

GRANT AGREEMENT
NUMBER — 692191 — SmartEIZ

Horizon 2020 Twinning project 'SmartEIZ'

**Strengthening scientific and research capacity of the Institute of Economics,
Zagreb as a cornerstone for Croatian socioeconomic growth through the
implementation of Smart specialization strategy**

Policy Brief

*Productivity of enterprises and the intensity of market forces: How does the
market function in Croatia?*

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**GRANT AGREEMENT
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List of key messages

- Labour productivity (LP) was stable in pre-crisis period before plummeting in 2009 after which is constantly lower by about 20 percent compared to pre-crisis figures
- Large enterprises and/or exporters recorded highest growth of LP, TFP and also capital productivity (CP), with the latter measure displaying the greatest volatility
- Private enterprises are characterized by most dynamic change in unit labor cost (ULC) and CP while state-owned enterprises (SOEs) are quite rigid in this regard
- There are no significant differences among different Croatian regions or sectors in these productivity metrics
- Croatian economy is characterized by less intense market dynamism that cannot adequately contribute to increased innovation and faster growth, both of the corporate sector and the overall economy
- Market dynamism (measured by market entry and exit) is the highest for the enterprises focused solely on domestic production and sales
- TFP change in whole economy was very turbulent with negative trend in crisis period (2009-2015), but this returned to pre-crisis growth rate in 2016
- Throughout the analysis, positive contribution of net entry to the overall TFP change was sufficient enough to offset the decline in the TFP of the enterprises remaining on the market

1. Introduction

The importance of productivity and technology is at the very root of SmartEIZ project. At the first project meeting it was decided that, apart from topics more focused on policy issues, emphasis will also be placed on topics that are slightly more theoretically oriented. As indicated in *D2.4 Twinning strategy for EIZ*¹ (henceforth: Strategy) productivity analysis plays a key role in SmartEIZ project. As already mentioned in the Strategy Iovty et al. (2014) investigated productivity in Croatia on a sample of 1,400 national firms and recorded persistent (and increasing) heterogeneity in the performance of Croatian firms along different outcome measures. Their results also suggest lower market dynamism (measured using market entry and exit rates) and a negative contribution of overall productivity growth of net market entry. Our study builds to that research, enhancing it in two distinctive ways. Our research is based on a population of Croatian companies so it doesn't suffer from small sample bias and we also based our analysis on a panel dataset.

As outlined in *D3.1 A list of best practices, approaches and methods in management of innovation and technology transfer*² (henceforth: Best practices), productivity analysis is identified as one of the eight selected topics in EMIT that form basis and focal points of SmartEIZ. This theme provides the basis for application of other topics in the field of EMIT, the main area within which training activities of SmartEIZ are carried out.

The basic logic is that productivity growth leads to increased revenue for enterprises and organizations. Since such growth is often associated with technological progress, benefits are in most cases collected by those organizations and individuals with specific skills. In turn, as was recently observed, this leads to a shift in income towards those possessing these specific skills. Growth in productivity should also act as driver of innovation, but also on better performance within the innovation system as a whole. However, changes in productivity cannot be linearly mapped to innovation at micro and / or macro level. Likewise, productivity growth has its impact on both foreign direct investment and global value chains which describe the internationalization of innovation activities, and on topics related to openness and globalization.

The rest of this brief is structured as follows. The remainder of this chapter gives an overview of economy development in Croatia from 2001 onwards and presents the aims of the research. Chapter 2 briefly outlines methodology used in data analysis. The following chapter presents and analyses obtained results. Finally, chapter 4 concludes this research.

The Croatian economy has undergone numerous changes over the past twenty years. Post-war reconstruction, introduction of value added tax in 1998, investment promotion law in 2000, period of respectable growth and catching up with the European Union (2003-2008), a five year period of profound and persistent recession (2008 – 2013) and formal accession to the European Union in 2013 are just some of the determinates of Croatia in the mentioned period. In the 2001 -

