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The Efficiency of EU Public Administration in Helping Firms Grow

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Research assistance:
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Abstract

This study links public sector efficiency to firm growth via several microeconomic channels. The results show that greater public administration efficiency induces higher rates of fast growing firms. Especially corruption and ineffective justice systems were identified as the factors that most impede firms' growth. In addition, public service provision that relies on fees rather than on taxes was associated with higher efficiency.

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The efficiency of EU public administration in helping firms grow

Final Report

Carried out for the European Commission, Directorate-General Enterprise and Industry, within the Framework Service Contract No. ENTR/2009/033

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INTRODUCTION

What are the effects of the quality of public administration (PA) on firm growth? There are currently a number of EU policy initiatives for which answers to this guiding question are relevant. Examples of such initiatives include the Europe 2020 strategy which stresses the importance of an efficient, effective and transparent public administration; the Small Business Act, the Service Directive or the Action Programme for Reducing Administrative Burdens in the European Union. The objective of this report is to empirically shed more light on the guiding question. This report argues that a) from a conceptual perspective, it seems likely that PA is a key driver for firm growth and performance, and that b) the quality of PA is certainly a main lever for policy makers.

With respect to a), firms interact with public administration on many occasions, for instance when entrepreneurs register their business, when firms apply for various type of licenses, when they pay taxes or in case of legal disputes. While obviously, such interactions cannot be avoided, firms nevertheless incur costs from such interactions. Staff needs to spend time on handling various bureaucratic tasks, or firms pay external advisors to carry them out on their behalf, and it takes time until firms learn the outcomes of such interactions causing delays and, at least to some extent, uncertainty. The quality at which PA operates shapes such costs, and may therefore affect both firm performance and growth.

With respect to b), understanding these links from a policy perspective is crucial. On the one hand, PA efficiency, effectiveness and transparency feature prominently in Europe 2020 strategy. The recent (or ongoing) crisis pointed out a significant heterogeneity in the functioning of public administration. Frequently, these problems in public administration coincide with countries (or regions) that underperform economically. On the other hand, improving the quality of public administration is a main lever of governments to promote the business environment. Even in times of fiscal consolidation, taking measures to make public administration more business friendly remains feasible, or may even be desirable as such measures potentially support consolidation efforts.

This report takes a multifaceted and innovative approach to address potential problems that render an empirical investigation of the role of the quality of public administration for firm growth difficult. Any naïve econometric specifications relating firm growth to indicators of the quality of public administration is prone to omitted variable bias, i.e., the omission of a wide range of potentially unobserved factors that are both correlated with public administration quality and firm growth. Such factors are likely to be country-specific and to vary over time which implies that country fixed effects are not sufficient to remove such bias. In Chapter 1, these issues are discussed in greater detail. It is therefore unsurprising that research on the links between public administration and firm performance and growth at the microeconomic level is still in its infancy. For instance, it is unclear how an efficient PA affects competitiveness, let alone firm-growth (Djankov, 2009). Consequently, recommendations for policy reforms often lack supporting empirical evidence or are ambiguous (Rothstein and Teorell, 2008).

The purpose of this study is to model and to analyse empirically the contribution of public administration quality to firms' productivity and growth. The study is structured in three core tasks. Chapter 1 aims at analysing whether the efficiency of public administration impacts on firm growth. Chapter 2 and 3 analyse whether and to what extent public administration contributes to the costs of firms. This report complements the existing literature in two ways.

First, this report analyses the relationship between the quality of public administration and firm growth in three innovative and complimentary ways which provides a methodological contribution to the literature on the link between public administration and firm performance and thereby provides new evidence for policy. Chapter 1 mainly examines empirically the effects of the quality in various dimensions of public administration on the share of high growth firms or employment growth within industries and countries. It solves the econometric issues in a compelling way: it builds on and extends the well-known approach by Rajan and Zingales (1998) which allows controlling for any unobserved country-specific factors that may bias the results.

Rather than estimating the effects on firm growth, Chapter 2 looks at the cost of public administration. In particular, using input-output tables, it compares the costs of public administration as an intermediate input to industries using WIOD which are international input-output tables recently compiled (see Timmer 2012). The advantage of this approach is that it avoids econometric problems altogether by considering the costs of public administration only, and the results shed light on one specific dimension of public administration quality from the perspective of firms, namely on those services which are provided by public administration at a cost rather than free of charge (otherwise they would not be recorded in input-output tables).

Chapter 3 also examines the costs imposed on firms by public administration, but contrary to Chapter 2 it uses business perceptions about the relative costs imposed on firms by inefficiencies in various dimensions of PA. Here, the advantages are that it avoids econometric problems, and that the data are based on firms' subjective

assessment on whether and to what extent public administration represents an obstacle to their operation. As Chapter 3 argues, business perceptions are especially pertinent to this report and eases measurement problems. The analysis is based on firm-level data from the World Bank Enterprise Surveys.

Second, using these methodologies, the report provides new insights for policy. Chapter 4 therefore synthesises the information obtained from these approaches and summarises the relevant policy implications of the empirical findings. Chapter 1 finds that the efficiency of public administration has an impact on the rate of high growth firms and employment growth at the NACE 2-digit industry level. More PA efficiency induces greater rates of fast growing firms, in particular by increasing the firm turnover and net-entry. This holds especially for general indicators of the efficiency of public administration that measure the overall quality of the governance system, including the presence of an independent judiciary and freedom of corruption. The results from the NACE Rev. 2 sample are weaker than the findings from NACE Rev. 1.1, especially for employment growth as an output indicator. It is likely that the economic crisis overshadows the impact of the interaction term.

Chapter 2 finds that public administration services as intermediate inputs are relatively minor. This implies first that most public services are provided more or less "free of charge" (being financed out of the general tax pool) and secondly that by concentrating on intermediate flows only, which the application of an input-output modelling tool implicitly requires, a considerable part of the potential supply-side benefits of public services will be left out. Even if those restrictions are accepted, the main results of the analysis of intermediate public administration linkages do not support the hypothesis that these linkages play a particularly important role in the overall economy when compared to intermediate flows emanating from other sectors. Their share in total intermediate inputs is far too low to have any significant impact.

Chapter 3 finds that tax administration, corruption and courts are considered to be the most impeding factors for firm growth in virtually all countries in the sample of analysis. These findings are recurring across the time period under consideration and may indicate that there seems to be room for improvement in Member States with respect to these dimensions of public administration. Based on cross-country rankings along a particular dimension of public administration, the analysis shows that the best or worst performing country with respect to one constraint also performs very good or poorly, respectively, across several other dimensions of public administration.

Chapter 1.
HIGH GROWTH FIRMS AND PUBLIC ADMINISTRATION EFFICIENCY

1 INTRODUCTION

Fast-growing firms are important bearers of economic dynamics, diffusion of innovations and employment generation; few fast-growing firms create a large fraction of new jobs (for a survey, see Henrekson and Johansson, 2010). Such enterprise dynamism differs across countries and regions, and is an indicator for an economy's ability to re-structure itself. In the United States economy, firm dynamics are relatively stronger in comparison to the European Union. European economies have a larger share of stable firms relative to the United States, where both growing and shrinking firms are more prevalent (Bravo-Biosca et al., 2013). These differences may reflect unused growth potential in the European Union. Fast-growing firms and firm growth figure now importantly in the European economic policy debates. For instance, the European Commission's Innovation Union Communication, one of the seven pillars of the Europe 2020 strategy, mentions the support of fast-growing small and medium-sized enterprises (SMEs).

The interaction of the efficiency of public administration (henceforth abbreviated also as PA) in its interaction with other factors of production such as capital and labour is a key element that determines aggregate economic performance. Empirical studies show that government efficiency is the aspect of governance that most robustly affects aggregate productivity (Méon and Weill, 2005). Average firm growth and the share of high growth firms in an economy are indicators for economic dynamism and correlate with economic performance. This study analyses the impact of PA efficiency on firm growth and high growth firms. This impact may occur on various levels, since modern advanced economies are characterised by multiple and very different interactions between firms with the public administration. For instance, firms need to comply with regulatory requirements, need to register, need to pay taxes, or may use courts in order to resolve contractual disputes. Public administration efficiency therefore may affect both the productivity distribution and the growth rate distribution in an economy. However, research on these micro-economic links is not very developed. It is still largely unclear through which channels an efficient PA affects productivity development and firm-growth.

The purpose of this study is to analyse empirically the contribution of public administration efficiency to firm growth. While the present research is mainly driven by its quantitative approach, the subsequent discussion of the results considers also the policy context. In particular, it analyses (i) how public administration efficiency relates to the presence of high growth firms and industry growth, (ii) discuss the role of PA innovations such as e-services in the process of high firm growth, and (iii) explore the most important indicators of PA-efficiency that affect high firm-growth. Hence, the guiding hypothesis is that high firm growth is affected by the respective industry- and country specific environment. An efficient public administration lowers transaction costs, which should affects firms that interact with the public administration in their growth endeavours.

The analysis is limited by short time series, which do not allow establishing a longitudinal cause-and-effect relationship. In particular firm growth indicators are not available to match the most recent public administration efficiency indicators (e.g., European Public Sector Innovation Scoreboard - EPSIS). On a similar note, the available data do not cover all member states. The primary objective of this section is to test if and how the public administration quality affects high firm growth. In this respect it must be noted that the concept of efficiency of public administration used in this report is a quite broad concept. It is conceptually and empirically very difficult to disentangle the effects of public administration efficiency from effects that are related to quality of governance in general and the efficiency of regulations. The outcomes measured are not only related to the efficiency of public administration in a narrow sense but also related to the efficiency of the regulations that are in place. In addition, ex-post evaluations of specific policies are not conducted.

Due to conceptual and empirical difficulties it is very difficult to isolate the effect of PA-efficiency on firm growth rates from other factors. To overcome the identification issues, a sophisticated econometric estimation strategy was implemented. The aim was to identify conceptual channels through which public administration efficiency affects the share of high growth firms at the country-industry level. A broad range of datasets was used, including Eurostat and OECD data on industrial dynamics and public administration indicators, inter alia provided by the European Commission, the World Bank or the World Economic Forum.

The findings suggest that public administration efficiency affects high firm-growth processes primarily in industries that are characterised by a high level of firm dynamics. Industries that are characterised by greater firm turnover and higher net-entry rates display a greater impact of public administration efficiency on high

growth firms. Accordingly, high firm growth facilitating dimensions of the public administration are especially those that affect firm dynamics in a direct way, such the time to start a business or the time required for insolvency procedures. In addition, very general indicators of public administration efficiency such as government effectiveness, regulatory quality and freedom of corruption affect the share of high growth firms. This indicates that a more impartial and transparent governance regime has a positive impact on industry dynamics, as this effect is again stronger in industries characterised by greater firm turnover and net entry.

These results are much stronger for the time period before the financial crisis (up to 2007). While the results for the time period after the financial crisis show a clear indication that the efficiency of public administration does affect the share of high growth firms. This is likely related to the fact that the impact of the financial crisis makes it much more difficult to identify effects on the share of high growth firms. The financial crisis is a symmetric shock that affected all countries, but had very heterogeneous effects at the industry level. For example, export-oriented manufacturing was much more hit by the downturn than domestically oriented service industries. Moreover, shocks in the construction sector were also very heterogeneous across the countries in the sample. This might be the primary reason why the econometric evidence is much weaker for the post-crisis period. In order to provide more substance and detail an exploratory firm level analysis as well as a brief survey on the effects of e-government on firm performance supplement the econometric findings.

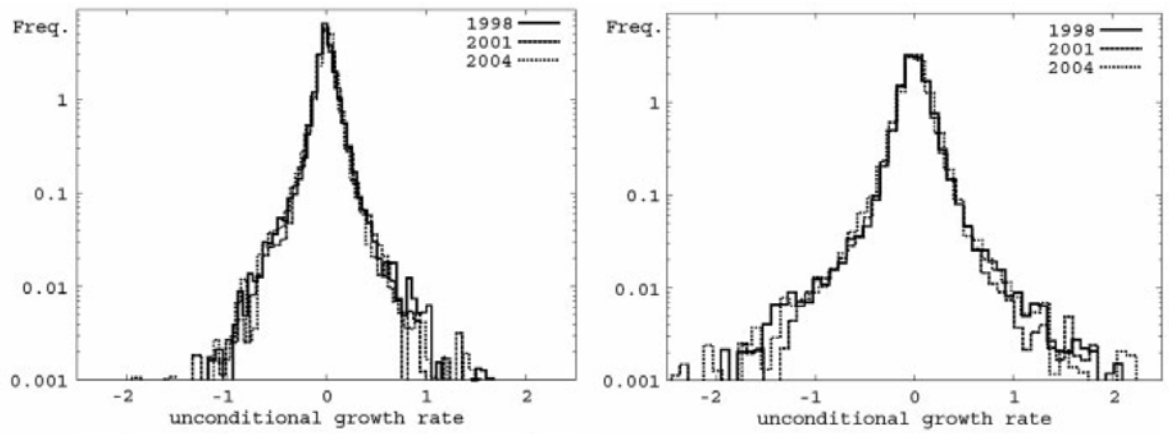
This chapter is divided into seven parts. The next subsection motivates the study by providing a brief survey on the link between public administration and firm-performance. Subsection 3 discusses the data and measurement issues. Subsection 4 presents the econometric framework and the conceptual channels through which PA-efficiency may affect firm growth. Linking PA-efficiency to firm-performance is not straightforward. While correlation analyses show a statistical significant relationship of PA quality with high firm growth, the descriptive relationship is not identified. There is a causality issue. An econometric methodology is presented that allows pinning down causality, and the estimates identify the effect of public-administration efficiency on the share of high growth firms at the country-industry level. Employment growth will be examined as an additional performance indicator to capture aggregated employment dynamism. Subsection 5 presents and discusses the results, also predicting the impact of selected policy reforms. Section 6 presents supplementary micro-evidence from the EFIGE dataset. Subsection 7 provides a summary and a policy discussion of the results.

2 PUBLIC ADMINISTRATION AND HIGH GROWTH FIRMS

2.1 High Growth Firms

Firm growth and decline is at the core of economic dynamics. Recently, much attention has been attached to the phenomenon of high growth firms (HGFs). The special interest in high growth firms is partly motivated by the fact that high growth firms are perceived as important drivers of economic dynamics, diffusion of innovations and employment generation. In policy discussions of the innovative performance and job creation of innovative small firms, there are often references to high technology firms such as Google, Apple and Microsoft. But the available evidence shows that high growth firms do not necessarily cluster in specific industries. They are found in almost all sectors of the economy (c.f. Hölzl, 2009, Henrekson and Johansson, 2010).

Figure 1.1 – Distribution of the unconditional growth rates of employment (left) and sales (right) for a sample of French manufacturing firms



Note: Growth rates on the x-Axis are log differences. The y-axis is in log scale
Source: Coad, 2010

Henrekson and Johansson (2010) provide a survey of 19 early studies that examined high growth firms. Despite substantial differences in method and measurement they find some important results that are remarkably robust across definitions of high growth firms, time periods and coverage of firms. Coad et al. (2014) provide an update of this survey and summarise the findings in a list of stylised facts about high growth firms:

1. Firm growth distributions are symmetric and heavy tailed (see Figure 1.1 for an example). If firm growth is measured as log differences the distribution of growth rates follows a Laplace distribution with heavy tails (cf. Stanley et al., 1996, Bottazzi and Secchi, 2006). Most firms do not grow at all, only a few firms experience high growth or high decline.[1]
2. A small number of HGFs creates a large share of new jobs.
3. High growth firms tend to be small and young but an important subset of high growth firms is also large and old.
4. High growth firms are not more common in high technology industries. While the focus of policy makers is primarily on high growth firms in high-technology sectors (e.g., Mason and Brown 2013), the available evidence suggests that , if anything, there appear to be more high growth firms in service industries relative to other sectors (Henrekson and Johannsson, 2010).
5. High growth is not persistent over time. Coad (2007) and Coad and Hölzl (2009) analysed the persistence of growth across the firm growth distribution. They found negative autocorrelation for small fast-growing firms. The findings of Hölzl (2014) suggest that most high growth firms display high growth only once and are akin to "one-hit-wonders".
6. It is difficult to predict which firms are going to grow. The explanatory power of firm growth regressions is usually quite small and the unexplained variance very high. Geroski (2000) summarises this in the following provocative statement: "The most elementary fact about corporate growth thrown up by econometric work on both large and small firms is that firm size follows a random walk" (Geroski, 2000, p. 169).
7. Using different growth indicators selects a different set of firms as high growth firms. Even switching from employment growth to sales growth can make an important difference (cf. Sheperd and Wiklung, 2009).

