharmaceutical	0.01	0.00
Air transport	0.01	46.12	Other mining	0.04	-0.68	Manuf. food	0.01	-0.22	Information service activities	0.01	0.02
Creative, arts and entertainment activities	0.01	15.40	Office administrative	0.04	-9.01	Mining support	0.01	0.00	Residential care activities	0.01	0.00

Libraries, archives, museums	0.01	128.57	Manuf. motor vehicles	0.04	-7.34	Specialised construction activities	0.01	1.47	Other professional, scientific and technical activities	0.01	-0.06
Remediation activities	0.01	19.11	Information service activities	0.05	31.85	Postal and courier activities	0.01	0.40	Manuf. computer, electronic and optical	0.01	-0.02
Manuf. wearing apparel	0.01	18.90	Sports activities	0.06	36.66	Manuf. other non-metallic mineral pds.	0.01	0.02	Manuf. fabricated metal products	0.01	0.03
Social work activities without accommodation	0.02	26.06	Manuf. basic metals	0.06	-8.50	Manuf. basic metals	0.01	-0.10	Waste collection	0.01	0.00
Gambling and betting activities	0.02	41.16	Repair of machinery and equipment	0.13	7.05	Manuf. leather	0.01	-0.02	Publishing activities	0.01	0.10
Activities auxiliary to financial services	0.02	10.58	Travel agency	0.14	-16.00	Water transport	0.01	0.96	Programming and broadcasting activities	0.01	0.01
Information service activities	0.03	3.13	Rental and leasing activities	0.14	-1.44	Repair of machinery and equipment	0.04	10.27	Other personal service activities	0.01	-0.14
Scientific research and development	0.03	18.94	Water collection, treatment and supply	0.15	-2.27	Manuf. wearing apparel	0.04	1.00	Repair of computers	0.01	0.03
Repair of machinery and equipment	0.04	10.35	Gambling and betting activities	0.16	-9.60	Manuf. fabricated metal products	0.04	0.14	Scientific research and development	0.01	0.00
Waste collection	0.04	17.27	Forestry	0.17	6.68	Land transport	0.04	-0.31	Education	0.02	-0.02
Education	0.05	1.03	Accommodation	0.23	-2.36	Forestry	0.04	0.11	Activities of head offices	0.02	0.11
Employment activities	0.07	44.90	Food and beverage service activities	0.29	-21.28	Construction of buildings	0.04	0.65	Advertising and market research	0.02	0.09
Repair of computers	0.07	14.11	Legal and accounting activities	0.44	-4.27	Civil engineering	0.04	0.42	Manuf. coke & ref. petroleum	0.02	0.00
Construction of buildings	0.15	19.34	Wholesale and retail trade of motor vehicles	0.46	5.50	Manuf. other transport equipment	0.05	2.40	Financial service activities	0.03	-0.01
Advertising and market research	0.16	2.50	Wholesale trade	0.48	0.22	Computer programming	0.05	1.83	Human health activities	0.03	0.00
Human health activities	0.19	-0.80	Electricity, gas, steam and air conditioning	0.50	45.95	Animal production	0.11	0.97	Security and investigation activities	0.04	0.00
Other professional, scientific and technical activities	0.20	10.85	Warehousing and support activities for transportation	0.53	3.12	Wholesale trade	0.14	0.44	Computer programming	0.04	0.01
Specialised construction activities	0.40	20.56	Animal production	0.67	6.02	Real estate activities	0.16	2.64	Employment activities	0.06	0.30
Other personal service activities	0.42	17.99	Employment activities	1.12	34.26	Retail trade	0.16	0.28	Telecommunications	0.06	0.00
Computer programming	0.66	11.20	Real estate activities	1.34	17.87	Electricity, gas, steam and air conditioning	0.18	0.81	Legal and accounting activities	0.06	0.01
Activities of head offices	0.94	21.88	Retail trade	1.94	14.98	Warehousing and support activities for transportation	0.29	1.20	Architectural and engineering activities	0.09	-0.01
All Sectors	14.81		All Sectors	2.42		All Sectors	-2.12		All Sectors	0.43	

Note 1: Sectors partial effects are calculated as the difference between the TFP using all sectors and TFP excluding the respective sector. Sectors are weighted by employment share.

Note 2: Sector decomposition is calculated as the aggregation of firms' contribution components to overall TFP by sector.