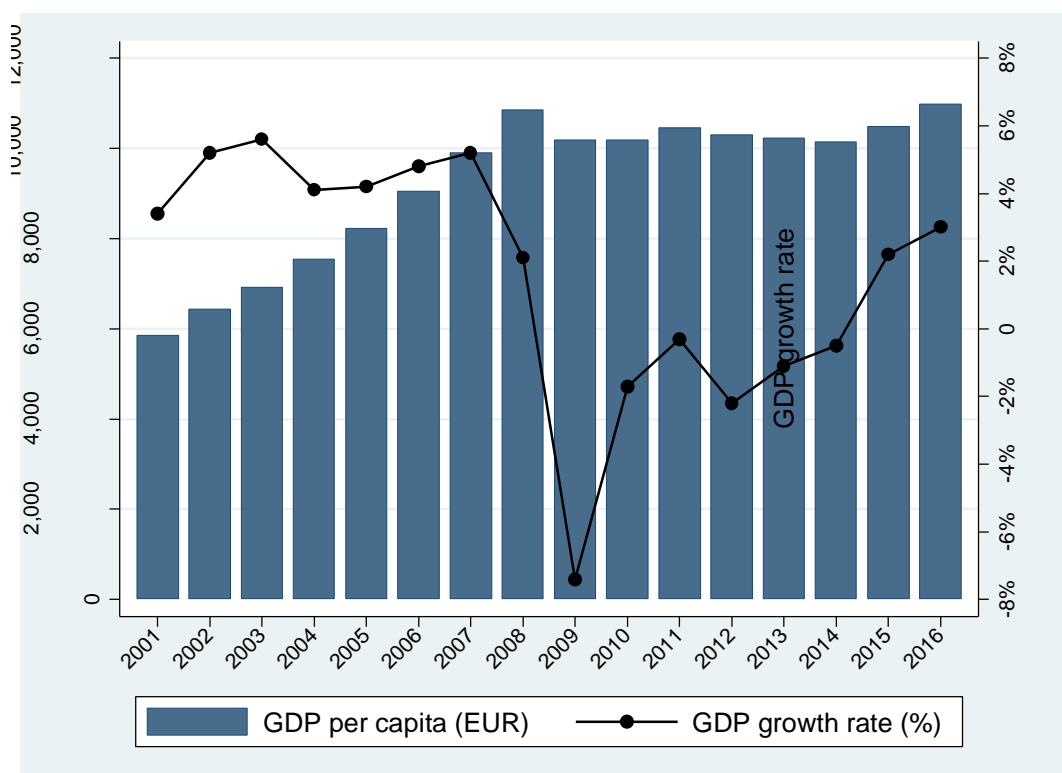
¹ Available at <http://www.smarteliz.eu/system/wp-content/uploads/2016/12/D2.4- Twinning-strategy.pdf>

² Available at <http://www.smarteliz.eu/system/wp-content/uploads/2017/03/D3.1 A-list-of-best-practices.pdf>

**GRANT AGREEMENT
NUMBER — 692191 — SmartEIZ**

2016 period, GDP per capita recorded an upward trend and peaked in 2008, after which it sharply fell and stabilized just above 10,000 EUR per capita, only to see it increase from 2015 onwards with improved economic outlook (Figure 1). GDP growth rate tells similar story – it recorded a constant growth between 3 and 5 percent by 2008, then it plummeted in 2009 which was followed by sluggish recovery until 2015 when this rate again reached positive values, but still not at its pre-crisis levels.

Figure 1. GDP per capita and GDP growth rate in Croatia



Source: Croatian Bureau of Statistics

Investigating the reactions of enterprises and market forces in the context of the described changes is the key for understanding the mechanisms and relationships that govern the economy as well as for underpinning factors halting growth and development. The availability of micro data of Croatian companies in the period from 1996 to 2016 provides for the first time a comprehensive analysis of productivity changes in Croatian enterprises over a period of twenty years. Previous attempts of conducting similar analyses in Croatia were limited by focusing only on certain industry (Družić, 2016) or the limitations inherent to all sample-based research (Iootty et al., 2014). Compared to the existing literature in Croatia, this paper offers (i) a comprehensive approach to analysis by taking into account all industries; and (ii) analysis of the entire population enterprises in Croatia in the observed period, thus avoiding the inherent problems sample analyses.

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**GRANT AGREEMENT
NUMBER — 692191 — SmartEIZ**

The aim of the research was to establish company performance indicators (labor productivity, capital productivity, unit labor cost and total factor productivity), explore the dynamics of entry and exit of companies from the market and determine how market forces affect the. This is the first study of this type that covered a population of Croatian companies and analysed the aforementioned indicators over a longer time period from 2003 to 2016. The characteristics of the companies under which the analysis was carried out included the region, the size of the company, the ownership structure, the international orientation and the branch of the economy.