Coad et al. (2014) also emphasise that there are still important controversial issues in the research on high growth firms. The most important controversies relate to concerns about (i) the methodology of selecting high growth firms, (ii) the aggregate implications of having a larger share of high growth firms in an economy and discussions about (iii) the policy implications of available research results.

There is still some controversy on the measurement of high growth firms, as economic theory does not provide guidance in this process. The present contribution applies the OECD-Eurostat definition of fast firm growth, as this is the definition used by most statistical offices. The OECD and Eurostat recommended that HGFs should be defined as firms with at least ten employees in the start-year and annualised employment growth exceeding 20% during a 3-year period (Eurostat-OECD, 2007). Research (e.g., Daunfeldt et al., 2014) criticised the Eurostat-OECD definition of high growth firms on the basis that this definition excludes a large number of firms from consideration. Other researcher questioned the usefulness of using relative growth rates to define high growth firms, as relative growth measures favour smaller firms in favour of larger firms (e.g., Hölzl and Friesenbichler, 2010).

However, more relevant to the present report are the controversies regarding the aggregate implications of differences in high growth firm shares across countries. Only a few studies compare the presence of high growth firms across countries, and the findings seem to suggest that a higher share of high growth firms is associated with a higher share of firms that display large job losses (Hölzl, 2011). At the same time studies preliminary evidence points into the direction that countries with a more dynamic growth distribution (more high growth and high decline firms) have a higher productivity growth (e.g., Bravo-Biosca, 2010). However, not much is yet known about the direction of causality of these processes. An important finding of Bravo-Biosca (2010) is that that the share of high growth firms is different across countries (see also Bravo-Biosca et al., 2013). But not much is known about the reasons for these cross-country differences. Hölzl (2011) showed that fixed country effects explain approximately 23 % of the observed variance of HGF shares across 11 countries, while fixed sector effects explained around 35 % of the variation. Deeper knowledge about the interaction of institutional characteristics (e.g,. corruption, regulatory quality) or economic policy variables (e.g., availability of e-government, time to start up a business) with high growth firms indicators would help to understand what kind of institutional support are most appropriate for a dynamic growing economy populated by high growth firms.

[1] This result holds in strict sense only for log differences. Yet, every measure of relative growth (e.g., percentage change, job creation rate) is only a monotonic transformation of any other measure. This implies that the shape of the distribution changes but not the substantive findings.

It is important to note that firm growth is a novel indicator to assess the competitiveness of economies. The basic idea is that economic dynamism is related to economic performance. A large theoretical and empirical literature exists that aims at identifying the sources of persistent differences in productivity across countries. Processes of creative destruction selection and learning are central for aggregate employment and productivity growth (e.g., Metcalfe 1998, Bartelsman et al., 2004; Restuccia and Rogerson, 2008). The literature on firm heterogeneity shows that countries are characterised by large and persistent heterogeneity in firm-level productivity (e.g., Bartelsman et al., 2004). Thus cross-country differences in economic performance may be related to within-differences in the productivity dispersion across firms (e.g., Hsieh and Klenow, 2009; Bartelsman et al., 2013).

2.2 Public Administration Efficiency and Firm Growth

Interestingly, the question marks about determinants and drivers of high firm growth are mirrored by the literature on public administration. Empirical work on microeconomic links between economic performance and public administration quality is still in its infancy and only partially explored (Djankov, 2009). It is largely unclear through which specific channels PA quality and efficiency affects industrial dynamics and firm performance. Most of the available evidence comes from the macroeconomic studies. Important results show that institutions and governance structures can be considered as important determinants of economic growth beside drivers such as physical capital, human capital and the accumulation of knowledge.

The present chapter concentrates on the interaction between indicators of PA efficiency and economic dynamism, and how these impact firm growth. There is ample evidence on the impact of regulation (e.g., entry regulation, labour regulation, financial regulation) on firm performance, but not much evidence on the impact of the efficiency of public administration on firm growth. Cuaresma et al. (2014) analyse the World Bank Business Environment and Enterprise Performance Survey for CEE economies to study the impact of institutional determinants on firm growth. They find that the overall institutional business environment is an important driver of firm growth and that the fastest growing firms appear to be most affected by a poor business environment. In a recent OECD working paper, Bravo-Biosca et al. (2013) found that financial development, banking competition, and institutions that foster better contract enforcement are associated with a more dynamic growth distribution and a higher share of high growth firms.

Klapper, Laeven and Rajan (2006) provide quantitative evidence using data from the Amadeus database for 20 EU Member States. They use among other possible determinants together with entry regulation indicators from the World Bank Doing Business database to estimate the effect of public administration efficiency on total factor productivity. They find that reducing registration costs from the 75th to 25th percentile in the Doing Business sample leads to a 14 percent increase in value added per worker. Fisman and Sarria-Allende (2004) and Ciccone and Papaioannou (2007) provide evidence on the impact of product market and entry regulation on the number of start-ups. They find robust evidence that more burdensome regulation leads to lower entry rates.

An even ampler literature exists on the of employment protection legislation on job-reallocation and firm performance. The findings of this literature show that more stringent employment protection regulations lower job reallocation via the lower entry and exit dynamics (e.g., Haltiwanger, Scarpetta and Schweiger, 2008). But also – and more relevant to present study- that stricter employment protection laws reduce job-reallocation among existing firms (e.g., Gomez-Salvador et. al., 2004). Garicano et al. (2012) show that labour regulations that apply only to enterprises above a threshold size affect the incentives of firms below that threshold to grow above that particular threshold. Finally, the findings of Cingano et al. (2010) indicate that stricter employment regulations also affect capital investment, especially for financially constrained firms.

In the European policy discussion on administrative and regulatory burden often special emphasis is placed on SMEs (e.g., European Commission, 2007). This relates to the fact that smaller firms face a disproportionately higher regulatory burden than larger firms. Ample evidence indicates that smaller businesses have to bear a higher regulatory burden than large enterprises. This is related to the facts that

- Regulation and administrative procedures have in general an important fixed-cost component.
- Smaller enterprises have limited managerial capacities to deal with administrative processes. This leads to a lower efficiency of smaller enterprises in dealing with public administration. The same holds for buying specialised expertise to deal with regulatory and legislative issues.
- In very small enterprises, the entrepreneurs themselves have to deal with public administration, what in turn keeps him away from dealing with core business activities.
- Costs resulting from delays are more problematic for small firms, as their activities and range of products are usually less diversified than those of large firms.

Thus, the unit costs (fees and time) and the costs associated with uncertainty and administrative delays generally put a higher burden on smaller firms. This explains why much of the debate about reducing administrative costs is focussed on small enterprises. But there is an additional disadvantage for small enterprises: Large enterprises often have direct access to public administration and even policy makers, what allows them to influence policy and outcomes in their interest to some extent. Small enterprises generally lack this possibility because of a collective action problem. Thus the transparency and the integrity of public administration and the policy making process are very important to SMEs.

The empirical evidence on the link between firm size and the legal system provides some hints of the negative effect of higher administrative costs and uncertainty on firm growth. For example, Laeven and Woodruff (2007) find a positive relationship between firm size and the quality of the legal environment in a cross-country study. A polarisation of economic activities into a large number of very small firms and a small number of very large firms without medium-sized firms may reflect misallocation of resources. The results of Laeven and Majnoni (2005) indicate that judicial efficiency affects the cost of capital. Thus the inefficiency of public administration may as well translate into inefficient investment allocations that hamper firm growth. Especially in developing countries there is disproportional concentration of employment in very small firms (Tybout, 2000; Banerjee and Duflo, 2005). For EU countries the results of Pagano and Schivardi (2003) indicate that there is a positive relationship between average firm size and productivity growth. According to Pagano and Schivardi (2003) the source for this positive relationship is a positive link between firm size and innovation. Bravo-Biosca et al. (2013) and Bartelsman et al. (2004) find that aggregate economic performance is positively associated with a higher share of high growth firms (and high decline firms). While processes of firm growth dynamics are often associated with welfare losses at the individual level (e.g., bankruptcy, business stealing effects of competition), it seems to be that these losses are more than compensated by the gains of other economic entities. One interesting finding by Bartelsman et al. (2004) is that, while much of the differences in entry and exit rates are related to differences in the sectoral structure of economies, the differences in growth performance remain also after controlling for the sectoral composition of firms. This suggests that differences in institutions and regulatory quality may be relevant for explaining differences across countries. The evidence thus suggests that it may be an indication of weakness in the institutional environment if small firms do not grow into medium sized and large firms.

2.3 Summary

The basic hypothesis that emerges from this literature survey is that an efficient public administration is expected to reduce barriers to the reallocation of market shares and reduces barriers to entry and exit. The (in) efficiency of the public administration should be related to an excessive heterogeneity in firm-level performance that indicates a misallocation of resources across firms that in turn affects negatively aggregate economic outcomes. This hypothesis is directly related the findings that cross-country differences in economic performance are associated with within-differences in the dispersion of performance across firms (e.g., Hsieh and Klenow, 2009; Bartelman et al., 2013). Firm growth enters this consideration because a larger share of high growth firms may indicates a larger economic dynamism and market share reallocation. If the reallocation is directed towards increasing the market shares of more efficient firms at the expense of less efficient firms, then higher economic dynamism is associated with better aggregate performance.

Next, it needs to be taken into account that different sectors are affected in a different way by specific aspects of public administration efficiency then this allows pinning down the impact of public administration efficiency in greater detail and with greater precision. One can expect that differences in the growth potential of industries (as Fishman and Sarria-Allende, 2004), differences in the average firm size or differences in the entry and exit dynamics of industries are useful industry variables that allow to identify the differential impact of public administration efficiency not only across countries but also across industries. The analysis concerns the impact of general indicators of regulatory quality and specific indicators such as quality of entry and bankruptcy regulation, the efficiency of tax administration or use of e-government solutions.

3 DATA AND MEASUREMENT

3.1 Indicators of Public Administration Efficiency

The present report builds on the work by Pitlik et al. (2012). It uses general and specific dimensions of public administration quality, and adapts them to the present analysis of firm growth. The focus is on the quality of implementation and enforcement of existing regulation and economic policies. Here, it is also important to note that a clear distinction between public administration efficiency and the quality of regulations is very difficult to achieve. In fact, the quality of administration and the quality of regulation and policies seem to be largely interdependent, and mutually affect firms in their interaction with the public administration. There are important elements in the business environment that are not affected by the quality of public administration. A prominent

example is the access, availability, and costs of external finance, which is central for investment and innovation. While regulations (e.g., creditor protection, bankruptcy regulation, capital market and banking regulations) affect access to finance, there is not much known about the direct links between the quality of public administration and the access to finance, and conceptually, it is difficult to argue that there is a direct link. Thus, while access to finance is central to firm growth, access to finance is not covered by the regressions in this section.

An empirical framework is used to address particularly relevant elements of the public administrations of the Member States which appear to be most important to firm growth. The applied framework was proposed by Pitlik et al. (2012), but modified it for the present purposes. Three general links are distinguished, which cover quite broad influences that affect the quality of the public administration and its relation to the business environment, namely

A. General governance
B. E-government, and
C. Corruption and fraud.

'General governance' reflects the multi-dimensional concept of administration quality. E-government indicators stand for the tools of administrative modernization' and should somehow summarise the use of instruments to enhance the capacities of the administration and the sophistication of service provision. 'Corruption and fraud' presents assessments of the extent to which the powers of government and administration are exercised for private gain.

In addition four more specific links can be distinguished, concerning issues of

D. Starting a business,
E. Public payment morale,
F. Tax compliance, and
G. Efficiency of civil justice.

These links explicitly relate the quality of an administration to processes of firm growth and capture the most important interactions between public administration and enterprises. The analyses do not focus on industry-specific interactions between public administration and certain branches. Rather, the links have been selected with the intention of drawing a broad and at the same time concise picture of the impact of specific aspects of efficiency and effectiveness of public administration on firm growth at the industry and Member state levels.

The selection of the indicators was restricted by the availability, quality, country coverage, time coverage and representativeness of the indicator.[2] In order to achieve this scope, an assessment framework for possible indicators based on three main criteria was applied:

- In the context of country coverage, indicators have to cover as much of the EU member states as possible. Indicators that are available for less than 23 Member States are excluded.
- The time coverage of the indicator is also taken into account. As the firm growth data cover the time between 2002 and 2010, only indicators that are available for more than 3 years and cover at least one year in the sub-periods 2002 – 2005, 2006-2007 and 2008-2010 are used. The year of publication is distinguished from the year to which the indicator refers. The latter is more relevant for the present purposes.
- With respect to representativeness of indicators, the underlying sample representativeness and the adequateness of the calculation methods are considered. Results need to be comparable over time. Indicators with important limitations in terms of their representativeness are excluded.

Table 1.1 presents the twelve selected indicators for the three general and four specific links of public administration effectiveness together with the data source and measurement scale. Albeit for some public administration links more recent data and/or more sophisticated indicators are available (for example collected in the European Public Sector Innovation Scoreboard), the selected indicators are appropriate for the empirical study. It is necessary that the reference time periods of the PA--indicators and of the high firm growth data are synchronised to allow an appropriate interpretation of the results. Hence, the reported statistics refer to periods for which data on HGFs are available. In addition, only indicators with broad country coverage were selected. In fact, most of the indicators are available for almost all EU countries. Data for Malta and Croatia are not available for the Doing Business indicators. The indicator with the least observations is the payment delay of public administration. Data is missing for Bulgaria, Croatia, Luxemburg, Malta and Romania.

[2] A large number of indicators have been considered.

Table 1.1 – PA-efficiency indicators

Public Administration Link	Indicator name	Indicator values	Data source
A) General governance			
	Government effectiveness	Index range -2.5 to +2.5, higher values indicate better performance	World Bank Worldwide Governance Indicators
	Regulatory Quality	Index range -2.5 to +2.5, higher values indicate better performance	World Bank Worldwide Governance Indicators
B) Egovernment			
	Availability of E-Government services	% of total of 8 services	EC E-Government Benchmarking Reports
C) Corruption and fraud			
	Freedom of corruption	Index on a scale from 0 (high corruption) to 100 (low corruption)	Heritage Foundation, Index of Economic Freedom
D) Starting a business and licensing			
	Time required to start-up a company	number of calendar days	World Bank – Doing Business
	Cost to start-up a company	% of income per capita	World Bank – Doing Business
E) Public Payment morale			
	Average delay in payments from public authorities	days	Intrum Justitia European Payment Index
F) Tax compliance and tax administration			
	Time to prepare and file tax returns and to pay taxes	hours per year	World Bank Paying Taxes
G) Efficiency of civil justice			
	Enforcing contracts: Time	Calendar days	World Bank – Doing Business
	Enforcing contracts: Cost	Percentage of claim	World Bank – Doing Business
	Resolving insolvency: Time	Calendar days	World Bank – Doing Business
	Independent judiciary	Index from 1 to 7, high values indicate independence	WEF Global Competitiveness Report

Source: WIFO elaboration.

Table 1.2 presents the descriptive statistics for the selected time-aggregated indicators. It distinguishes between the entire sample, and a subset thereof, which used only observations for which matching data about HGFs and employment was available as described above.

Table 1.2 – Descriptive statistics - PA-efficiency indicators

Variable	Number of countries	Mean	Std. dev.	Min	Max
Entire sample					
Government Effectiveness	32	1.18	0.59	-0.28	2.34
Regulatory Quality	32	1.26	0.38	0.21	1.92
E-Government availabilty	30	60.07	22.66	10.00	100.00
Freedom of Corruption	32	66.14	20.34	28.00	97.00
Starting Business Time	29	22.85	17.31	4.00	114.00
Starting Business Cost	29	7.46	7.02	0.00	32.50
Payment Delay	25	21.32	18.47	4.00	80.40
Paying taxes Time	29	245.15	173.04	59.00	930.00
Enforcing Contracts Time	29	527.96	275.69	210.00	1440.00
Enforcing Contracts Cost	29	20.33	6.99	8.80	40.50
Resolving Insolvency Time	29	2.22	1.54	0.40	9.20
Independent Judicary	32	6.62	1.97	2.51	9.38
Sample used					
Government Effectiveness	15	1.24	0.59	-0.23	2.22
Regulatory Quality	15	1.28	0.37	0.39	1.83
E-Government availabilty	15	57.07	16.09	34.55	81.22
Freedom of Corruption	15	64.48	19.62	31.40	94.80
Starting Business Time	15	25.19	13.68	6.19	63.75
Starting Business Cost	15	9.16	6.57	0.00	20.10
Payment Delay	12	22.72	16.62	6.50	59.33
Paying taxes Time	15	260.68	180.97	59.00	774.33
Enforcing Contracts Time	15	634.40	330.18	287.25	1357.50
Enforcing Contracts Cost	15	21.97	6.82	9.16	33.13
Resolving Insolvency Time	15	2.62	1.68	0.90	7.44
Independent Judicary	15	6.30	1.83	3.33	8.99

Source: WIFO elaboration.