Source: Staff elaboration based on FINA data

Table 9.3: Outlier companies, by sector

Company name	Sector
Pleter Services LLC	Accommodation and food service activities
Valamar Riviera JSC For Tourism	Accommodation and food service activities
National Park Plitvice Lakes	Activities of botanical and zoological gardens and natural reserves
AKD Pprotection LLC	Administrative and support service activities
Belje JSC	Agriculture, forestry and fishing
Croatian Forests Llc	Agriculture, forestry and fishing
Croatian Lottery Llc	Arts, entertainment and recreation
Croatian Freeways Company Llc	Construction
Dalekovod JSC	Construction
Sister Company of Croatian Freeways Company LLC	Construction
Croatian Electric Company - Distribution Operator LLC	Electricity, gas, steam and air conditioning supply
Croatian Electric Company - Production LLC	Electricity, gas, steam and air conditioning supply
Hops LLC	Electricity, gas, steam and air conditioning supply
Croatian Radio Television	Information and communication
Croatian Telecom JSC	Information and communication
3.May Shipbuilding Part of Uljanik Group JSC	Manufacturing
AD Plastic JSC	Manufacturing
Astom Croatia LLC	Manufacturing
Belupo Medicines and Cosmetics JSC	Manufacturing
Brodosplit Shipbuilding LLC Part of DIV Group	Manufacturing
Electro Contact JSC Manufacturer of Components for Household Appliances	Manufacturing
Factory for Railway Vehicles Gredelj	Manufacturing
INA Oil Industry JSC	Manufacturing
Jamnica Mineral Water Production JSC	Manufacturing
Ledo Jsc	Manufacturing
Mill and Bakeries LLC	Manufacturing
Part of INA Group JSC	Manufacturing
Petrokemija JSC	Manufacturing
Podravka Food Industry JSC	Manufacturing
SPACVA Wood Industry JSC	Manufacturing
TVIN Wood Industry LLC	Manufacturing
Uljanik Shipbulding JSC	Manufacturing
Varteks Varazdin Textile Industry JSC	Manufacturing
CRSCO Drilling Services LLC	Mining and quarrying
STSI - Integrated Technical Services, Ltd.	Mining and quarrying
Zagreb Holding LLC	Real estate activities
Croatian Airlines JSC	Transportation and storage

Croatian Postal Company JSC	Transportation and storage
Croatian Railways Cargo Company LLC	Transportation and storage
Croatian Railways Infrastructure Company LLC	Transportation and storage
Croatian Railways Train Pulling Company	Transportation and storage
Jadrolinija - Croatian Liner Shipping Company LLC	Transportation and storage
Port of Rijeka JSC	Transportation and storage
Railway Constructions LLC	Transportation and storage
Zagreb Airport LLC	Transportation and storage
Water Supply and Drainage JSC	Water supply; sewerage, waste management and remediation activities
Inovine JSC	Wholesale and retail trade; repair of motor vehicles and motorcycles
Konzum JSC	Wholesale and retail trade; repair of motor vehicles and motorcycles
Pevec JSC	Wholesale and retail trade; repair of motor vehicles and motorcycles
Puljanka JSC	Wholesale and retail trade; repair of motor vehicles and motorcycles
Tisak JSC	Wholesale and retail trade; repair of motor vehicles and motorcycles

Note: Outliers firms that fall outside a 3 standard deviation range from the TFP aggregate average

Source: Staff elaboration based on FINA data

Box 9.1 : Business-Environment Distortions and Firm-level Productivity: Global Evidence – Paper methodology on TFPR estimation

The lack of empirical evidence on the HK assumptions has led Economists to the debate about what exactly TFPR dispersion captures. For example, De Loecker et al. (2014) shows that TFPR dispersion can be explained by adjustments costs in capital coupled with volatility in sales, which are very common features of developing countries. Two recent papers by David and Venkateswaran (2017) and David et al. (2018) show that half of dispersion in the average product of capital is related to markup and technological differences, while the rest is unexplained and potentially driven by economic distortions.

Correa, Cusolito and Pena (2018) estimate the production function in a two stage model following the method De Loecker (2013) developed to explore learning by exporting effects but instead of looking into exporting effects only, they focused on the effects of policy variables that shape the business environment in which firms operate. The method endogenizes the productivity process because an exogenous productivity process, as it is often assumed in the control function approach.

First step:

For the sake of simplicity, they assume a Cobb-Douglas production function, where the inputs are labor, capital, and materials. After log-linearizing the PF, they get the following expression:

$$y_{it} = b_L l_{it} + b_K k_{it} + b_M m_{it} + \omega_{it} + e_{it}$$

Where y_{it} , l_{it} , k_{it} and m_{it} refer to (deflated) revenue, labor, capital stock, and materials, ω_{it} stands for firm level productivity and e_{it} is an i.i.d error term capturing unanticipated shocks to production and measurement error. Since productivity is unobservable, the paper follow Akerberg, Caves, and Frazer (ACF) (2015) and use materials to make it observable and estimate the equation by ordinary least squares (OLS).

Second step:

The standard proxy estimator approach (OP, LP, ACF) crucially relies on an exogenous (first-order) Markov process for productivity, where productivity at time $t + 1$ consists of expected productivity given a firm's information set and a productivity shock ξ_{it+1} . This law of motions plays a critical role in the proxy estimator approach and guides the identification of the production function coefficients. The paper extends the standard approach and consider a general model in which policy variables shaping the business environment in which firms operate are allowed to impact future productivity as given.

$$W_{it} = g_0(W_{it-1}) + \sum_{k=1}^K \hat{\alpha}_k g_k(x_{k,it-1}, W_{it-1}) + Z_{it}g + X_{it}$$

The approach has the advantage that it is flexible enough to allow the marginal effects to be heterogeneous across producers given their TFPR level, which makes a substantial contribution to the policy debate on heterogeneity of policy treatment at the firm-level.