2. Brief Methodology

The analysis was carried out on the population of Croatian companies from 2003 to 2016, provided by Croatian Financial Agency (FINA), on enterprises from both private and public sector. Panel dataset structure allowed for division of enterprises into three categories based on the their status on the market: i) enterprises that were active in year t and year $t + 1$ were marked as "Survivors"; ii) enterprises that were active in the year t but not in year $t + 1$ were marked as "Exit"; and iii) the enterprise which were active in year t but not in year $t - 1$ were marked as "Entry". The size of the enterprise was based on the number of employees: i) micro enterprises (1-9 workers); ii) small enterprises (10-49 employees); iii) medium-sized enterprises (50-249 workers); and (iv) large enterprises (250 or more workers). Ownership categories were based on FINA's coding, as shown in Table 1. The analysis covered all Croatian counties which, due to certain degree of homogeneity among them, were sorted into five regions according to Gelo and Gelo (2012) (Table 2). Industry sectors were divided using AMECO definitions, based on NACE Rev. 2 2-digit industries (Table 3). Finally, international exposure category was based on the enterprises information on the value of exports and imports: i) only importers; ii) only exporters; (iii) importers and exporters; and (iv) neither importers nor exporters. All monetary values are expressed in Croatian kuna (HRK) and deflated using deflators for each NACE Rev. 2 2-digit industry and 2010 as a base.

Four main firm performance indicators were estimated: labor productivity, capital productivity, unit labor cost and total factor productivity (TFP).

$$\text{Labour productivity} = \frac{\text{Real valued added (at factor cost)}}{\text{(average) number of (full time) employees}}$$

$$\text{Capital productivity} = \frac{\text{Real valued added (at factor cost)}}{\text{Real stock of capital}}$$

$$\text{Unit labour cost} = \frac{\text{Cost of personel}}{\text{Real valued added (at factor cost)}}$$

TFP was defined as the Solow residual of the production function and is estimated using the methodology of Levinsohn and Petrin (2003). A production function with output as the dependent variable, and capital, labor, and material costs as input variables was used. Specifically, output was

**GRANT AGREEMENT
NUMBER — 692191 — SmartEIZ**

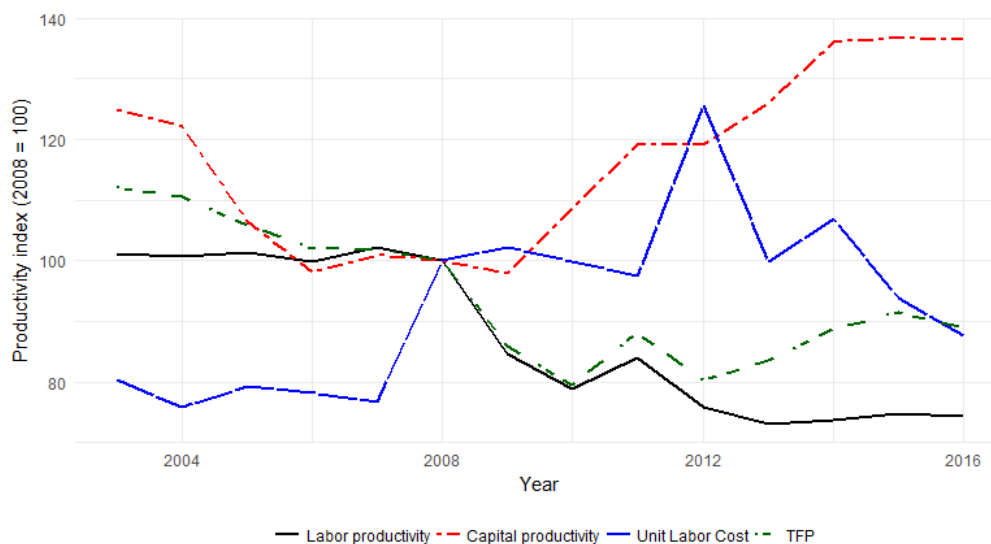
proxied by real value added at factor cost; labor by (average) number of full-time employees; material inputs by real material costs; and capital by real stock of tangible fixed assets. To control for differences in production technologies across sectors, the TFP analysis estimates heterogeneous sector-specific (2-digit) production functions. Unless stated otherwise, all Tables and Figures are based on FINA data and our analysis.

3. Results and Analysis

3.1. Performance indicator comparison

Labor productivity in the pre-crisis period (2003-2008) remained relatively stable reflecting favourable economic conditions, before it plummeted in 2009 with the arrival of financial crisis (Figure 2). Ever since then it is constantly lower by about 20 percent compared to 2008. Capital productivity was decreasing in the pre-crisis period, only to rebound in recession and post-recession period (2014-2016). Total factor productivity followed a similar trend to labor productivity, but with smaller drop since the onset of crisis and positive signs of recovery from 2015, which goes hand-in-hand with recovery of the whole economy.