It needs to be recognised that public administration efficiency is a multi-dimensional concept which captures numerous and quite different aspects of the rules and mechanisms of a country's public administration. Public administration efficiency is partially determined by the way the governmental institutions operate. The management of public affairs and the capacities of a state to provide a sound regulatory environment conducive to firm growth depend largely on the basic institutional concepts. It is very difficult to disentangle conceptually, let alone empirically, the efficiency of the public administration from the political process and the quality of governance. This problem arises from the fact that the efficiency of public administration depends crucially on the efficiency of regulations that are implemented by the political process. This suggests that the institutional and regulatory framework plays a key role for public administration efficiency (even if public administration is considered in a very narrow sense relating only to the service provision by the public sector). The basic institutional framework enables and reinforces the potential of firms and branches, especially through shaping an entrepreneurial business environment, on the one hand. On the other hand, the basic institutional framework can also exert unnecessary regulatory burdens on firms, leading to red tape, bureaucratic delays, costs of tax administration and even to inferior public service quality.

A large number of different indicators of government effectiveness have been proposed by researchers, international institutions and business consultants that aim at quantifying the institutional quality of countries. The World Bank's Worldwide Governance Indicators (WGI) are among the most advanced indicators. The WGI themselves rely on a wide variety of perceptions-based governance indicators and provide a summary assessment of government quality. The database covers a large number of countries and measures six dimensions

of governance: (1) Voice and accountability, (2) Political stability and absence of violence/terrorism, (3) Government effectiveness, (4) Regulatory quality, (5) Rule of law, and (6) Control of corruption. These six dimensions are all expressed as a composite indicator. Of these indicators two dimensions are especially relevant for public administration efficiency: (1) government effectiveness and (2) regulatory quality.

The patterns in Table 1.6 reveal a high correlation with the indicator of 'Freedom of corruption' and 'Independent Judiciary' that are themselves important elements of the quality of institutions in a country. Government effectiveness (GE) and Regulatory quality (RQ) show a moderate or high correlation with most indicators that are included in this study, except for "Enforcing contracts: Costs", where no correlation can be detected. This suggests that the cost of using the legal system is not related with the institutional quality of countries. Both government effectiveness and regulatory quality are highly correlated with GDP per capita.

The E-government indicator is a measure of tools for administrative reform. The modernisation of the public sector is pursued through the application of a large array of different tools that aim at increasing the capacity of public administration for high-quality service provision. However, there is still a lack of robust empirical evidence as regards the economic impact of the modernisation tools. Universally accepted reform model do not exist. This leads to challenges in selecting appropriate data for benchmarking countries (see Pitlik et al., 2013, pp. 57 for an extensive discussion). For this reason only one e-government indicator is used in the present study. Box 1.1 provides an extensive discussion how the availability of e-government may affect firm competitiveness.

Box 1.1 – HOW E-GOVERNMENT LINKS TO COMPETITIVENESS

E-government affects competitiveness through a reduction of transaction costs. Hirst and Norton (1998) emphasise that e-government affects firm-public administration relationships alongside three dimensions. (1) External connections between firms and the public administration are improved due to more transparency about decisions and the provision of information. This includes also the provision of information (e.g., the announcement of public sector projects, information about laws and regulations, publication of reports and studies). (2) Relational connections between firms and the public administration change due to organisational reforms that accompany the launch of e-government services. Often horizontal and vertical tasks are merged in the provision of e-services, so that e-government applications provide one-stop shops for firms to interact with the public administration. (3) The organization of bureaucracy changes also internally when services are provided online. Moreover, online services allow the use more timely responses and geographical flexibility. For example, the Service Directive requires Member States to implement electronic processes that can be accessed from outside the specific Member State (EU, 2007).

In addition, e-government may facilitate the democratic attributes of regulatory procedures by enabling inclusiveness (e.g., consultations, polls, electronic forums, focus groups or other forms of discussions; OECD, 2011). E-government is also considered an effective tool to enhance good governance (Andersen, 2009; Shim and Eom, 2009), because digital applications tend to increasing the transparency of decision-making, and may make corruption as well as rent seeking less likely (Pitlik et al., 2012).

Srivastava and Teo (2007) analyse the relationship between e-government and competitiveness at the country level. First, they link e-government government variables to efficiency parameters, such as indicators on public resource spending or administrative efficiency. Second, the efficiency gains which e-government induces eventually increases the GDP per capita, the present proxy for business competitiveness. Furthermore, the study finds a smaller social divide due to e-government. This confirms that the provision of e-government services is part of an efficient public administration, which contributes to a sound business environment (Lau, 2005).

E-GOVERNMENT AND FIRM GROWTH

Does e-government link to firm growth? This may occur through two channels: (1) lower transaction costs, and (2) business opportunities. First, fast growing enterprises by definition engage in more transactions than other firms. This is likely to hold for public sector transactions, too. If these becomes faster and less costly, growth processes might encounter fewer frictions. Second, e-government promotes the information economy. The government itself consumes ICT, and potentially creates business opportunities (Lau, 2005).

Evidence on the impact of e-governance on firm performance is rare, let alone firm growth. The literature indicates that in an economy wide comparison it is unlikely that the demand that e-government induces will affect firm growth patterns. However, e-government mainly contributes to firm performance through the reduction of the administrative burden and the online provision of information. For instance, Thompson et al. (2005) analyse survey data from 100 firms in three US states. They find that technology-oriented firms are more prone to consume e-government services as part of their market intelligence; i.e., they are more likely to retrieve information that is made available online by the government or bureaucracies. These firms are also more profitable in comparison to the other sampled firms; the effect of e-government on profitability is mediated by the attribute of being a technology oriented firm.

Criticising the constructs used by Thompson et al. (2005), Badri and Alshare (2008) use survey data on firms in Dubai to assess the effects of the use of e-government. The results indicate that the use of e-government relates positively to enhanced intelligence generation, new business development, and time savings. E-government was found a tool to expand revenue, as well as an opportunity to cut costs. The study linked e-government services to more profitability, especially through revenue

gains due to better intelligence generation (e.g., information about competitive dynamics, quality benchmarks, training or collaboration). The development of new business relations after the identification of possible partners on public websites occurred too, but to a lesser extent. This confirms the finding by Thompson et al. (2005) that the benefits from e-government services hinge on a firm's ability to expand its business, and its ability to increase efficiency.

Cegarra-Navarro et al. (2007) study the determinants of the use of e-government in Spain. A precondition for its use is access to a sufficiently fast internet connection. If broadband access is given, in particular size and the extent to which surveyed firms were already using ICT affected the consumption of e-government services. Large firms, as well as firms that are more ICT oriented, tend seek information online, and are therefore more likely to use relevant services. This confirms that e-government is a component of the general economic environment, and indicates that it is more effective if firms' absorptive capacities suffice. This also cast doubt on whether the mere conversion of offline to online services will be adequate to improve competitiveness and firm performance. Both the e-readiness of firms and the awareness about e-government services can be highlighted as important policy aspects.

The present study uses the indicator "Availability of e-government services". Cognisant of the availability of improved indicators for more recent periods, this indicator was chosen due to its timely availability to match the period for which data on high growth firms are available. The indicator is correlated with many of the other public administration indicators but not with Starting Business: Time, Payment delays and Enforcing Contracts: Time and Enforcing Contracts: Cost. The association to GDP per capita is weak indicating that e-government availability is not confined to the richest countries in Europe.

The occurrence of corruption is one of the most profound and widespread problems that affects public administration efficiency in poor as well as rich countries. Corruption represents a de-facto tax of productive activities. These costs may affect incentives to invest as well as incentives for innovative firms to enter a market. However, corruption increases also the uncertainty for firms, as it may affect the duration of administrative processes and in a corrupt environment, outcomes become more uncertain for firms as they may be driven more by bribes rather than fixed bureaucratic rules. Even rules may be changed in response to corruption. This shows that corruption is not uniform but a rather multi-faceted phenomenon. However, most available indicators of corruption show a quite high correlation among each other. Therefore one indicator that has a broad coverage over time and countries was selected. The indicator selected for the link Corruption and fraud is the "Freedom of Corruption indicator" of the Heritage Foundation. The high correlation between corruption indicators assures that the results are not driven by the fact that this specific indicator was chosen. The correlation matrix in Table 1.3 shows that this indicator is strongly related to "Government Effectiveness" and "Regulatory Quality" as well as to "Independence of the judiciary". Also the association to GDP per capita is high: Richer countries have a lower level of corruption and fraud.

Table 1.3 – Correlations between PA-efficiency indicators

	Government Effectiveness	Regulatory Quality	E-Government availabilty	Freedom of Corruption	Starting Business Time	Starting Business Cost	Payment Delay	Paying taxes Time	Enforcing Contracts Time	Enforcing Contracts Cost	Resolving Insolvency Time	Independent Judicary
Government Effectiveness	1											
Regulatory Quality	0.91	1										
E-Government availabilty	0.26	0.12	1									
Freedom of Corruption	0.95	0.88	0.37	1								
Starting Business Time	-0.36	-0.44	-0.04	-0.39	1							
Starting Business Cost	-0.61	-0.52	-0.38	-0.56	0.24	1						
Payment Delay	-0.37	-0.44	-0.14	-0.21	0.18	0.70	1					
Paying taxes Time	-0.49	-0.46	-0.26	-0.64	0.20	0.43	0.02	1				
Enforcing Contracts Time	-0.49	-0.66	0.24	-0.40	0.17	0.39	0.64	0.30	1			
Enforcing Contracts Cost	-0.06	-0.05	0.25	-0.12	-0.32	-0.13	-0.12	0.49	0.22	1		
Resolving Insolvency Time	-0.38	-0.28	-0.19	-0.54	0.16	-0.07	-0.42	0.78	0.00	0.48	1	
Independent Judicary	0.91	0.91	0.32	0.93	-0.54	-0.56	-0.42	-0.58	-0.50	-0.11	-0.43	1

Source: WIFO calculations.

The first specific link is "Starting a business". Entry regulations have received substantial attention from both policy makers and researchers following the study by Djankov et al. (2002). Djankov et al. (2002) have shown that countries with higher administrative entry barriers have higher corruption and lower levels of wealth. High entry regulations have a negative influence on entrepreneurial behaviour and thereby impede economic performance (e.g., Ciccone and Papaioannou, 2007; Klapper, Lewin and Delgado, 2009). However, the results of Stel, Storey, and Thurik (2007) suggest that administrative entry regulation is less important than other types of regulation for more ambitious start-ups in high income countries. The efficiency of entry regulations is generally

measured by differing yet interrelated aspects: (i) the duration of procedures, (ii) the number of procedures, (iii) the number of governmental entities to contact, and (iv) the cost of procedures. The Doing Business database of the World Bank provides most of the relevant and up-to-date indicators that quantify the ease of starting up a business. For the present purpose, two indicators from this database were selected: “Starting a business: time” and “Starting a business: cost”. These two indicators show only a correlation of 0.31 with each other. This indicates that they measure two different aspects of entry regulations. Interestingly, both indicators show only a medium correlation (around 0.3- 0.6) with other public administration indicators. No relationship is found for “Enforcing contracts: Costs”.

An efficient tax system has two characteristics. On the one hand it is designed to minimise distortions of taxpayers' decisions. On the other hand it minimises tax compliance costs for firms and as well as the cost of tax administration to levy taxes in order to maximise efficiency and to reduce the excess burden of taxation. To the present study the second aspect is more relevant, which measures the efficiency of the tax administration by the time required to pay taxes (Doing Business database of the World Bank). This indicator does not cover tax rates but provides an assessment on the administrative burden put on enterprises by the national tax system. Tax rates remain unconsidered, as tax rates are essentially a political variable that may only weakly be associated with the effectiveness of public administration. Table 2 shows that there are considerable differences across countries in the efficiency of tax administration. The indicator shows the highest correlation with the indicator time required to resolve insolvencies and moderate (negative) correlation with government effectiveness, regulatory quality, freedom of corruption and having an independent judiciary. The relationship to GDP per capita is statistically significant. Richer countries have put a lower burden on their enterprises.

Table 1.4 provides indicative regression evidence that richer countries have a more efficient governance and higher regulatory capacity. The association to GDP per capita is statistically significant. The relative regulatory cost and the time required for starting a business are generally lower in richer countries. The economic significance of public procurement in Europe is considerable, with yearly purchasing valued at 3.5 % of the region's GDP. This money is spent by a very large and heterogeneous population of public authorities (more than 250.000 contracting authorities and more than 2 million procedures). Data on public procurement complexity are available (e.g., the study of PwC, London Economics, and Ecorys in 2011 for the European Commission that provides estimates on cost and effectiveness of public procurement regulations). The focus is on the element of payment delays, as payment delays affect smaller firms much more than larger firms. Payment delays are especially costly for smaller firms, as payment delays can lead to liquidity problems. The data come from Inrtum Justitia. Intrum Justitia conducts annually a survey in 25 European countries tracking trends in payment behaviours in Europe. The survey takes into account the weight of the different size classes of companies, business sectors and customer groups (B2B, B2C, or public authorities). The indicator Average delay in payments from public authorities (in days) was chosen. The present situation in European Countries makes it important that firms are paid on time. The descriptive statistics show that the variance is quite large across countries. The lowest average payment delay is 4 days, while the longest delay is 80.4 days. Payment delays of public authorities are highly correlated with the cost of starting up a new business and show moderate correlation (correlation coefficient between 0.4 and 0.6) with government effectiveness, regulatory quality, the time to start up a business and the time required settling contract disputes. However, payment delays are not statistically significantly associated with GDP per capita (see Table 1.4).

Property rights and correctly enforced contracts are very important for incentives to invest and to innovate. Contract enforcement institutions help to resolve disputes between private parties. Their efficiency and impartiality are crucial for a business environment that fosters growth, risk-taking and investment. The most important institution for the resolution of contract disputes is the civil court system. The last specific link covered is the efficiency of civil justice. The efficiency of a civil justice system comprises four aspects: (i) the correctness of judgements, (ii) duration and (iii) cost of the proceedings, and (iv) cost of public spending on civil justice. Three of these dimensions are measured by four different indicators. The first three indicators (time required to enforce contracts, costs required to enforce contracts, the time required for insolvency proceedings) measure primarily the direct costs to enterprises in legal proceedings. These indicators come from the World Bank Doing Business database, which provides homogeneous information on the costs and duration of procedures to resolve a commercial dispute and to resolve insolvency. The cost and duration are calculated using homogeneous cases. For contact enforcement the case is a sales dispute with the value of 200% of the economy's income per capita where the judgement is 100% in favour of the seller. For resolving insolvency (formerly closing a business) the case is the failure of a limited company that runs a hotel. An indicator for the efficiency of insolvency proceedings is included, as a number of studies have shown that bankruptcy regulations do not only define ex post resolution cost but also affect incentives to provide finance for risky projects and incentives to start-up a business (e.g., Claessens and Klapper, 2005) and have therefore broader importance in the business environment. The fourth indicator judicial independence measures the perceived overall fairness and impartiality of the legal system. To be more precise this indicator is based on answers to the survey question: "To what

extent is the judiciary in the country independent from influences of members of government, citizens and firms?" of the World Economic Forum's annual Executive Opinion Survey that is used to compile the Global Competitiveness report. The score ranges from 1 (equals "heavily influenced") to 7 (equal to "entirely independent"). Interestingly, the correlation across those four indicators is not very strong. This indicates that the indicators capture indeed very different aspects of the efficiency of the legal system. The only moderate (negative) correlation coefficient (correlation between 0.4 and 0.6) is obtained for the pair time required for insolvency proceedings and the independence of the judiciary. These two indicators show also a direct relationship to GDP per capita: Insolvency proceedings are faster in richer countries and richer countries have a higher rating for the independence of its judiciary.