Source: Correa, Cusolito and Pena (2018)

Box 9.2 : HAMAG-BICRO Guarantee Schemes

HAMAG-BICRO operates 3 budget-funded guarantee programs adjusted to enterprise maturity and harmonized with the offer of commercial banks and HBOR. These are as follows:

- (i) The beginner's program, which targets SMEs which have been operating less than 5 years, with a maximum guarantee rate of 80 percent and a maximum guarantee amount of HRK 10 million for investments, working capital, leasing and innovations;
- (ii) The growth program, which targets SMEs which have been operating for more than 5 years, with a maximum guarantee rate of 80 percent and a maximum guarantee amount of HRK 18 million for investments, working capital, leasing, innovations (a guarantee rate up to 70 percent) and performance guarantees; and
- (iii) The farmers program with a maximum guarantee rate of 50 percent (for young farmers up to 80 percent) and a maximum guarantee amount of HRK 10 million for investments and working capital. These are being phased out with EU-funded sources.

A large part of HAMAG BICRO's guarantee portfolio includes EU-funded programs through allocations from both regional and rural development sources.

- **ESIF Individual Guarantees.** This instrument, targeting SMEs and newly established companies, has been designed based on previous experience with national schemes. The novelty is interest rate subsidies for identified industries (tourism, manufacturing). There are two measures: (i) Measure A – ESIF guarantees for investment loans (with the possibility of an interest subsidy) with a guarantee rate up to 80 percent, a minimum guarantee amount of EUR 150,000, and a maximum guarantee amount of EUR 2 million; (ii) Measure B – ESIF guarantees for working capital loans with guarantee rates up to 80 percent, a minimum guarantee amount of EUR 150,000, and a maximum guarantee amount of EUR 1 million.
- **ESIF First Loss Portfolio (FLP) Guarantee.** The goal of FLP guarantees is to encourage financial institutions to finance companies that have the biggest effect on the growth and development of the Croatian economy, and they have been set as a priority. The guarantee enables SMEs to have better access to financing: reduced collateral requirements, reduced loan interest rates (because of the lower risk profile), potentially longer grace periods, and deferred payment. The instrument covers the first loss of a portfolio of new loans on a loan-by-loan basis, covering up to 25 percent of the guarantee cap rate and 80 percent of the guarantee rate. The maximum amount of each guarantee in the portfolio is capped at EUR 150,000. The FLP guarantee provides credit risk coverage on a loan-by-loan basis for the creation of a portfolio of new loans targeting the final beneficiaries up to the maximum guarantee cap rate. Given that this scheme covers the first loss of the portfolio up to 80 percent, the risk exposure of the financial institutions is considerably reduced and should increase their willingness to provide loans to the targeted final beneficiaries.
- **European Agricultural Fund for Rural Development (EAFRD) Guarantees.** This guarantee instrument funded by the EAFRD has been designed as an individual guarantee, and the scheme should replace the current HAMAG-BICRO guarantee product for farmers. The maximum guarantee rate is 70 percent and covers only investment loans that can include up to 30 percent or EUR 200,000 of working capital. Young farmers and milk producers could get up to 80 percent of the guarantee.

HAMAG-BICRO also has 3 ESIF loan programs for regional development: micro investment loans, small investment loans and micro working capital loans. ESIF loan programs are aimed at providing easier access to loan funds for SMEs. ESIF loans are financial instruments designed for SMEs, including start-up companies and private individuals that aim to establish and run a business. Loans are granted to micro, small and medium entrepreneurs, i.e. small business subjects, in compliance with the SME Development Promotion Act. No approval fees are charged for ESIF loans.

- **ESIF Micro Investment Loans.** These are micro investment loans with a maximum amount of EUR 25,000 and an interest rate from 0.5 to 1.5 percent, depending on the county of investment (less developed counties get 0.5 percent). The grace period if repayment is more than 2 years is up to 12 months, and the total repayment period is up to 5 years.
- **ESIF Micro Working Capital Loans.** Micro working capital loans are for a maximum amount of EUR 25,000 and have an interest rate from 1.5 to 3.5 percent, depending on the development of the county of investment

(less developed counties get 1.5 percent). The grace period if repayment is more than 2 years is up to 6 months, and the total repayment period is up to 3 years.

- **ESIF Small Investment Loans.** Small investment loans are from EUR 25,000 to a maximum of EUR 50,000 and have an interest rate from 0.5 percent to 1.5 percent, depending on the county of investment (less developed counties get 0.5 percent). The grace period if repayment is more than 2 years is up to 12 months, and the total repayment period is up to 10 years.

Source: Staff Elaboration

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