Figure 2. Performance indicators by years

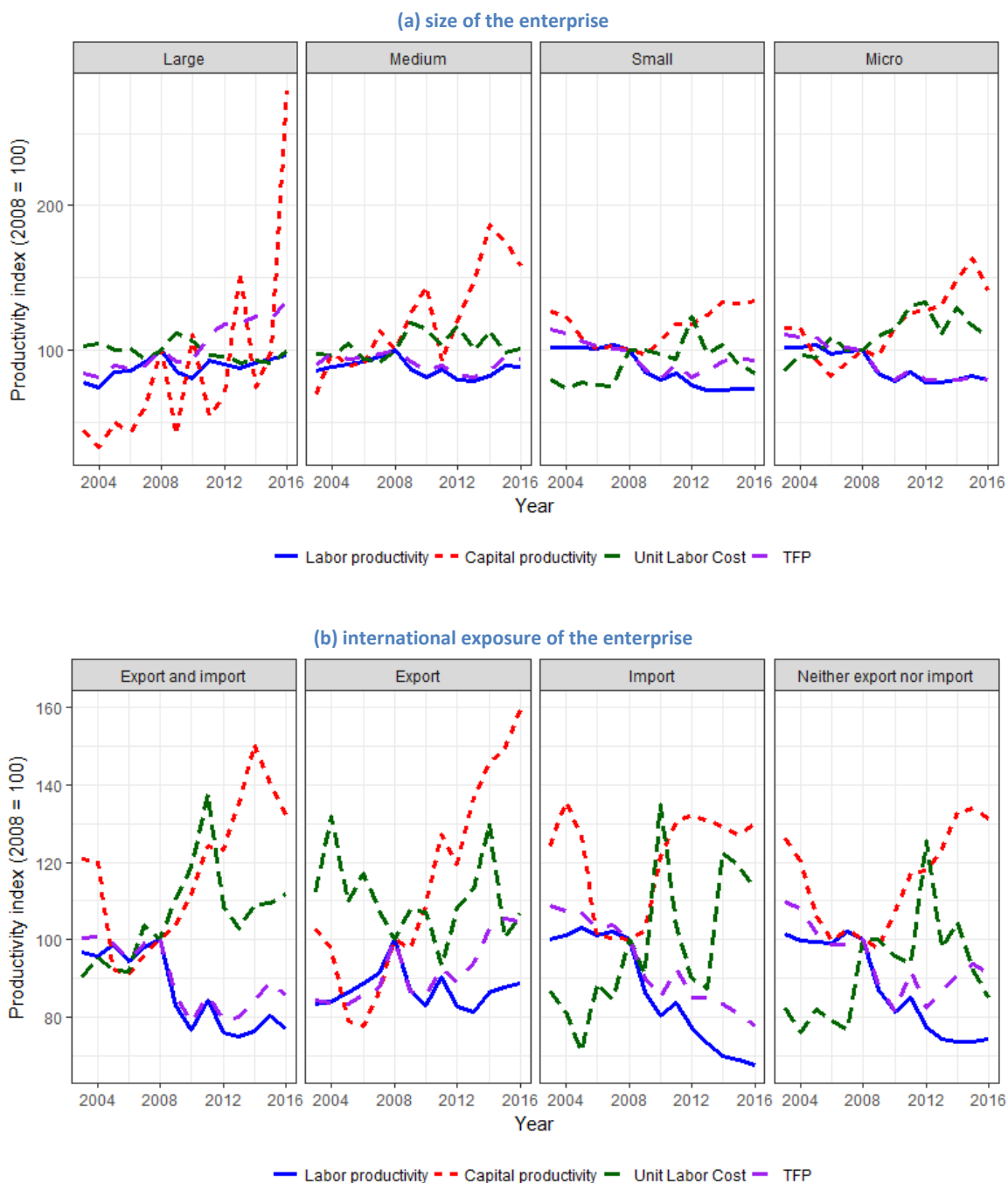


Disaggregating these changes by firm characteristics, TFP and labor productivity increased only in large enterprises, while other enterprises continue to experience a drop in these indicators (Figure 3a). The results also point to the same trend of TFP and labor productivity increase of exporters compared to other categories of international exposure (Figure 3b). The biggest drop in these two indicators is observed in import-only enterprises or the ones operating exclusively on the domestic

**GRANT AGREEMENT
NUMBER — 692191 — SmartEIZ**

market. Analysis carried for different sectors and regions did not show any noticeable difference among these indicators. This in turn suggests that the labor productivity and TFP are much more connected to export orientation and size of the enterprise than they are to the region or sectoral affiliation.