Table 1.4 – Correlations between PA-efficiency indicators

Dep Var.	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita
Indep. Var.	Government Effectiveness	Regulatory Quality	E-Government availabilty	Freedom of Corruption	Starting Business Time	Starting Business Cost
coeff	1.7134**	2.7804**	0.0199	0.0590**	-0.0339*	-0.0512+
	(0.265)	(0.434)	(0.015)	(0.009)	(0.014)	(0.025)
Constant	0.2478	-1.2349*	0.9987	-1.5739**	3.1386**	2.7604**
	(0.313)	(0.504)	(1.071)	(0.475)	(0.397)	(0.354)
Observations	27	27	26	27	25	25
R-squared	0.53	0.58	0.07	0.64	0.11	0.05

Dep Var.	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita	GDP per capita
Indep. Var.	Payment Delay	Paying taxes Time	Enforcing Contracts Time	Enforcing Contracts Cost	Resolving Insolvency Time	Independent Judicary
coeff	-0.0093	-0.0043*	-0.0013	-0.0184	-0.4673*	0.5213**
	(0.008)	(0.002)	(0.001)	(0.049)	(0.171)	(0.076)
Constant	2.5495**	3.4489**	3.0661**	2.7413*	3.3956**	-1.1434*
	(0.404)	(0.553)	(0.647)	(1.131)	(0.400)	(0.440)
Observations	20	25	25	25	25	27
R-squared	0.03	0.27	0.06	0.01	0.26	0.50

Source: WIFO calculations.

3.2 Measuring Firm Growth

High firm growth data is provided by Eurostat. The measure of high growth firms follows the definition proposed in the Eurostat-OECD Manual on Business Demography Statistics (Eurostat-OECD, 2007) which is used both by all European statistical offices and the OECD in their statistics on fast-growing firms. High growth firms are defined as firms that achieve an annualised growth rate of at least 20 % over a three-year period and have a size of at least 10 employees at the beginning of that period. Employment was chosen as the underlying indicator to measure firm growth. The indicator is the share of high growth firms, and is calculated as the number of high-growth enterprises as a percentage of the total population of active enterprises with at least 10 employees.

Data on high-growth firms are available at the NACE, 2-digit industry level for the periods 2005 through 2007 and 2008 through 2010 in separate NACE classifications (Rev. 1.1 and Rev. 2), which also affects the country coverage. To smooth erratic fluctuations in single years, country-industry averages were calculated. The averaging reduces the impact of outliers and thereby improves the data quality. In particular, the use of averages allows concentrating on structural correlations and causal links in the data.

The data of NACE Rev. 1.1 are provided for the period 2005 through 2007. The dataset contains 428 observations covering Belgium, Czech Republic, Denmark, Estonia, Hungary, Italy, Luxemburg, Latvia, Netherlands, Poland, Romania, Sweden Slovenia, Slovakia and Spain. The sample-mean of the share of high growth firms is 4.6%, ranging from 0 to 33.3%. The standard deviation is 3.7%. Furthermore, the NACE Rev. 2 classification is used to compute average values for 25 industries for the period 2008 through 2010. This provides 236 observations covering the Czech Republic, Cypress, Estonia, France, Hungary, Italy, Luxemburg, Portugal, Romania, Sweden, Slovenia and Spain.

As an additional performance indicator employment growth at the industry-country level was included. This indicator is implicitly a size-weighted average firm growth rates. Unfortunately no unweighted average of firm growth rates is available from the official statistics. The unweighted average would provide the average growth rate of firms in an industry. The use of the weighted average documents at the same time industry growth, which is likely related to share of high growth firm but provides evidence on growth that, is not driven by high growth firms. The use of employment growth as an additional performance indicator allows addressing the underlying objective of aggregate employment generation. Albeit this study focuses on firm growth, the primary interest is not in the number of high growth firms or the high growth firm itself, but to uncover aggregate implications of having a larger share of high growth firms. An understanding of how these performance indicators are related is therefore required to draw sound policy recommendations from the present results. The number of persons employed (V161100) provided by Eurostat's Structural Business Statistics was used for the NACE Rev. 2 classification. Employment data at the industry-country level for NACE Rev. 1.1 classification were poorly available. Hence employment information from EUKLEMS complemented the sample and increased the sample size.

The samples of the HGF and employment growth indicators are not comparable, because they were drawn from different country-industry sets. To generate comparability only observations were used for which data for both indicators was available. To further increase the sample size, the NACE Rev. 1.1 sample was complemented by national accounts data about nine, mainly service industries, adding a total of 135 observations.

Table 1.5 – Correlations between PA-efficiency indicators

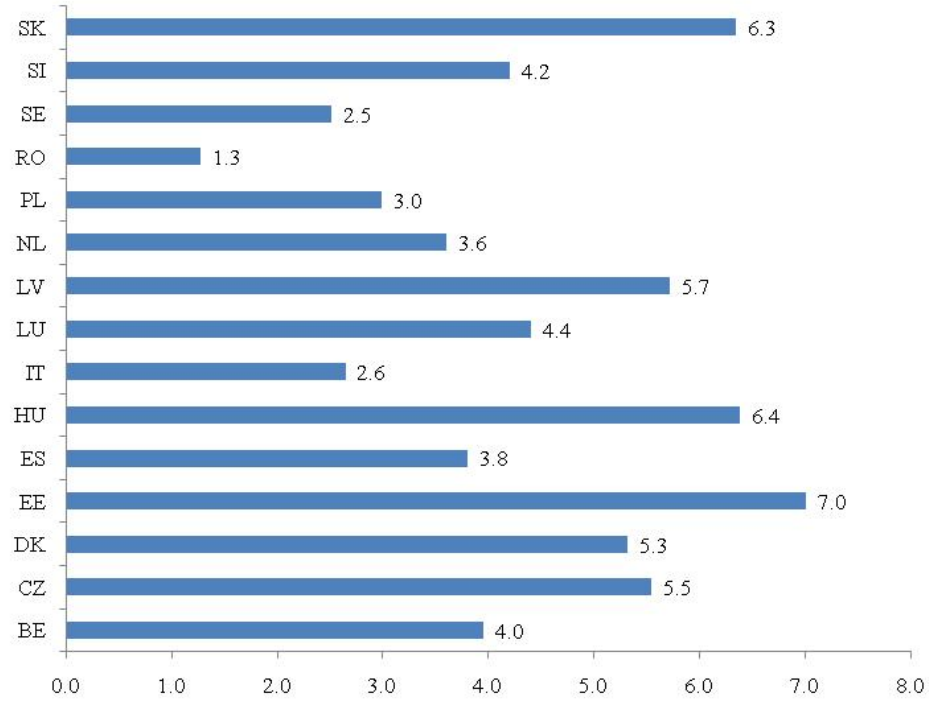
	NACE Rev. 1.1.		NACE Rev. 2	
	HGF share in %	Employment growth in %	HGF share in %	Employment growth in %
Observations	322	322	206	206
Mean	4.47	0.01	5.79	0.02
Median	3.92	0.01	4.41	0.00
Std. Deviation	2.95	0.06	5.25	0.24
Min.	0.00	-0.33	0.00	-0.19
Max.	21.05	0.60	35.29	3.22

Note: Numbers in the table are based on averages. NACE Rev 1.1 refers to average values for the years 2005 to 2007, NACE Rev 2 refers to average values for the years 2008 to 2010. The data used is a subsample, which only contains observations for which both indicators were available. Country coverage is different for NACE Rev. 1.1 and NACE Rev. 2.
Source: WIFO calculations.

Table 1.5 provides descriptive statistics for the share of HGFs and industry level employment growth. The samples used contain only observations for which both indicators were available. This improves the comparability of each sample across countries. Being consistent across indicators, the samples themselves differ in their country coverage, which is inter alia reflected by the median share of HGFs. In the NACE Rev. 1.1 sample for the period 2004-2007, the median amounted to 3.92%, while in the 2008-2010 NACE Rev. 2 samples the median was slightly higher at 4.41%.

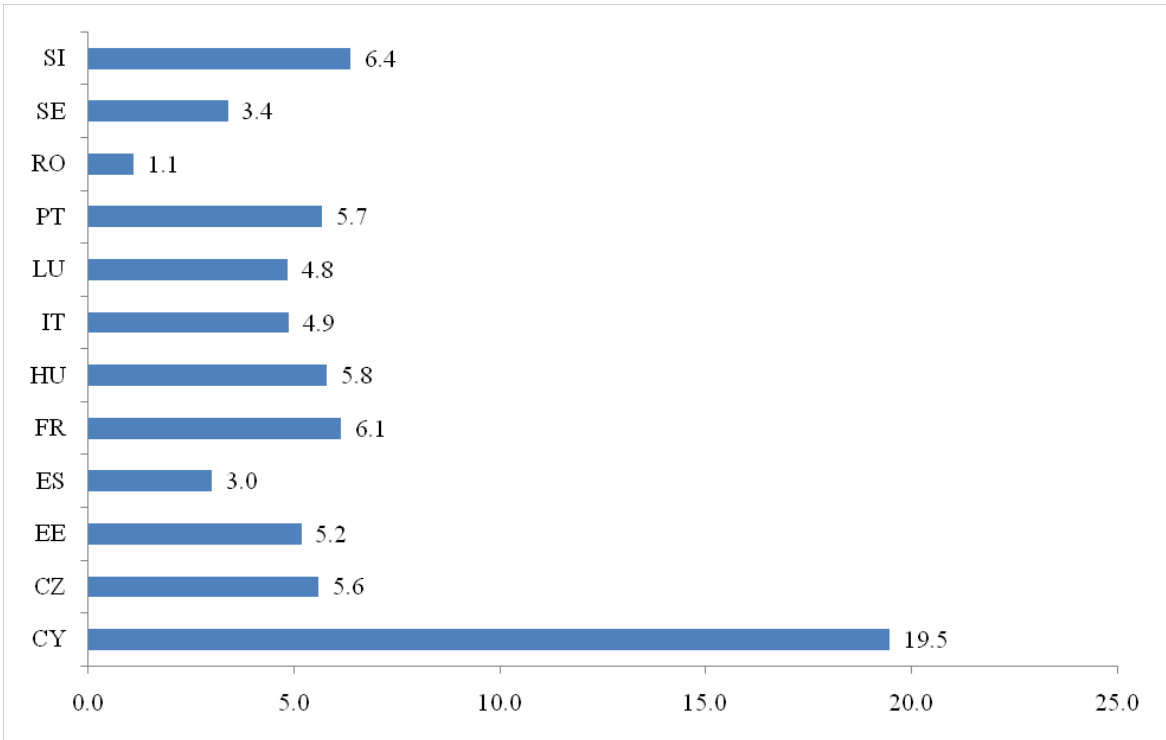
Figure 1.2 shows the country means of the shares of HGFs across industries for the NACE Rev. 1.1 sample. Countries in convergence processes such as Spain (7%), Hungary (6.4%) or Slovakia (6.3%) exhibit higher mean shares of HGFs than more mature economies, like Sweden (2.5%). Figure 1.3 indicates that the mean growth rate of HGFs is highest in Cypress (19.5% across 17 NACE 2-digit industries). Romania has the lowest proportion of fast growing firms. The cross-country variance indicates that not necessarily the countries with the most 'efficient' PA have the highest shares of HGFs.

Figure 1.2 – Share of high growth firms, mean, NACE Rev 1.1



Source: EUROSTAT, WIFO calculations.

Figure 1.3 – Share of high growth firms, mean, NACE Rev. 2



Source: EUROSTAT, WIFO calculations.

3.3 Indicators of industry-specific Characteristics

The econometric analysis (see next section) requires the use structural industry indicators. The descriptive statistics are presented here without going into detail why these indicators were used. The indicators were selected on the basis of two requirements: (i) they need to be easily linked to firm growth and have an interpretation that they explain a different impact of public administration efficiency on different industries and (ii) that they would be available for the countries and time period under consideration. The selected five industry characteristics:

- the firm turnover rate
- net entry rate
- average firm size
- gross value added growth
- capital intensity.

The data sources for the firm turnover rate and the net entry rate are the Structural Business Statistics of Eurostat. The database has readily available information on the firm turnover rate, labelled business churn (V97015) and the net entry rate, labelled business population growth (V97010).

The indicator for the average firm size was calculated using two different data sources for NACE Rev. 1.1 and NACE Rev. 2. Data from the Structural Business Statistics was used for the NACE Rev. 2 classification. The average firm size was defined as the number of persons employed (V161100) divided by the population of active enterprises (V11910). Since the coverage of employment data in the Structural Business Statistics for NACE Rev. 1.1 classification was comparatively poor, employment data from EUKLEMS to calculate the average firm size was used.

The value added growth rate is based on Eurostat's national accounts aggregates by branch (NACE Rev. 2) for the period 2008 through 2010, and national accounts aggregates and employment by branch (NACE Rev. 1.1) for the period 2004 through 2007. The growth rate of gross value added applied is a geometric average. Also the indicator for capital intensity is derived from the national accounts by branch data. Information on the depreciation by branch served as a proxy to calculate the capital intensity as ratio of the depreciation and gross value added. Unfortunately capital stock data was available only for a few countries for NACE Rev 2. In order to have consistent indicators of capital intensity the available capital stock data from the EUKLEMS database for NACE Rev. 1.1 was not used. The descriptive statistics for the industry characteristics are reported in Table 1.6.

Table 1.6 – Descriptive statistics of industry characteristics (NACE Rev. 1.1. & NACE Rev. 2)

	Turnover rate	Net entry rate	Avg. firm size (persons)	Gross VA growth in %	Capital intensity proxy
NACE Rev. 1.1.					
Observations	297	299	167	303	232
Mean	15.58	2.61	123.07	1.05	0.20
Median	14.70	1.11	13.87	1.04	0.15
Std. Deviation	6.74	6.87	487.31	0.09	0.25
Min.	0.00	-16.67	0.36	0.53	0.03
Max.	48.86	35.93	3759.42	1.48	3.48
NACE Rev. 2					
Observations	225	225	225	191	140
Mean	17.63	1.36	22.19	0.97	0.33
Median	16.76	0.61	5.93	0.98	0.15
Std. Deviation	7.42	7.66	56.16	0.09	1.55
Min.	0.00	-17.80	1.40	0.53	0.00
Max.	44.28	41.92	479.84	1.28	18.48

Note: Numbers in the table are based on averages. NACE Rev 1.1 refers to average values for the years 2005 to 2007, NACE Rev 2 refers to average values for the years 2008 to 2010. Country coverage is different for the two time periods and indicators.
Source: WIFO calculations.

4 UNCOVERING THE LINK BETWEEN PUBLIC ADMINISTRATION EFFICIENCY AND FIRM GROWTH

4.1 Introduction

In a first step to analyse the relationship between industry performance and public administration efficiency, a set of regressions relate performance indicators to public administration efficiency indicators, controlling for industry-specific effects and GDP per capita for aggregate productivity differences across countries. These regressions are for illustrative purposes only and should be interpreted as conditional contemporaneous correlations between public administration indicators, level of economic development and firm growth indicators. It is not possible to give these regressions a causal meaning therefore they should be considered to be exploratory. Moreover, the coefficients are not identified.

Table 1.7 reports the regression results for high growth firms with robust standard errors. The results suggest that there are links between public administration efficiency and high firm growth that are not related to the level of economic development (GDP per capita). The indicators for general governance and the regulatory quality show a positive association with the share of high growth firms, while the association of time and cost to enforce contracts and delays in payments from public authorities showed as expected a negative association with the share of high growth firms. Surprisingly, the time to start a business is positively associated with the share of high growth firms. For the other public administration efficiency indicators no partial correlation coefficient is statistically significant. These are the indicators for e-government, freedom of corruption, the cost of starting a business, the time to prepare and file tax returns and pay taxes, the indicator for an independent judiciary and for resolving insolvency.

Table 1.8 reports the similar results for employment growth. The estimated coefficients are almost all negligible in size, and in most cases statistically insignificant. Only the partial correlation of general government effectiveness with employment growth shows a statistical significant result s, but the result is counterintuitive. The coefficient was negative. Robustness checks from an unreported median regression produced comparable to the reported OLS regressions.

The OLS regressions seem to confirm that a more efficient public administration exerts a positive effect on the shares of fast growing firms at the country level. However, these results are biased and do not provide clear information on the link between the share of high growth firms and public administration efficiency indicators. The econometric modelling of the interaction between public administration and firm competitiveness indicators requires special attention. The OLS coefficients in Table 1.7 and Table 1.8 are not identified. A large number of country-specific variables that differ from the public administration efficiency indicators are not included. However, including such variables does not help, as many country-specific variables show a very high correlation with GDP per capital or indicators of public administration efficiency. Therefore, the coefficients cannot provide the basis for a causal story of the impact of the public administration efficiency indicators on high firm growth. They could also reflect common determinants and macroeconomic variables that may have in reality only a weak relationship to the public administration efficiency.

4.2 Econometric Identification of the Impact of Public Administration Efficiency on Firm Growth

The regression analysis has shown that many of the PA efficiency indicators are related to the country-industry share of high growth firms in the expected way. However, these results are not reliable. The estimated coefficients are to be interpreted as conditional correlation coefficients. They do not identify a causal relationship due to potentially omitted variables and possible reverse causality. Put differently, public administration efficiency is related to the share of high growth firms, but it remains unclear if an efficient PA causes firm growth.

This identification issue is further aggravated by the data structure. The short time periods for which the data are available do not allow identifying the effect of changes in PA efficiency over time. PA efficiency indicators reflect structures that only change slowly, whereas the share of high growth firms across countries, and industries, varies to a much greater extent. This renders an unambiguous identification of the effect at the macro-economic level unfeasible.

The present challenge is to overcome these problems econometrically, i.e. to identify the causal impact of public administration efficiency on the rate of high growth firms. The applied method was originally developed by Rajan and Zingales (1998), and adjusted to control for possible bias by Ciccone and Papaioannou (2007). The estimator has recently been used to identify the effects of institutions on firm growth distributions in an OECD policy paper (Bravo-Biosca et al., 2013).

Table 1.7 – HGF and PA – exploratory OLS regression results

Dependent variable	HGF	HGF	HGF	HGF	HGF	HGF	HGF	HGF	HGF	HGF	HGF	HGF
Governance Indicator	GE	RQ	E-gov. Avail.	FREECORR	SB Time	SB Cost	EPI	PT Time	EC Time	EC Cost	RI Time	INDJUS
Coefficient	1.7936**	3.4780**	-0.0128	0.0180	0.0512**	0.0165	-0.0213*	0.0012	-0.0014**	-0.0862**	0.1179	0.2728*
Std. errors	(0.400)	(0.633)	(0.012)	(0.015)	(0.010)	(0.029)	(0.009)	(0.001)	(0.000)	(0.024)	(0.095)	(0.138)
Industry dummies and GDP per capita included as control variable												
Observations	383	383	383	383	383	383	291	383	383	383	383	383
R-squared	0.736	0.744	0.722	0.722	0.734	0.721	0.821	0.722	0.726	0.730	0.722	0.724
Robust standard errors in parentheses												

Source: WIFO calculations.

Table 1.8 – Employment growth and PA – exploratory OLS regression results

Dependent variable	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Emp. growth	Emp. growth
Governance Indicator	GE	RQ	E-gov. Avail.	FREECORR	SB Time	SB Cost	EPI	PT Time	EC Time	EC Cost	RI Time	INDJUS
Coefficient	-0.0106+	0.0083	-0.0000	-0.0003+	0.0003+	-0.0004	-0.0003*	-0.0000	-0.0000*	-0.0000	0.0016	-0.0029
Std. errors	(0.006)	(0.014)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.002)
Industry dummies and GDP per capita included as control variable												
Observations	267	267	267	267	267	267	234	267	267	267	267	267
R-squared	0.241	0.236	0.235	0.241	0.243	0.237	0.280	0.240	0.248	0.235	0.237	0.241
Robust standard errors in parentheses												

Source: WIFO calculations.

Box 1.2 – IDENTIFYING THE IMPACT OF PA-EFFICIENCY ON FIRM GROWTH

Cross-sectional regressions indicate a positive relationship between PA efficiency and the shares of fast growing firms. However, these estimations are not identified, especially because there may be omitted variables. Moreover, the data structure aggravates the causality problem. E.g., available time series are short and PA efficiency measures change slowly over time. To overcome these issues, an estimator that adds the industry dimension is implemented (Rajan and Zingales, 1998). The idea is that industries are affected differently by different PA efficiency measures. For instance, the efficient provision of entry-exit regulations is likely to play a greater role in industries with more firm turnover. The interaction of these two indicators is then assumed to drive aggregate firm growth.

The method follows a stepwise approach. First, it requires a conceptual link that is reflected by industry-characteristics (such as firm-turnover rates). These moderate the effect of PA-efficiency on firm growth (such as PA-efficiency related to entry-exit). Second, the conceptual link is assumed not to vary across countries. Yet, the observed industry characteristics across countries are affected by national policies and framework conditions. This is addressed by using a benchmarking country (or country group), which represents a (largely) 'frictionless' economy. Third, the share of HGFs at the country-industry level is regressed on the interaction of the PA-efficiency indicator at the country level and the industry-specific characteristics of the benchmark, controlling for country and industry-specific effects. Eventually, in the study an instrumental variable regression technique proposed by Ciccone and Papaioannou (2007; 2010) is used. This technique allows to control for possible bias due to the choice of benchmarking countries.

The estimated coefficient indicates whether industries that are more reliant on an efficient public administration exhibit relatively more fast growing firms in countries that have a more efficient public administration. For instance, industries with a greater firm turnover are expected to generate more HGFs. This effect is moderated by better and more efficient general governance system. Put differently, industries with low firm turnover rates in an inefficient governance environment will perform worse than industries with high firm turnover in a sound governance environment. The expected sign of the estimated coefficient is therefore positive.

The presently implemented method seeks to overcome the identification issue by introducing an additional dimension. It not only explores cross-country, but also cross-industry variance. The use of industry-level data hinges on the idea that an industry's need for the efficient delivery of public administration services differs across sectors. As a result, PA efficiency has a different impact on different industries. For instance, industries that exhibit greater firm dynamism are likely to perform better if public services that are related to entry-exit are provided efficiently. PA efficiency in entry-exit is likely to facilitate firm turnover. If firm-turnover itself is less relevant to an industry, such public services are likely to be less relevant to that industry's performance.

The pivotal element in this estimation strategy is to identify a conceptually clear and robust link between industry-level indicators that moderate the impact of public administration indicators, and affect the share of high growth firms. Put differently, an industry variable moderates the impact of PA efficiency across heterogeneous industries, and is expected to affect the growth performance of firms (industries). Notably, the method requires an appropriate industry characteristic to identify the causal effect. If no such industry variable is available or a wrong industry variable is selected, then the relationship cannot be identified.

The public-administration indicators presented above linked to firm growth rates through a series of conceptual links. The estimations explore the impact of the interaction between industry-specific indicators and PA-efficiency and industry characteristics (see Table 1.9 for further details about the interactions).

The econometric model links indicators on firm dynamics with indicators for public administration efficiency and a number of industry-level moderator variables. The basic equation is

$$FG_{c,i} = \alpha + \beta\,(PA_c \times IND_i) + \mu_c + \mu_i + \varepsilon_{c,i} \qquad (1.1)$$

where FG is the firm growth indicator (share of high growth firms or employment growth at the country-industry level). PA denotes a national public administration efficiency indicator and IND an industry characteristic that is appropriate to the specific link between the PA indicator and the dependent variable. *i* indexes industries and *c* countries; μ_c and μ_i are country and industry specific effects, respectively, and $\varepsilon_{c,i}$ is an i.i.d. error term.

As the data on the distribution of high growth firms is more reliably if expressed in longer time averages, only the cross-section is used instead of a pooled regression with time dummies. Again, the basic idea is to identify the causal impact of PA efficiency indicators by exploiting the variation across sectors for their expected impact, controlling for sectoral and country-specific unobserved factors.

The impact of an efficient public administration is estimated in the interaction term $PA_c \times IND_i$. This coefficient is identified, because country and industry specific effects are included in the regression. The interpretation of the estimated indicator is straightforward. It examines whether industries that are more reliant on an efficient

public administration exhibit relatively more fast growing firms in countries that have a more efficient public administration.

This should minimise the problems of endogeneity of public administration variables. The feature of this methodology is that the interaction terms allow inferring the effect of PA-efficiency on industry variables, while controlling for other country observable factors that have been omitted from the regression equation, which might however be potentially correlated with national policy characteristics (Bravo-Biosca et al., 2013).

The underlying pattern of the industry characteristics themselves that are used in the regressions does not vary across countries. The observed country-variation, however, may be affected by national policies or sectoral comparative advantages that do not reflect global influences. For instance, the turnover rate of the industry "E41 Collection, purification and distribution of water" exhibits a sample mean of 9%, whereas "E45 Construction" averages at 21%. In (almost) all observed countries there is more firm dynamism in construction than in the purification of water (NACE Rev. 1.1). However, these differences vary across country due to country specific effects. The variation coefficient (i.e. the variance as a percentage of the mean) is 48% in construction and 40% in water purification. This is another source for potential bias, which is avoided by the idea that the averages of benchmark countries provide a proxy for a largely frictionless (or least inefficient) economy. This implies that the 'good-practice' economy faces average sectoral demand and technology shifts that are not affected by the specific national configuration and policies.

Rajan and Zingales (1998) originally used this identification scheme to identify the impact of financial market development on industry growth and entry by using external financial dependence as the industry-level variable. The United States were used as benchmark country. The idea behind this estimation strategy was that financial development should have a stronger impact on industry development and entry in industries that have a higher external financial dependence. The USA was selected as the single benchmark country, because it was assumed to be the country with the highest financial development. The USA was then excluded from the sample. This research, however, will select a set of 'good-practice' countries to create a hypothetical benchmark that have an above average PA efficiency.

Ciccone and Papaioannou (2007) criticised the estimation strategy used by Rajan and Zingales (1998), because the use of a moderator variable for just one benchmark country may affect the results, since the industry characteristics in the benchmark country consist of global as well as country-specific influences. Value added growth, for example, reflects both global as well as country-specific demand and productivity shifts.

Ciccone and Papaioannou (2007) emphasise that correcting for the country-specific determinants is relevant, as these country-specific influences lead to measurement errors that may lead to biased estimates. While this is especially important when one uses one, and only one country (such as Rajan and Zingales, 1998 and Ciccone and Papaioannou, 2007) this could possibly affect the estimates. This research selected countries with high PA-efficiency. In the NACE Rev 1.1 specification, data was available for Denmark and Sweden, i.e. two Northern European countries that are from the same region. In the NACE Rev. 2 regressions, Denmark was used as the only quasi-benchmark due to restricted data availability. Ciccone and Papaioannou (2007) discuss the possible bias in greater detail, and emphasise that country-specific influences should bias the estimates downwards. However, depending on the correlation patterns of country-specific determinants across countries, the bias could also be upwards. Ciccone and Papaioannou (2007; 2010) propose an instrumental variable estimation procedure that will be implemented in the present report.

Ciccone and Papaioannou (2007) propose an instrumental variables (IV) estimator for the estimation of the consistent coefficients. They propose instrumenting the benchmarking industry variable with a different indicator that is correlated with the global component of the benchmarking country's industry values, but is not correlated with the specific component of the benchmarking country. This should lead to an industry indicator that is "purged" from individual countries' effect.[3]

This two-step approach is implemented to estimate industry indicators that reflect industry characteristics in a (hypothetical) country facing representative demand, technology and policy shocks. The first step computes the least squares prediction for the industry indicators (IND) based on a regression on country and industry-specific effects as well as the interaction of the respective country-level PA efficiency indicator with industry effects. This prediction is given by:

[3] For further details on the discussion of the bias and the construction of the instrument, see Ciccone and Papaioannou (2007; 2010).

$$IND_{c,i} = \mu_c + \mu_i + \mu_i PA_c + \varepsilon_{c,i} \quad (1.2)$$

where μ_c are country fixed effects, μ_i are industry-specific effects that are additionally interacted with country-specific public administration efficiency measures (PA_c). The benchmarking countries are not used in this estimation to assure that the predictions do not capture specific effects of the benchmark-country. In the second step, the IV is generated by predicting the industry-specific indicators for the averaged values of the benchmark countries. This variable is equal to the estimated industry fixed effect plus the benchmarking country value of the PA efficiency variable multiplied by its industry-specific coefficient.

The use of this econometric methodology allows identifying the impact of public administration quality. The estimates reflect the difference in the differential effect of the policy in different sectors if moving from a country with low values to countries with a high value for that particular PA impact. Notably, this does not allow identifying specific sectoral impacts, but only the impact at the national level (Bravo-Biosca et al., 2013).

4.3 Linking industry-specific characteristics and PA Efficiency

The econometric approach hinges on industry-specific characteristics. The main underlying assumption is that the effect of public policies differs across industries. Estimating the impact of public administration efficiency on the rate of high-growth firms requires knowledge which industries are more affected by the public administration, and which direction that effect takes.

Five industry-specific characteristics are used in the study. Firm dynamics are covered by the indicators firm turnover-rate and firm net entry rate. Higher firm dynamics allow a greater reallocation of market shares towards more productive firms, therefore it is expected that high growth firms are more prevalent in industries with greater firm dynamics. If public administration inefficiency affects firm dynamism industries with a high turnover rate and/or firm net entry rate are expected to be affected more by the inefficiency than industries with low firm dynamics. The average firm size is used as an indicator of the minimum efficient scale of operations in an industry. This may reflect structural entry barriers. Here the expectation is that administrative burdens affect primarily smaller firms. Thus industries with a low average firm size may benefit more from an efficient provision of services that is accompanied with lower administrative burdens. However, there may also be a link to incentives to invest as a higher average firm size often also reflects economies of scale. Here an inefficient public administration may affect incentives to invest. In this case industries with a high average firm size benefit more from an efficient public administration. The investment channel is expected to be more important for indicators of general governance, corruption and impartial judiciary, while the administrative burden channel should be more important for specific regulations measured in terms of time and cost. In order to check this relationship capital intensity was also included as an indicator, as capital intensity is often associated with a larger average firm size in an industry and incentives to invest are more important for high growth firms in capital intensive industry. The last indicator used is average gross value added growth. This indicator should reflect the growth potential of industries. Here the assumption is that inefficiencies in the public administration affect firm growth in industries with high growth potential to a larger extent than in stagnating industries.

The expected sign of the interaction effect is depicted in Table 1.9. The differential links between firm dynamics indicators are quite straightforward: It is expected that a more efficient public administration affects industries with a high firm dynamics to a greater extent than industries that show low firm dynamics. This relationship holds for the industry characteristics: firm turnover rate, net entry rate of firms and the growth rate of value added (that signals growth potential). The expected sign depends on the directionality of the public administration efficiency indicator. When high values of the public administration indicators depict high efficiency as for instance in the cases of regulatory quality, government effectiveness of independent judiciary the expected sign is positive, indicating that industries with higher firm turnover, higher net firm entry or higher value added growth display ceteris paribus also a higher share of high growth firms. In contrast, when low values of the public administration indicators depict high efficiency the expected sign is negative.

Less straight-forward is the determination of the sign for the links average firm size and capital intensity. The regression analysis should be considered as a rather exploratory tool than an instrument for hypothesis testing. Two different mechanisms can be identified in the literature. First, there may be an effect of higher public administration efficiency on investment incentives. Such relationships have been documented by Alesina et al. (2005) for investment and by Bassanini and Ernst (2002) for R&D. This channel should dominate for the case of general public administration efficiency indicators that focus primarily on the quality of public administration (government effectiveness, regulatory quality, freedom from corruption and independent judiciary). In this case, a more efficient regulation is expected to be more advantageous for the growth rate of firms in industries with high capital intensity and a higher average firm size.

However, a second link may exist. When improved public administration efficiency affects primarily administrative burdens, then one should expect that industries with smaller firms benefit more from a more efficient public administration. The expected sign of the estimated interaction coefficient is then reversed with regard to the investment channel. In the present case, the SME channel is expected to hold for links that refer to operational aspects of the PA. For example, a more efficient start-up regulation should affect employment growth and the share of high growth firms in industries with low capital intensity or a low average firm size.

The indicator set about the efficiency of the civil justice system amalgamates dimensions of both inefficiency and efficiency. In order to arrive at unambiguous expected signs, the indicators were split into two sets. Indicators that measure firms' operational costs such as the costs of contract enforcement measure inefficiencies and quantify transaction costs (see G1 in Table 1.9), while the indicator 'independent judiciary' measures the perceived impartiality of the legal system and resembles a general governance indicator (see G2 in Table 1.9).

Given the ambiguity involved, it is not expected that all relationships lead to statistically significant results. As explained earlier the identification scheme used depends crucially the choice of an appropriate variable that mediates the differential impact of public administration efficiency across industries. Using a set of five industry characteristics that are uniform across the links emphasises the exploratory intention of this study. Nevertheless, the estimation methodology allows identifying causal links of public administration efficiency on high firm growth and employment growth. The main technical requirement is the existence of a meaningful heterogeneity of the impact of public administration efficiency that is mediated by observable industry characteristics.

5 RESULTS

The following explores whether the interaction of the industry-specific characteristics and PA efficiency affects firm growth rates. The relationships examined are for the general governance indicators, e-government, corruption and fraud, starting a business, public payment morale, administrative burden of the tax system and efficiency of civil justice. The estimated coefficient indicate whether industries with specific industry characteristics (average firm size, industrial dynamism and capital intensity) exhibit relatively more fast growing firms in countries that have a more efficient public administration. Employment growth is used as an alternative outcome indicator. The impact of an efficient PA on firm growth is estimated for both NACE Rev. 1 and NACE Rev. 2.