Figure 3. Performance indicators by enterprises characteristics

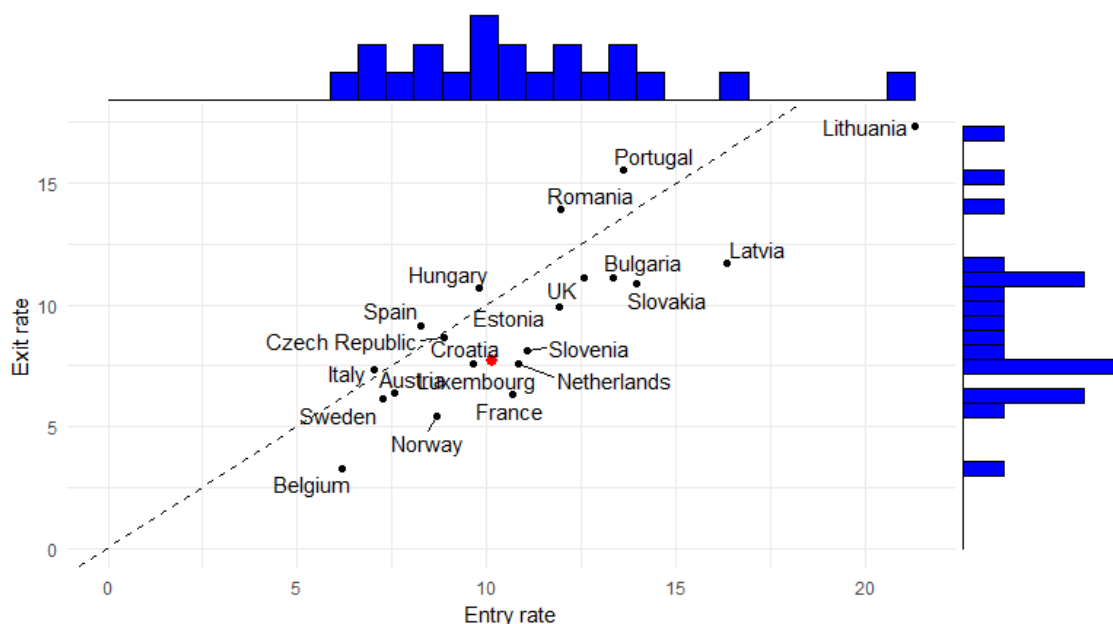


3.2. Analysis of market dynamism (market entry and exit)

The financial crisis that affected Croatia in late 2008 had a significant impact on the entry and exit of enterprises from the market. Since 2006, the entry rate has been steadily declining, suggesting that crisis has undermined the entrepreneurial intentions of Croatian citizens, while the exit rate is steadily rising due to the fact that the crisis has led many businesses to bankruptcy or liquidation.

If we compare market dynamism in Croatia to the other European countries (Figure 4) we see that Croatia is in the company of the richer European countries, such as France, Netherlands and Luxembourg. The 45 degree line is actually zero net change in the rate of entry into the market, i.e. the situation when entry rate is equal to exit rate. Looking at the average rates of entry and exit for 2008-2015 period, the majority of European countries, including Croatia, exhibit positive net entry rate. Negative net entry rate was recorded in Italy, Spain, Portugal, Romania and Portugal. The most rigid market is found in Belgium with a very small entry and exit rates and the most dynamic one is found in Baltic countries (especially Lithuania), Bulgaria and Portugal. Compared to Croatia, almost all new EU members (EU12) have higher degree of market dynamism, enabling quicker market transformation, improved innovativeness and higher growth rates.

Figure 4. Market entry and exit - Croatia and Europe



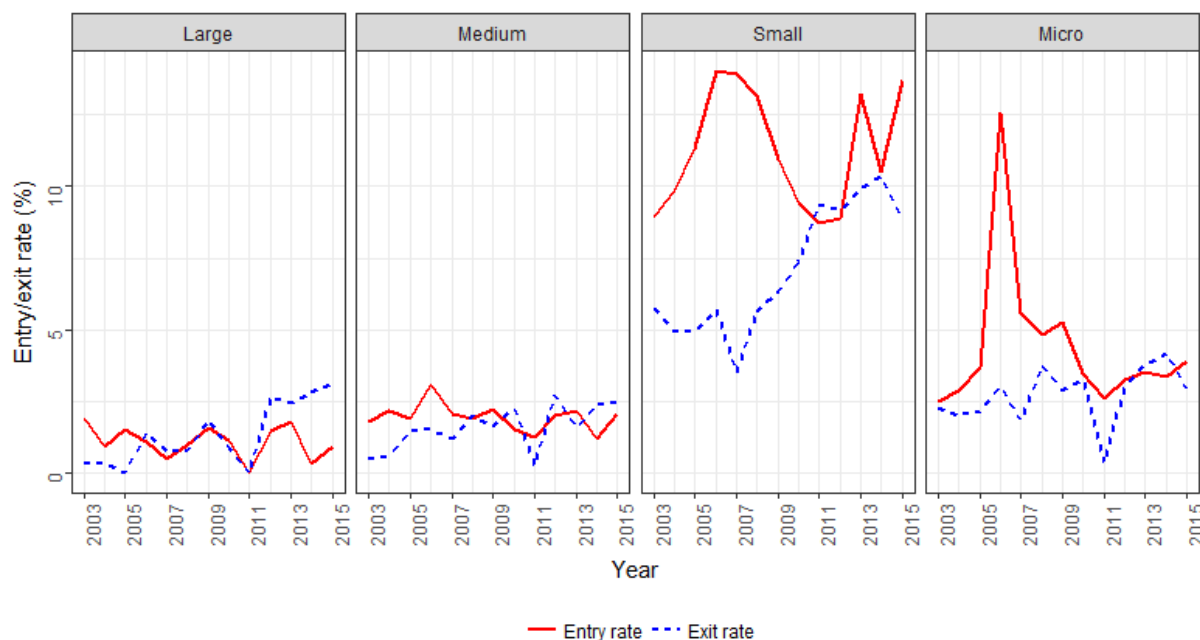
Source: Eurostat

**GRANT AGREEMENT
NUMBER — 692191 — SmartEIZ**

Looking at the size of the enterprise (Figure 5a), it is interesting to note that small enterprises fared much worse in the crisis period (judging from the market exit rate) compared to micro enterprises, but also that micro-sized enterprises suffered a permanent decrease in the entry rate after the crisis, which then contributes most to the overall decline in the rate of entry for the entire economy. It is equally interesting that both entry and exit rates are the highest for enterprises focused solely on domestic production and sales (Figure 5b), which in fact means that the market is most dynamic in the segment of the corporate sector exclusively targeted at the domestic market with no exports or imports. Since these enterprises recorded convincingly highest rate of exit from the market, the inclination of entrepreneurs to limit their business within national borders is clearly not a successful business strategy. The high market dynamism and attractiveness of the corporate segment to focus solely on the domestic market suggests that Croatia is still a relatively closed economy disinclined to internationalization and exposure to foreign competition that comes with it. Market entry rates disaggregated by economy sector suggest that the largest fall in the number of newly founded enterprises after the recession happened in construction sector, which also coincides with the fading of the real-estate price bubble.

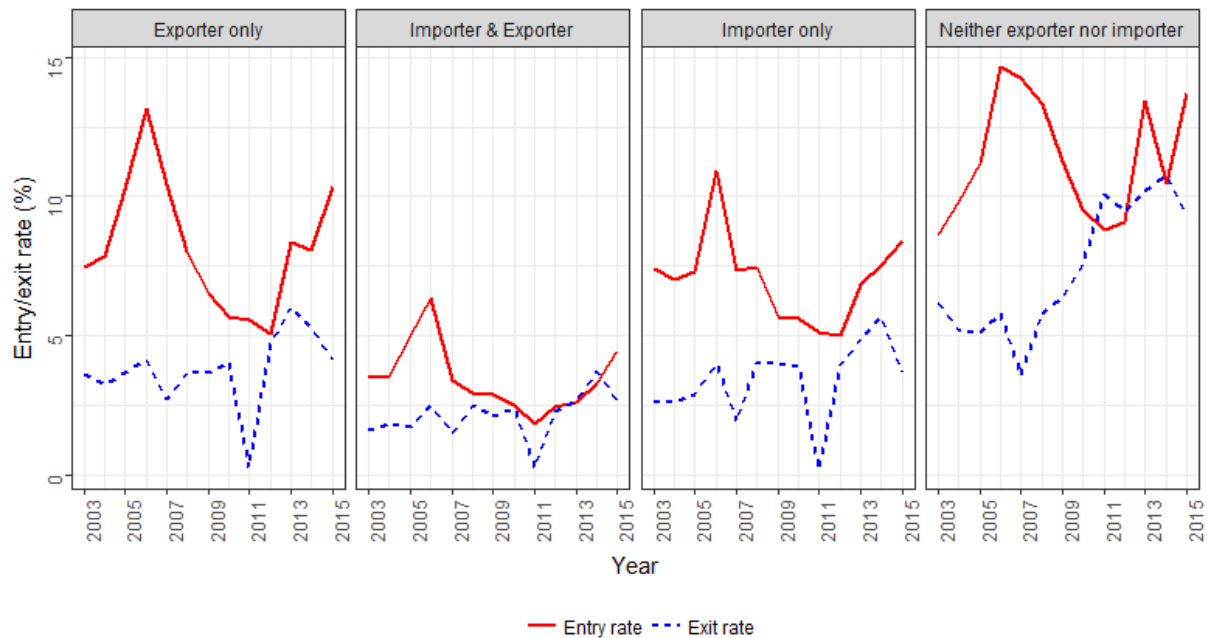
Figure 5. Market entry and exit rates by enterprises characteristics