The results show that PA efficiency has an impact on the rate of high growth firms and employment growth at the NACE 2-digit industry level. More PA-efficiency induces greater rates of fast growing firms, in particular by increasing the firm turnover and net-entry. This holds especially for general indicators that measure the overall governance system, including the presence of an independent judiciary and freedom of corruption. Indicators that measure PA-efficiency in dimensions related to operational aspects of firms show weaker effects. Especially the time to resolve insolvencies and efficiency in the tax administration can be linked to greater rates of high-growth firms via firm dynamism channels.

In addition, the identified patterns suggest that firm-growth and employment growth rates are not identical but different processes. PA-efficiency also increases employment growth, especially via investment-related channels such as capital intensity. Again, the general indicators (regulatory quality, general governance, freedom corruption and fraud, independent judiciary, cost to enforce contracts) perform better than indicators that measure specific operational dimension. These results also imply that improvements in the efficiency (and quality) of the public administration is conducive to both firm and overall employment growth, even though these occur via differential processes.

The econometric methodology on which the following results draw allows identifying the impact of public administration efficiency through pre-defined channels. The impact of certain aspects public administration efficiency is mediated by the selected industry characteristics. For instance, industries with high entry dynamics in countries with fast start-up procedures benefit more from the efficient provision of entry services than industries with low entry dynamics in countries where starting a business takes longer. The idea for this difference-in-difference estimator reaches back to Rajan and Zingales (1998), whose method does not correct for the country-specificities in the industry characteristics, which may cause biases. The presently implemented instrumental variable estimator corrects for the individual country effects of the industry indicators in the benchmark countries (see Ciccone and Papaioannou, 2007). The selected benchmark countries with high PA efficiency are advanced northern European countries (Denmark and Sweden for NACE Rev. 1.1 and only Denmark for NACE Rev. 2 due to data restrictions). The coefficients can be interpreted in the same fashion as the Rajan and Zingales (1998) method, which have been computed as a robustness check. The results do not indicate fundamental differences in the coefficients, and therefore remain unreported.

Table 1.9 – Conceptual links between PA-efficiency and industry-characteristics

National PA efficiency indicator	Industry link	Expected sign of coefficient: high values = high efficiency	Expected sign of coefficient: low values = high efficiency	Motivation
A) General governance	Average Firm Size	Positive		Good governance affects incentives to invest
	Dynamism: Turnover of firms, growth potential	Positive		Industry dynamism and good governance reinforce each other
	Capital Intensity	Positive		Good governance affects incentives to invest
B) Availability of e-government	Average firm size	Negative		Small firms benefit relatively more from e-government than large firms
	Dynamism: Turnover of firms, net entry, growth potential	Positive		E-government and industry dynamism are reinforce each other
	Capital Intensity	Negative		E-government has a larger impact on low capital-intensive industries
C) Corruption and fraud	Average Firm Size	Positive		Corruption affects incentives to invest negatively
	Dynamism: Turnover of firms, net entry, growth potential	Positive		Dynamic industries benefit from a corruption free environment
	Capital Intensity	Positive		Corruption affects incentives to invest negatively
D) Starting a business and licensing	Average Firm Size		Positive	Industries with a high share of small firms are negativel affected by higher start-up costs and time
	Dynamism: Turnover of firms, net entry, growth potential		Negative	Industries with greater dynamism are negatively affected by higher start-up costs and time
	Capital Intensity		Positive	HGF in capital-intensive industries are less affected by high start-up costs
E) Public procurement	Average Firm Size		Positive	Delays in public procurement hamper firm growth, especially in small firms
	Dynamism: Turnover of firms, net entry, growth potential		Negative	Dynamic industries are negatively affected by inefficiencies in public procurement
	Capital Intensity		Positive	Capital intensive industries are less affected by poor public payment morale
F) Tax compliance and tax administration	Average firm size		Positive	Large firms and inefficient tax administration negatively affect firm dynamism
	Dynamism: Turnover of firms, net entry, growth potential		Negative	Industrial dynamism is hampered by an inefficient tax administration
	Capital Intensity		Positive	Industries with larger firms are less affected by an inefficient tax administration
G1) Efficiency of civil justice, operations related	Average Firm Size		Positive	Large firms are less negatively affected by higher transaction costs
	Dynamism: Turnover of firms, net entry, growth potential		Negative	Higher transaction costs hamper firm dynamics
	Capital intensity		Positive	SME channel
G2) Efficiency of civil justice, independent judiciary	Average Firm Size	Positive		Industries with smaller firms are affected by an inefficient justice system / impartial justice affects investment incentives
	Dynamism: Turnover of firms, growth potential	Positive		Industries with high firm dynamics are affected more by ineffienct and impartial justice systems
	Capital Intensity	Positive		Industries with smaller firms are affected by an inefficient justice system / impartial justice affects investment incentives

Source: WIFO elaboration.

5.1 General Governance and Regulatory Quality

General governance reflects the broadest measure of public administration efficiency that captures its multidimensional nature by including the efficiency of government and regulations. The general institutional and regulatory framework provides an important starting point to assess the impact of public administration efficiency on firm growth. Table 1.10 and Table 1.11 report the estimates of the impact of government effectiveness and the overall regulatory quality on the share of high growth firms and employment growth. Both variables are expressed so that higher values indicate a higher efficiency (or quality) of public administration. Table 9 expects positive coefficients for the link with dynamism (turnover rate of firms, net entry rate of firms and growth potential as expressed by the growth rate of value added) and negative coefficients for the average firm size and capital intensity.

All regressions follow an instrumental variable approach which includes industry and country specific effects that allow for the identification of the effect. The subsequent tables only report the coefficient of the interaction between the industry-characteristic and the PA-quality indicator. Industry and country specific effects were estimated, but not reported because they merely serve as control variables that are required by the method to be consistent.

The results of the regressions for NACE Rev. 1.1, covering the time period 2004 to 2007 suggest the presence of a clear causal link between government effectiveness and regulatory quality on the share of high growth firms. The results – in line with the expectations – confirm the positive relationship between the presence of high growth firms in dynamic industries characterised by above-average turnover of firms and above-average net entry of firms. These results hold for both samples used - NACE Rev. 1.1 and NACE Rev. 2.

The effects of a more efficient PA can be illustrated by quantifying the results of the difference in difference estimation. For instance, the 10th percentile turnover rate of the NACE Rev. 1.1 sample in the benchmarking economy (Manufacture of machinery and equipment n.e.c.) can be compared to the 90th percentile (Research and development). If Hungary altered its governance system so that its general governance indicator would match the value for the Netherlands, the machinery and equipment industry would generate 1.3 percentage points more high growth firms. This result is stronger in the R&D industry, where such an improvement in the general governance system would generate 2.8 percentage points more high growth firms. Since the R&D sector displays more firm turnover than the machinery and equipment industry, it would benefit more from improvements of the specific PA-efficiency indicator. For the NACE Rev. 2 sample covering the period 2008-2010 the results confirm the hypotheses with regard to the firm turnover and firm entry channel. The average firm size channel is also positively associated to firm growth, which indicates in line with the expectations that incentives to invest in capacities are affected by PA-inefficiencies. This hampers the emergence of high growth firms.

The results for employment growth in the NACE Rev. 1.1 sample as an output indicator are similar, but suggest that other links play a more important role. The coefficients indicate that more dynamic industries, i.e. industries that show high firm turnover rates, are affected more by the government effectiveness indicator. However, both average firm size and capital intensity are positively associated with employment growth. This emphasises the role of size and investment in employment growth processes. In the NACE Rev. 2 sample, the regressions on employment growth did not obtain any statistical significant results for the suggested links (growth potential, average firm size and capital intensity).

It is important to note that the implemented estimation technique does only allow identifying asymmetric effects across industries. If government effectiveness and regulatory quality affect all industries in the same way, then this impact cannot be identified by using the regression technique used. However, as the previous discussion of the unidentified results have shown, it is almost impossible to identify the true impact of general governance indicators on the share of high growth firms or employment growth using other regression techniques.

The results for the regulatory quality regressions largely resemble those of government effectiveness. The differential links turnover rate and net entry display positive signs for NACE Rev. 1.1 sample. In the NACE Rev. 2 regressions, the differential channels net entry and average firm size show significant coefficients. The results for employment growth identical to the results obtained for government effectiveness in NACE Rev. 1.1. The average firm size channel is again statistically significant, albeit its coefficient is almost zero. Capital intensity is also positively associated with firm growth, reflecting the importance of regulatory quality for incentives to invest that affect in turn employment growth.

Table 1.10 – Government effectiveness

General Governance	HGF; Nace Rev. 1.1 (1)	(2)	(3)	(4)	(5)	Employment growth; Nace Rev. 1.1 (1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.1268**	0.2075**	0.0005	4.4774	0.8273	0.0020*	-0.002	0.0000+	0.1044	0.0327+
Std. errors	(0.042)	(0.071)	(0.001)	(5.247)	(1.049)	(0.001)	(0.003)	(0.000)	(0.103)	(0.018)
Observations	322	322	188	322	322	322	322	188	322	322
R-squared	0.603	0.601	0.574	0.591	0.592	0.332	0.326	0.361	0.326	0.333
	HGF; Nace Rev. 2.0					**Employment growth; Nace Rev. 2.0**				
	(6)	(7)	(8)	(9)	(10)	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.1583+	0.3407**	0.1042**	10.7090	-0.7111	0.0163	0.0092	0.0046	-0.1488	-0.2510
Std. errors	(0.091)	(0.099)	(0.037)	(7.073)	(2.392)	(0.013)	(0.007)	(0.004)	(0.172)	(0.255)
Observations	193	193	193	193	193	193	193	193	193	193
R-squared	0.873	0.881	0.878	0.872	0.87	0.236	0.222	0.226	0.218	0.221

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.11 – Regulatory Quality

Regulatory Quality	HGF; Nace Rev. 1.1 (1)	(2)	(3)	(4)	(5)	Employment growth; Nace Rev. 1.1 (1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.1617*	0.3009**	0.0005	6.0303	0.9492	0.0028+	-0.0038	0.0001*	0.3409	0.0830+
Std. errors	(0.071)	(0.116)	(0.001)	(8.299)	(1.681)	(0.002)	(0.005)	(0.000)	(0.222)	(0.043)
Observations	322	322	188	322	322	322	322	188	322	322
R-squared	0.598	0.599	0.572	0.591	0.591	0.330	0.327	0.386	0.333	0.344
	HGF; Nace Rev. 2.0					**Employment growth; Nace Rev. 2.0**				
	(6)	(7)	(8)	(9)	(10)	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.1135	0.4762**	0.1417+	12.0861	1.6652	0.0265	0.0144	0.0082	-0.2518	-0.4044
Std. errors	(0.197)	(0.172)	(0.074)	(12.459)	(4.172)	(0.022)	(0.012)	(0.008)	(0.307)	(0.404)
Observations	193	193	193	193	193	193	193	193	193	193
R-squared	0.870	0.877	0.875	0.871	0.870	0.235	0.221	0.226	0.218	0.220

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.12 – E-government

	HGF; Nace Rev. 1.1					Employment growth; Nace Rev. 1.1				
E-gov availability	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0026	0.0012	0.0000	0.2791	0.0142	0.0000	-0.0000	0.0000	-0.0002	0.0003
Std. errors	(0.002)	(0.003)	(0.000)	(0.195)	(0.036)	(0.000)	(0.000)	(0.000)	(0.005)	(0.001)
Observations	322	322	188	322	322	322	322	188	322	322
R-squared	0.594	0.590	0.574	0.596	0.590	0.324	0.324	0.345	0.324	0.324
	HGF; Nace Rev. 2					Employment growth; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0027	-0.0016	-0.0003	-0.0110	-0.0424	-0.0012	-0.0005	-0.0004	0.0018	0.0194
Std. errors	(0.005)	(0.007)	(0.003)	(0.434)	(0.130)	(0.001)	(0.001)	(0.000)	(0.011)	(0.020)
Observations	193	193	193	193	193	193	193	193	193	193
R-squared	0.870	0.870	0.870	0.870	0.870	0.282	0.225	0.249	0.218	0.229

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.13 – Corruption and fraud

	HGF; Nace Rev. 1.1					Employment growth; Nace Rev. 1.1				
FREECORR	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0044**	0.0075**	0.0000	0.1149	0.0240	0.0001*	-0.0000	0.0000**	0.0031	0.0010*
Std. errors	(0.001)	(0.002)	(0.000)	(0.181)	(0.036)	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)
Observations	322	322	188	322	322	322	322	188	322	322
R-squared	0.608	0.605	0.574	0.591	0.592	0.332	0.325	0.362	0.326	0.334
	HGF; Nace Rev. 2.0					Employment growth; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0044	0.0095**	0.0027*	0.2516	-0.0292	0.0002	0.0002	0.0000	-0.0039	-0.0025
Std. errors	(0.003)	(0.003)	(0.001)	(0.210)	(0.078)	(0.000)	(0.000)	(0.000)	(0.005)	(0.005)
Observations	193	193	193	193	193	193	193	193	193	193
R-squared	0.872	0.876	0.874	0.871	0.870	0.220	0.219	0.219	0.218	0.218

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

5.2 E-government

The provision of public services through e-government is an important policy priority in many Member States. E-government may affect firm growth through lower administrative burdens and new business opportunities. Administrative burdens are generally more burdensome for smaller firms. The primary theoretical channel would is that industries with on average smaller firms (or less capital intensive firms) benefit most from e-government service (see Box 1.1). Table 1.12 shows, however, that all the estimated coefficients are statistically insignificant.

5.3 Corruption and fraud

A low level of corruption and fraud is important for the impartiality of public administration. Corruption may affect the incentives to invest as well as the incentives to start-up through increasing the uncertainty of firms. Therefore, it can be expected that a low level of corruption is more relevant for industries that show higher firm dynamics and a higher capital intensity. The results in Table 1.13 confirm these expectations. Freedom of corruption exerts a positive effect on firm growth in industries that have a high turnover of firms and a high net entry rate for the time period time period 2004-2007 (NACE 1.1). These results are mirrored for the time period 2008-2010 (NACE 2), where industries with a net entry rate show a higher share of high growth firms. The NACE 2 subsample indicates that high growth firms are positively associated with a high average firm size, which suggests that corruption and fraud affects the incentives to invest. However, the capital intensity channel does not carry a statistically significant result.

For employment growth, the channels associated to the firm turnover rate, average firm size and capital intensity show the expected statistically significant and positive sign, confirming the relevance of the investment channel. The magnitude of the coefficients is rather small for the differential channels firm turnover and average firm size.

5.4 Starting a business

The next link that is investigated econometrically is starting a business and licensing. Two indicators were selected for this analysis: “Starting a business: time” and “Starting a business: cost”. Both were drawn from the doing Business database of the World Bank. These variables show a different scale than the indicators considered before. High levels of these PA-efficiency indicators indicate low efficiency. Accordingly, the sign of the predictions is reversed. The results for “Starting a business: time” and “Starting a business: cost” are in Table 1.14 and Table 1.15.

The results for the time a start-up takes confirm the expectation that more time required to start a business has a negative impact in industries that show higher firm dynamics, measured by firm turnover and the net entry rate. However, statistically significant results for the share of high growth firms were only obtained for the first time period (2004-2007 – NACE 1.1). The results for the NACE 2 sample were statistically insignificant.

Results for the NACE Rev. 1.1 sample indicate that employment growth is negatively affected by lengthy start-up procedures if the realised growth potential is high. The time required to start a company was the PA-efficiency indicator that delivered most of the unexpected results. Three unexpected signs were obtained for the employment growth indicator. The interaction of net entry and PA-inefficiency was positively associated with firm growth, and the channels “average firm size” and capital intensity show negative signs. This result is particularly surprising if one considers the interaction between firm and overall employment growth. One would expect that the administrative burden channel is more relevant than the investment channel. However, the results suggest otherwise.

It is important to note that these results only hold for the start-up time indicator. All estimated coefficient for the costs to start a business channel were statistically insignificant.