(a) size of the enterprise



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NUMBER — 692191 — SmartEIZ**

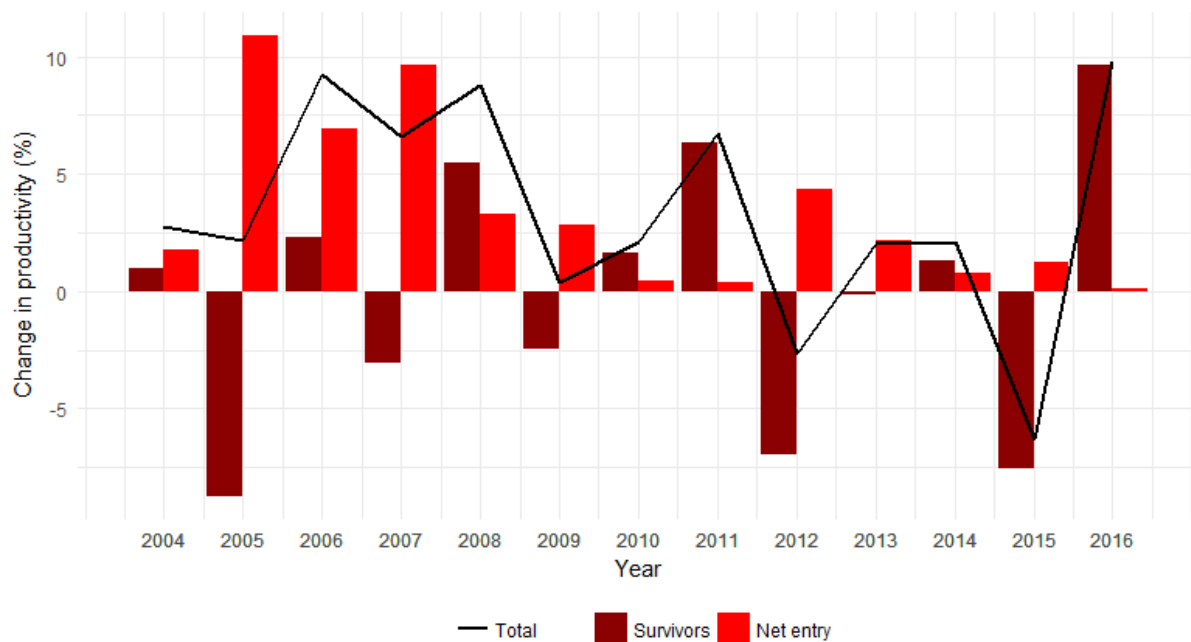
(b) international exposure of the enterprise



3.3. Decomposition of total productivity change

The final part of this research analysed TFP change across the whole economy (Figure 6). The total TFP change between any two years consisted of two components: 1) change in the TFP of enterprises that "survived" on the market; and 2) change in TFP from net entry, where we compared the TFP of enterprises new to the market with those that exited the market.

GRANT AGREEMENT
NUMBER — 692191 — SmartEIZ
Figure 6. Decomposition of TFP change



Overall, there is a negative trend in TFP change during the crisis period (2009-2015) and then sudden recovery in 2016 which saw the TFP change return to its pre-crisis level. However, it should also be emphasized the constant positive contribution of net entry to the overall change in TFP which, in most years, was sufficient enough to offset the decline in the TFP of the enterprises remaining on the market. Intuitively, this means that enterprises entering the market are on average more productive than enterprises leaving the market, suggesting that market forces still work, albeit with reduced intensity.