Table 1.14 – Starting a business, time

	HGF; Nace Rev. 1.1					Employment growth; Nace Rev. 1.1				
SB-time	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0049**	-0.0049+	-0.0000	-0.1743	-0.0570	0.0000	0.0001*	-0.0000**	-0.0128*	-0.0031**
Std. errors	(0.001)	(0.003)	(0.000)	(0.179)	(0.048)	(0.000)	(0.000)	(0.000)	(0.006)	(0.001)
Observations	322	322	188	322	322	322	322	188	322	322
R-squared	0.600	0.592	0.578	0.591	0.594	0.324	0.329	0.425	0.341	0.353
	HGF; Nace Rev. 2.0					**Employment growth; Nace Rev. 2.0**				
	(6)	(7)	(8)	(9)	(10)	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0010	-0.0059	-0.0017	-0.3258	-0.0409	-0.0010	-0.0003	-0.0003	0.0030	0.0192
Std. errors	(0.005)	(0.005)	(0.002)	(0.307)	(0.116)	(0.001)	(0.000)	(0.000)	(0.009)	(0.018)
Observations	193	193	193	193	193	193	193	193	193	193
R-squared	0.870	0.872	0.872	0.871	0.870	0.270	0.221	0.243	0.218	0.229

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.15 – Starting a business, cost

	HGF; Nace Rev. 1.1					Employment growth; Nace Rev. 1.1				
SB-cost	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0053	-0.0079	-0.0000	-0.1700	-0.0181	0.0000	-0.0000	-0.0000	-0.0029	0.0003
Std. errors	(0.004)	(0.007)	(0.000)	(0.403)	(0.076)	(0.000)	(0.000)	(0.000)	(0.008)	(0.002)
Observations	322	322	188	322	322	322	322	188	322	322
R-squared	0.592	0.591	0.571	0.590	0.590	0.324	0.324	0.344	0.324	0.324
	HGF; Nace Rev. 2.0					**Employment growth; Nace Rev. 2.0**				
	(6)	(7)	(8)	(9)	(10)	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0022	-0.0011	0.0002	-0.0484	-0.0222	0.0007	0.0005	0.0003	-0.0023	-0.0075
Std. errors	(0.009)	(0.009)	(0.004)	(0.518)	(0.218)	(0.001)	(0.001)	(0.000)	(0.014)	(0.022)
Observations	193	193	193	193	193	193	193	193	193	193
R-squared	0.870	0.870	0.870	0.870	0.870	0.222	0.219	0.222	0.218	0.218

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.16 – Average delay in payments from public authorities

	HGF; Nace Rev. 1.1				
EPI	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0005	-0.0017	0.0000	-0.1304	0.0007
Std. errors	(0.002)	(0.002)	(0.000)	(0.199)	(0.034)
Observations	264	264	158	264	264
R-squared	0.635	0.635	0.640	0.636	0.635
	HGF; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0008	-0.0021	-0.0010	-0.1494	-0.0220
Std. errors	(0.003)	(0.003)	(0.001)	(0.146)	(0.074)
Observations	149	149	149	149	149
R-squared	0.886	0.887	0.888	0.887	0.886

	Employment growth; Nace Rev. 1.1				
EPI	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0000	0.0000	0.0000	0.0002	0.0006
Std. errors	(0.000)	(0.000)	(0.000)	(0.003)	(0.000)
Observations	264	264	158	264	264
R-squared	0.369	0.369	0.352	0.368	0.372
	Employment growth; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0005	-0.0002	-0.0001	0.0005	0.0109
Std. errors	(0.000)	(0.000)	(0.000)	(0.004)	(0.007)
Observations	149	149	149	149	149
R-squared	0.259	0.232	0.240	0.229	0.238

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.17 – Time to pay taxes

	HGF; Nace Rev. 1.1				
PT_T	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0003*	-0.0005*	0.0000+	0.0202	0.0039
Std. errors	(0.000)	(0.000)	(0.000)	(0.019)	(0.003)
Observations	322	322	188	322	322
R-squared	0.596	0.596	0.587	0.594	0.596
	HGF; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0001	-0.0004	-0.0001	-0.0145	-0.0020
Std. errors	(0.000)	(0.000)	(0.000)	(0.022)	(0.010)
Observations	193	193	193	193	193
R-squared	0.870	0.871	0.870	0.870	0.870

	Employment growth; Nace Rev. 1.1				
PT_T	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0000	-0.0000	-0.0000	-0.0001	-0.0000
Std. errors	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	322	322	188	322	322
R-squared	0.326	0.324	0.345	0.324	0.324
	Employment growth; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0001	-0.0000	-0.0000	-0.0003	0.0008
Std. errors	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Observations	193	193	193	193	193
R-squared	0.238	0.222	0.228	0.218	0.221

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

5.5 Public procurement

The next link analysed is public procurement, measured by payment delays in public sector procurement. The indicator is derived from surveys from Intrum Jusitia. Payment delays affect smaller firms much more than larger firms. Therefore it is expected that PA inefficiency (payment delays) is more important in industries that display a lower average firm size. Then again, the relevance of public procurement is not uniformly distributed across sectors, and information about the sectoral distribution of public procurement is not available. This would have been the most direct link how differences in the average delay in payments from public authorities would affect the share of high growth firms and employment dynamics. Table 1.16 reports the results using the same links as for the other indicators of public administration efficiency. Perhaps due to these data limitations, statistically insignificant results can be observed throughout all samples.

5.6 Tax compliance and tax administration

The next PA-efficiency indicator is the time required to pay taxes from the World Bank Doing Business database. This indicator does not provide information on the tax burden itself, which is largely politically determined, but allows assessing the administrative burden of the tax system. As with other administrative burden indicators, it is expected that more dynamic industries and industries with a larger share of SMEs are affected more by a high administrative burden put on enterprises by the tax system.

Table 1.17 presents the results. For the first time period (2004-2007, NACE 1.1) the reported coefficients are in line with the stated hypotheses. The results indicate that industries with a higher firm turnover and a higher net entry rate generate a lower share of high growth firms when the time to prepare and file tax returns and pay taxes is longer. In addition, SMEs are more affected than larger firms by more time consuming tax administrations, which turns the sign of the interaction effect positive. For the second time period (2008-2010, NACE 2) these effects are no longer detected. For employment growth no statistical significant results were obtained for the five different links, suggesting that the efficiency of the tax system does not have a differential impact on employment growth.

5.7 Efficiency of civil justice

The efficiency of civil justice refers to the quality and efficiency of dispute resolution between private parties. The efficiency and impartiality of the civil justice system are essential for incentives to invest and risk-taking. As there is no single best indicator of the efficiency of civil justice, four interrelated, yet different indicators were chosen: Enforcing Contracts: Time, Enforcing Contracts: Cost, Resolving insolvencies: Time, and the judicial independence that measures the perceived overall fairness and impartiality of the legal system.

Table 1.18 and Table 1.19 report the results for the cost and the time of contract enforcement. The results for the cost of contract enforcement with regard to the share of high growth firms shows four significant result for the first time period (2004-2007, NACE 1.1). The sign of the turnover coefficient is negative, i.e. industries with a higher firm turnover generate fewer HGFs when contract enforcement procedures are more costly. The coefficients for the channels average firm size and capital intensity are both positively associated with firm growth, indicating that larger, more capital intensive firms are less affected by higher enforcement costs than SMEs. The interaction between enforcement costs and the realised growth potential is positive, which contradicts the posed conjecture. The coefficients for the NACE Rev. 2 sample were insignificant for both employment growth and the share of high growth firms. This may indicate that the financial crisis overshadowed contract enforcement costs in a uniform manner across all industries in all countries. The time to enforce contracts only showed one statistically significant result, which was counterintuitive: HGFs are positively associated with industries with a higher turnover rate where contract enforcement takes longer.

Table 1.20 reports the results for the indicator that measures the time to resolve insolvency. For the share of high growth regressions for the first time period (2004-2007, NACE 1.1), the differential links with the turnover rate and the net entry rate carry a statistical significant sign. The relationship is negative, confirming the expectations that a longer average duration of bankruptcy proceedings affects the share of high growth firms negatively, especially in industries with more firm dynamism. Bankruptcy regulation is often considered to create mobility barriers for firms. The results for employment growth indicate similar results. Firm turnover seems to be negatively associated with high growth firms in countries where insolvency procedures take longer. These results were not replicated for NACE Rev. 2 (2008-2010), for which no statistically significant results were obtained.

Table 1.21 finally presents the results for independence of the judiciary indicator. This indicator is differently scaled than the other efficiency of civil justice indicators. A higher level of the indicator indicates a more impartial civil justice system. Therefore the expected signs of the relationship are again reversed. The results for

the share of high growth firms in the first time period (2004-2007, NACE 1.1) displays two statistically significant results that are in line with the expectations. More dynamic industries display a higher share of high growth firms when the legal system is perceived as fair. The differential links are the turnover rate of firms and the firm net entry rate. The results for second period tested (2008-2010, NACE 2) confirm these channels, and also find the channel firm size to have a statistically significant, positive result. This suggests that industries with smaller firms generate fewer HGFs when the judiciary is perceived as unfair.

The output indicator employment growth reveals the expected positive effect of firm turnover, firm size and capital intensity for the NACE Rev 1.1 sample. The two latter channels indicate that investment-driven employment growth processes are positively associated with an impartial legal system. The employment growth results for the NACE Rev. 2 subsample were insignificant.

Improvements in the legal system affect overall employment growth performances. In the current ranking of how impartial judiciaries are, Romania ranks the lowest and Denmark the highest. Using the 10th percentile capital intensity of the NACE Rev. 1.1 sample in the benchmarking economy (Insurance and pension funding, except compulsory social security) and the 90th percentile (Mining and quarrying of energy producing materials) allows quantifying the results. If Romania replicated Denmark's judicial system so that it ranked the same in the perception rankings, it would improve its industry-level employment growth performance between 0.75 and 3.9 percentage points. While the hypothesised improvement is a substantial challenge to grown systems, also smaller improvements are likely to facilitate employment growth.

Table 1.18 – Contract enforcement, cost

	HGF; Nace Rev. 1.1					Employment growth; Nace Rev. 1.1				
EC_T	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0000	-0.0001	0.0000	0.0022	0.0009	-0.0000	0.0000	-0.0000	-0.0003	-0.0000
Std. errors	(0.000)	(0.000)	(0.000)	(0.006)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	322	322	188	322	322	322	322	188	322	322
R-squared	0.589	0.590	0.574	0.590	0.591	0.324	0.324	0.365	0.333	0.331
	HGF; Nace Rev. 2.0					Employment growth; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	0.0005*	0.0002	0.0001	0.0079	-0.0071	0.0000	0.0000	0.0000	-0.0002	-0.0001
Std. errors	(0.000)	(0.000)	(0.000)	(0.008)	(0.005)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Observations	193	193	193	193	193	193	193	193	193	193
R-squared	0.881	0.871	0.874	0.870	0.871	0.220	0.218	0.219	0.218	0.218

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.19 – Contract enforcement, time

	HGF; Nace Rev. 1.1					Employment growth; Nace Rev. 1.1				
EC_C	(1)	(2)	(3)	(4)	(5)	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0024	-0.0161*	0.0002**	1.0674*	0.2028**	-0.0001*	-0.0002+	0.0000+	0.0133	0.0027
Std. errors	(0.004)	(0.007)	(0.000)	(0.427)	(0.064)	(0.000)	(0.000)	(0.000)	(0.010)	(0.002)
Observations	322	322	188	322	322	322	322	188	322	322
R-squared	0.590	0.599	0.612	0.604	0.608	0.329	0.328	0.367	0.329	0.332
	HGF; Nace Rev. 2.0					Employment growth; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)	(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0005	-0.0086	-0.0029	0.0336	-0.0353	-0.0012	-0.0009	-0.0004	-0.0071	0.0142
Std. errors	(0.007)	(0.008)	(0.003)	(0.527)	(0.220)	(0.001)	(0.001)	(0.000)	(0.014)	(0.023)
Observations	193	193	193	193	193	193	193	193	193	193
R-squared	0.870	0.871	0.871	0.870	0.870	0.232	0.223	0.228	0.218	0.219

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.20 – Time to resolve insolvency

	HGF; Nace Rev. 1.1					Employment growth; Nace Rev. 1.1					
RI_T	(1)	(2)	(3)	(4)	(5)	RI_T	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity		Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0355*	-0.0490*	0.0003	1.7909	0.3135	Coeff.	-0.0006**	0.0002	-0.0000	0.0120	-0.0031
Std. errors	(0.014)	(0.022)	(0.000)	(2.045)	(0.335)	Std. errors	(0.000)	(0.001)	(0.000)	(0.028)	(0.006)
Observations	322	322	188	322	322	Observations	322	322	188	322	322
R-squared	0.598	0.595	0.578	0.592	0.593	R-squared	0.330	0.324	0.344	0.324	0.325
	HGF; Nace Rev. 2.0						Employment growth; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)		(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity		Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
Coeff.	-0.0248	-0.0638	-0.0153	-2.6054	0.2493	Coeff.	-0.0048	-0.0035	-0.0015	-0.0166	0.0596
Std. errors	(0.032)	(0.040)	(0.014)	(2.658)	(1.102)	Std. errors	(0.005)	(0.003)	(0.002)	(0.071)	(0.098)
Observations	193	193	193	193	193	Observations	193	193	193	193	193
R-squared	0.871	0.873	0.871	0.871	0.870	R-squared	0.233	0.223	0.226	0.218	0.219

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.21 – Independent judiciary

	HGF; Nace Rev. 1.1					Employment growth; Nace Rev. 1.1					
INDJUS	(1)	(2)	(3)	(4)	(5)	INDJUS	(1)	(2)	(3)	(4)	(5)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity		Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensit
Coeff.	0.0485**	0.0807**	0.0001	1.4692	0.1936	Coeff.	0.0005*	-0.0008	0.0000*	0.0503	0.0132*
Std. errors	(0.013)	(0.023)	(0.000)	(1.802)	(0.363)	Std. errors	(0.000)	(0.001)	(0.000)	(0.033)	(0.006)
Observations	322	322	188	322	322	Observations	322	322	188	322	322
R-squared	0.609	0.605	0.573	0.591	0.591	R-squared	0.329	0.327	0.374	0.329	0.338
	HGF; Nace Rev. 2.0						Employment growth; Nace Rev. 2.0				
	(6)	(7)	(8)	(9)	(10)		(6)	(7)	(8)	(9)	(10)
	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity		Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensit
Coeff.	0.0604+	0.1325**	0.0457**	3.5778	-0.1401	Coeff.	0.0084	0.0041	0.0026	-0.0555	-0.1356
Std. errors	(0.034)	(0.048)	(0.016)	(2.997)	(0.951)	Std. errors	(0.007)	(0.004)	(0.002)	(0.078)	(0.130)
Observations	193	193	193	193	193	Observations	193	193	193	193	193
R-squared	0.873	0.881	0.881	0.871	0.870	R-squared	0.252	0.223	0.235	0.218	0.224

*Note: ** p<0.01, * p<0.05, + p<0.1*
Source: WIFO calculations.

Table 1.22 – Signs of regression results

		HGF										Employment growth									
		NACE 1.1 2004 - 2007					NACE 2 2008 -2010						NACE 1.1 2004 - 2007					NACE 2 2008 -2010				
PALink	Indicator	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity		Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
A) General governance																						
	Government effectiveness	+	+				+	+	+				+		+		+					
	Regulatory Quality	+	+					+	+				+		+		+					
B) Egovernment																						
	Availability of E-Government services																					
C) Corruption and fraud																						
	Freedom of corruption	+	+					+	+				+		+		+					
D) Starting a business and licensing																						
	Time required to start-up a company	-	-											+	-	-	-					
	Cost to start-up a company																					
E) Public Payment morale																						
	Average delay in payments from public authorities																					
F) Tax compliance and tax administration																						
	Time to prepare and file tax returns and to pay taxes	-	-	+																		
G) Efficiency of civil justice																						
	Enforcing contracts: Cost		-	+	+	+							-	-	+							
	Enforcing contracts: Time						+															
	Resolving insolvency: Time	-	-										-									
	Independent judiciary	+	+				+	+	+				+		+		+					

Note: only statistically significant results are reported.
Source: WIFO calculations.

It is important to note that the results for employment growth are much weaker than those obtained for high growth firms. The R^2 in the regression outputs indicates that the analysis was much more successful in identifying the determinants of the share of high growth firms than employment growth. This suggests that employment growth is driven by a variety of determinants that cannot be captured by industry and country dummies. Also the differential links are slightly different for employment growth and the share of high growth firms.

While PA-efficiency affects firm growth primarily through turnover rate of firms and net entry rate, the differential links that are more relevant for employment growth are average firm size, growth potential (average value added growth) and capital intensity (see Table 1.22). Only a minority of the statistical significant results are the same across the share of HGF and the employment growth regressions. However, the signs often point into the same direction, even if the results were statistically insignificant. Improving PA-efficiency is therefore not expected to generate trade-offs with regard to the share of high growth firms and employment growth. Taking into account that it is impossible to identify effects that affect all industries in the same way, the reported results provide a lower bound to the causal links that run from public administration efficiency to economic performance measured in terms of the share of high growth firms and employment growth.