Analysis by enterprise characteristics reveals that small and micro enterprises recorded the smallest fluctuation in TFP change. In the case of micro enterprises, a positive contribution to the overall change in TFP has been particularly noticeable since the beginning of the recession which did not record any negative rates of growth. Private companies had a great fluctuation in TFP but in the last two years they returned to pre-crisis levels, while TFP recovery was considerably slower in state-owned enterprises. Exporters once again showed resistance to the crisis and noted the smallest fluctuation in TFP change, which was rarely below zero, and they also record the fastest growing rates in 2016. On the other hand, firms focused exclusively on the domestic market recorded a nearly continuous decline in TFP since 2008 with a slight recovery since 2014 onwards. The change in TFP in the industrial sector clearly illustrates the economic situation - it is growing until the crisis, falling during the crisis, and then recovers again as the economy begins to recover, while the service sector recorded the greatest fluctuation of TFP, which seems to have reached the bottom in 2015 and is slowly starting to recover.

4. Conclusion

The weak market dynamism and unfavourable trends in labor productivity and TFP are primarily a consequence of non-implementation of structural reforms. In order to reverse the trends identified by the research, much effort will be needed to improve the business climate, increase the efficiency of the judiciary system, public administration and local government, and modernize the education system and link it to the needs of employers. Without these reforms, negative trends could continue, which means that the rate of potential growth of the Croatian economy will be permanently diminished and insufficient to compensate for the gap in income that currently separates us not only from the old EU member states but also from the largest some of the new member states of the Union. Insufficient labor productivity and TFP growth dampen the innovativeness of the economy and also decrease the attractiveness of the economy for foreign direct investment and participation in global value chains.

Research results suggest that Croatian corporate sector is characterized by mostly negative trends. Average labor productivity and total factor productivity of Croatian companies are thus decreasing over time, mainly due to long-lasting recession, while unit labor costs are increasing over time. Reducing labor productivity and total factor productivity (TFP) suggests that the potential for growth and creation of new value in Croatian enterprises decreases, while at the same time, due to increased unit labor costs, the international cost-competitiveness of the Croatian companies is reduced. The research also suggests that the intensity of market forces measured by entry and exit rates of companies from the market in Croatia is significantly reduced. These rates are more similar to those recorded by a stable and developed European economy, and are significantly less than the rates of entry and exit recorded by the new EU member states whose economies, just like Croatian economy, are still in the process of transformation and catch-up with the more developed European states. Such results suggest that Croatian economy is characterized by less intense market dynamism that cannot adequately contribute to increased innovation and faster growth, both of the corporate sector and the overall economy. Two segments of the corporate sector are, however, different from this trend. Large companies and exporting companies have achieved increase in both labor productivity and TFP over time, while the exporters are also characterized by a downward spiral in unit labor costs, meaning that their cost-competitiveness improves.

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Appendix

Table 1. Definition of ownership category

Ownership	FINA types of ownership
State	Public, communal...
	Conversion process in progress
	Conversion has not started
Private	Private since incorporation
	Private since conversion
Other	Cooperative
	Mixed with more than 50% private capital
	Mixed with more than 50% public capital

Table 2. Definition of Croatian regions

Region	County (NUTS 3)
Central Croatia	City of Zagreb
	Zagreb County
	Karlovac County
	Sisak-Moslavina County
	Bjelovar-Bilogora County
North-western Croatia	Krapina-Zagorje County
	Koprivnica-Križevci County
	Varaždin County
	Međimurje County
East Croatia	Virovitica-Podravina County
	Osijek-Baranja County
	Vukovar-Srijem County
	Brod-Posavina County
	Požega-Slavonia County
North Adriatic and Lika	Istra County
	Primorje-Gorski Kotar County
	Lika-Senj County
Central and South Adriatic	Zadar County
	Šibenik-Knin County
	Split-Dalmatia County
	Dubrovnik-Neretva County

**GRANT AGREEMENT
NUMBER — 692191 — SmartEIZ**

Table 3. Definition of economy sectors

Economy sector	NACE Rev.2 code - 2 digit level
Agriculture, forestry and fishery products	1 - 3
Industry, including energy	5 - 39
Construction	41 - 43
Services	45 - 99