5.8 Predicted impact of policy reform

The results suggest that reforms that improve the PA-quality facilitate firm dynamism, raising the question about the magnitude of the impact of policy reform, which is likely to differ with the policy dimension chosen, the scope for improvement in the public administration and the industry of interest (see Box 1.3). Drawing on the previously obtained regression results for the entire sample and the PA-quality rankings as well as the industry-specific channel firm-turnover, the impact of policy-reform efforts can be predicted (see Box 1.3). Table 1.23 provides an illustration of the impacts of a change in quality of public administration at the country level. This analysis is based on a hypothetical policy-reform scenario and illustrates the impact on the share of high growth firms when a country would switch from its own quality of public administration to a level that corresponds to the best practice value measured in the sample. The figures in Table 1.23 report the associated changes in the share of high growth firms as percentage points. The results used stem from the estimated regression coefficients for the firm turnover-rate channel (see Table 1.10 - Table 1.21). Countries with best best-practice indicators are identified as b.p. in the table. The country rankings for all PA-quality indicators for both samples used are shown in Table 1.24.

Box 1.3 – PREDICTED IMPACT OF POLICY REFORM

The coefficients of the interaction between industry characteristics and PA-quality can be used to predict the impact of policy reform efforts on the share of high growth firms. Two predictions are presented: (i) a policy reform that assumes an improvement in the PA-quality ranking; (ii) these reforms are based on an average industry, which is why the findings are reflected, and put into perspective, by providing the cross-industry range of the predicted impact. The term of the estimated regression (see equation (1.1)) that is used for the predictions is $\beta\ (PA_c \times IND_i)$.

Table 1.23 predicts the impact of reforms that assume an improvement in the country-specific level quality of the PA to the level of countries that lead the PA quality rankings. The impact is computed as the difference between the predicted value for HGFs in countries that lead in PA quality (best-practice countries) and countries that rank lower. Put differently, the share of HGFs will improve if countries implemented a PA-reform that made them achieve the PA-quality of frontrunner countries. The magnitude of this effect on HGFs is predicted. The results differ across countries with the scope for improvements in PA quality. The two other variables of the term, the estimated coefficients (β) and the mean industry turnover (IND), were held constant.

The used coefficients were obtained from the estimates for the entire sample (see Table 1.10 - Table 1.21). The chosen industry characteristic was the firm-turnover rate, since the results for this characteristic have shown to be robust. Following Bravo-Biosca (2013), industry and country specific effects were being held constant. The mean firm turnover rate for the benchmarking countries of 14.3% was used to rule out variance with respect to industries (see equation (1.1)). The PA-quality indicators used follow Table 1.1, and the absolute PA-quality values of the countries in the sample for the time period used can be found in Table 1.24.

In addition to holding the conceptual channel firm turnover rate constant at its mean value, the between industry variance of the policy-reform impact can be shown by using the 10^{th} and 90^{th} percentile of the distribution of the turnover-rate of the benchmarking country (see Figure 1.4). The 10^{th} percentile industry is "DK Manufacture of machinery and equipment n.e.c."; the firm-turnover-rate at the 10^{th} percentile is 9.6%. The 90^{th} percentile industry is "I62 Air transport" with a firm-turnover-rate of 20.6%. Other than predicting the reform-impact at the country level, a hypothetical country was created by using the average values of three highest and lowest ranked countries of the respective indicator.

The predictions show that public administration quality has a substantial impact on the share of high growth firms. As The general indicators of public administration quality (government effectiveness, regulatory quality, freedom from corruption and independent judiciary) show a higher impact than the specific link time to resolve insolvency. It is important to note that the impact should not be added across indicators, as the general indicators of public administration efficiency are highly correlated.

Table 1.23 – The impact of PA-reform on the rate of high-growth firms

	Government effectiveness	Regulatory quality	Freedom from corruption	Time to resolve insolvency	Independent judiciary
Belgium	0.71	1.13	1.42	b.p.	1.23
Czech Republic	2.06	1.47	3.10	3.27	2.68
Denmark	b.p.	b.p.	b.p.	0.59	b.p.
Estonia	1.90	0.99	2.04	1.02	1.19
Spain	1.59	1.33	1.60	0.25	2.83
Hungary	2.33	1.52	2.70	0.51	2.44
Italy	2.84	2.03	2.77	0.41	3.10
Luxemburg	0.62	0.13	0.52	0.51	0.64
Latvia	2.70	1.93	3.28	1.02	3.01
Netherlands	0.45	b.p.	0.33	b.p.	b.p.
Poland	2.86	2.26	3.37	1.02	2.95
Romania	4.24	3.27	3.92	1.50	3.90
Sweden	b.p.	0.37	b.p.	0.51	0.27
Slovenia	1.98	2.32	2.06	0.51	2.55
Slovakia	2.33	1.71	3.25	1.68	3.58

Note: The results show the differential of the rate of HGFs of best-practice (b.p.) countries and the respective countries. They are based on the estimated coefficients provided in the regression tables in the Annex, the respective PA-quality indicator and the mean turnover rate of Denmark and Sweden as benchmarking countries. The reform impacts were predicted for selected policy fields for statistically significant results of the NACE Rev. 1.1 period.
Source: WIFO calculations.

Table 1.24 – PA-quality rankings of countries in the sample (NACE Rev. 1.1 and NACE Rev. 2)

NACE Rev. 1.1

Country	Government Effectiveness	Regulatory Quality	Availability of E-gov.	Freedom of corruption	Time to start a business	Cost to start a business	Avg. Delay in public payments	Time required to pay taxes	Time to enforce contracts	Cost to enforce contracts	Time to resolve insolvency	Independent judiciary
BE	1.7	1.3	50.3	71.1	20.9	7.6	29.3	156.0	505.0	17.7	0.9	7.2
CZ	1.0	1.2	51.7	44.4	27.6	9.7	10.0	774.3	645.0	33.1	7.4	5.1
DK	2.2	1.8	71.3	94.8	6.2	0.0	11.4	135.0	383.8	23.6	2.2	9.0
EE	1.1	1.4	81.2	61.2	30.1	4.3	6.5	81.0	425.0	18.3	3.0	7.2
ES	1.2	1.2	62.2	68.2	63.8	15.8	52.3	256.3	515.0	17.2	1.5	4.9
HU	0.8	1.1	45.2	50.7	26.1	18.6	24.3	326.2	350.0	15.0	2.0	5.4
IT	0.5	0.9	62.1	49.6	12.6	19.7	59.3	322.2	1277.5	29.9	1.8	4.5
LU	1.8	1.7	34.5	85.4	24.1	6.6		59.0	321.0	9.2	2.0	8.0
LV	0.6	1.0	40.7	41.5	15.8	4.5	12.7	295.0	287.3	18.0	3.0	4.6
NL	1.9	1.8	52.2	88.4	8.4	8.7	21.3	193.0	514.0	24.4	1.1	8.9
PL	0.5	0.8	37.1	40.2	31.3	20.1	21.4	398.7	910.0	19.0	3.0	4.7
RO	-0.2	0.4	48.3	31.4	14.4	5.2		201.8	527.6	22.2	4.0	3.3
SE	2.0	1.6	80.2	92.4	16.0	0.7	7.0	122.0	459.5	31.3	2.0	8.6
SI	1.0	0.8	79.0	61.0	41.4	7.3		260.0	1357.5	17.4	2.0	5.3
SK	0.8	1.1	36.8	42.0	36.1	4.5	14.0	302.3	576.3	26.8	4.3	3.8

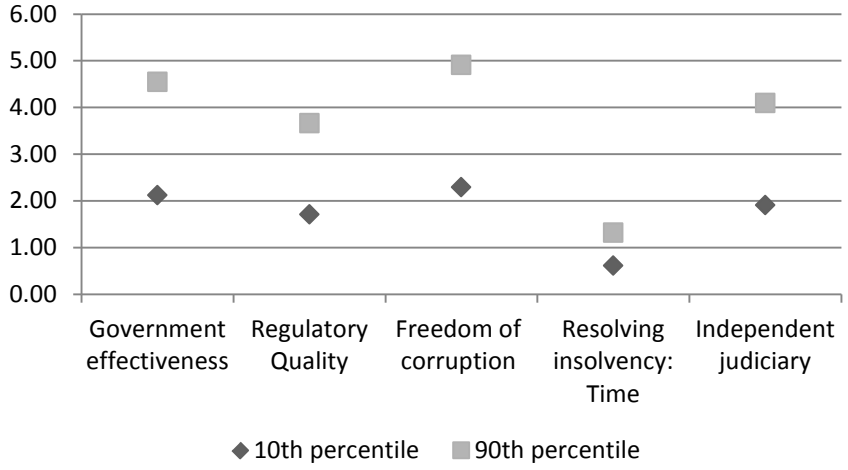
NACE Rev. 2

Country	Gov. Effectiveness	Regulatory Quality	Availability of E-gov.	Freedom of corruption	Time to start a business	Cost to start a business	Avg. Delay in public payments	Time required to pay taxes	Time to enforce contracts	Cost to enforce contracts	Time to resolve insolvency	Independent judiciary
CY	1.3	1.3	43.0	62.1	8.0	12.8	17.3	149.0	735.0	16.4	1.5	7.1
CZ	1.0	1.2	51.7	44.4	27.6	9.7	10.0	774.3	645.0	33.1	7.4	5.1
EE	1.1	1.4	81.2	61.2	30.1	4.3	6.5	81.0	425.0	18.3	3.0	7.2
ES	1.2	1.2	62.2	68.2	63.8	15.8	52.3	256.3	515.0	17.2	1.5	4.9
FR	1.6	1.2	62.5	69.7	11.1	1.1	19.0	132.0	390.0	17.4	1.9	6.6
HU	0.8	1.1	45.2	50.7	26.1	18.6	24.3	326.2	350.0	15.0	2.0	5.4
IT	0.5	0.9	62.1	49.6	12.6	19.7	59.3	322.2	1277.5	29.9	1.8	4.5
LU	1.8	1.7	34.5	85.4	24.1	6.6		59.0	321.0	9.2	2.0	8.0
PT	1.0	1.1	65.6	63.4	29.6	9.1	78.8	323.0	569.5	13.9	2.0	6.7
RO	-0.2	0.4	48.3	31.4	14.4	5.2		201.8	527.6	22.2	4.0	3.3
SE	2.0	1.6	80.2	92.4	16.0	0.6	7.0	122.0	459.5	31.3	2.0	8.6
SI	1.0	0.8	79.0	61.0	41.4	7.3		260.0	1357.5	17.4	2.0	5.3

Source: WIFO; see Table 1.1.

The impact of policy reforms is heterogeneous not only across countries, but also across industries. In the prediction above, the impact of policy reform was held constant across industries, and country-specific effects were emphasised. The following expands the picture from the country-level reform by exploring the reform-impact across industries. Country-variance is held constant, and the effect of a reform for hypothetical countries is assumed. The industry variance is sketched by the lower and upper bound of the effect. It is illustrated by taking into account the distribution of the industry-specific characteristics of the benchmarking countries. To estimate the lower bound of the effect, the 10th percentile industry of the firm turnover rate was selected. Accordingly, the 90th percentile industry was used to calculate the upper bound of the effect. The magnitude of the reform was obtained by the assumed achievement of the PA quality indicators of the three best ranked countries in the three worst ranked countries. It is important to note that the set of countries used differs across indicators, even though the countries that rank high in the PA-quality are often overlapping (see Box 1.3).

Figure 1.4 – Cross industry variance of the impact of PA-reform on the rate of high-growth firms



Note: The results show the differential impact of policy reform in the 10th percentile and 90th percentile industry of the channel firm turnover. The assumed reform predicts the improvement in the PA-quality indicators from the average value of the three worst performing to the average value of the three best performing countries. The averages represent hypothetical countries. They are based on the estimated coefficients provided in the regression tables in the Annex, the respective PA-quality indicator and the distribution of the turnover rate. The reforms were predicted for selected policy fields for statistically significant results of the NACE Rev. 1.1 period.
Source: WIFO calculations.

The illustration in Figure 1.4 is based on same underlying regression results (see Table 1.10 - Table 1.21) for the same five indicators (government effectiveness, regulatory quality, freedom of corruption, the time to resolve insolvency and the presence of an independent judiciary. Again, the findings tend to show a stronger impact of the general indicators of public administration quality.

5.9 Summary

The results indicate that the efficiency of public administration affects the presence of high growth firms. Table 1.22 provides a summary of the regression results. Only statistically significant results are reported. A plus sign indicates a positive coefficient and a minus indicates that the coefficient carried a negative sign. This study provided results for 280 regressions. 50 results statistically significant results were obtained. 5 out of those 50 have shown results that do not confirm the expectations insofar that they were statistically significant, but carried an unexpected sign against the background of the initially posed hypotheses. The time required to start a company was the PA-efficiency indicator that delivered most of the unexpected results. Three unpredicted signs were obtained for the employment growth indicator. The relatively low number of statistically significant results should not surprise. Five different industry characteristics were used as potential links even in cases where the expected relationship was expected to be weak. This approach reflects the exploratory nature of this research. Moreover, the results from the NACE Rev. 2 sample are weaker, especially for employment growth as an output indicator. These estimated coefficients may be downward biased as the impact of the economic crisis may overshadow the impact of the interaction term.

The results show that PA efficiency has an impact on the rate of high growth firms and employment growth at the NACE 2-digit industry level. More PA-efficiency induces greater rates of fast growing firms, in particular by increasing the firm turnover and net-entry. This holds especially for general indicators that measure the overall

governance system, including the presence of an independent judiciary and freedom of corruption. Indicators that measure PA-efficiency in dimensions related to operational aspects of firms show weaker effects. Especially the time to resolve insolvencies and efficiency in the tax administration can be linked to greater rates of high-growth firms via the firm dynamics channels.

The obtained results are novel and indicate that improvements in public administration efficiency will also have an impact on the share of high growth firms and firm growth in general. The results are comparable to the results obtained by Bravo-Biosca et al. (2013) that use a slightly different data set and focus on a different set of institutions that are not directly related to quality or efficiency of public administration.

In addition, the identified patterns suggest that firm-growth and employment growth rates are not identical but different processes. PA-efficiency also increases employment growth, especially via investment-related channels such as capital intensity. Again, the general indicators (regulatory quality, general governance, freedom corruption and fraud, independent judiciary, cost to enforce contracts) perform better than indicators that measure specific operational dimension. These results also imply that improvements in the efficiency (and quality) of the public administration is conducive to both firm and overall employment growth, even though these occur via differential processes.

6 AN INDICATIVE ANALYSIS OF FIRM-LEVEL DATA

6.1 The EFIGE-dataset

This section complements the previous analysis with firm level data. The EU-EFIGE/Bruegel-Unicredit dataset (Altomonte and Aquilante, 2012) is used to analyse the relationship between firm growth and public-administration efficiency, or the lack thereof.[4] The data was collected within the EFIGE project - European Firms in a Global Economy: internal policies for external competitiveness. Its main objective was to provide quantitative information on key dimensions for firm-level competitiveness. These include the structure of both firms, the workforce, the investment and innovation behaviour, internationalisation, market structures and corporate finance.

It provides information about 14,759 firms of eleven sectors in seven member states: Austria (443), France (2,793), Germany (2,935), Hungary (488), Italy (3,021), Spain (2,832) and the UK (2,067). A matched version of the dataset allows identifying growth patterns. The data used contains additional information from the AMADEUS dataset, which is provided by the Bureau van Dijk.[5] This allows depicting the relationship between (i) a public administration measure, and (ii) employment indicators.

The underlying questionnaire contains a series of perception questions about factors that prevent firm growth. These include 'legislative or bureaucratic restrictions'. The variable is a dummy variable, which takes on values of 0 (no) and 1 (yes). The answers obtained are to be interpreted in an indicative way. Due to the general character of the question, a causal effect cannot be established, especially since the phrasing does not specifically take into account PA-efficiency. All types of legislative, regulatory and bureaucratic restrictions are amalgamated. Thus, the analysis cannot identify the impact of specific elements of PA. It merely indicates whether restrictions from the public policy arena, be they political or administrative, are perceived by respondents as barriers to growth. In addition, the answers may be driven by third factors, such as firm- or country-specific characteristics that are not directly related to the public administration. For instance, respondents in one country may be less critical than respondents in another country, even though the relevant public administration may provide the same quality or efficiency (Task 3 provides a more detailed discussion of these issues). Nevertheless, the subsequent micro-analysis is a valuable as a descriptive complement to the findings of the identification strategy at the aggregate level from the previous section. The results point into the same direction as the identification strategy.

The remainder is structured as follows. First, the 'public administration as a growth hampering factor' indicators are put into a broader context. Second, firm level growth indicators and show their distributions are computed. Third, a statistical relationship between the firm growth indicators and the PA perception measures is established.

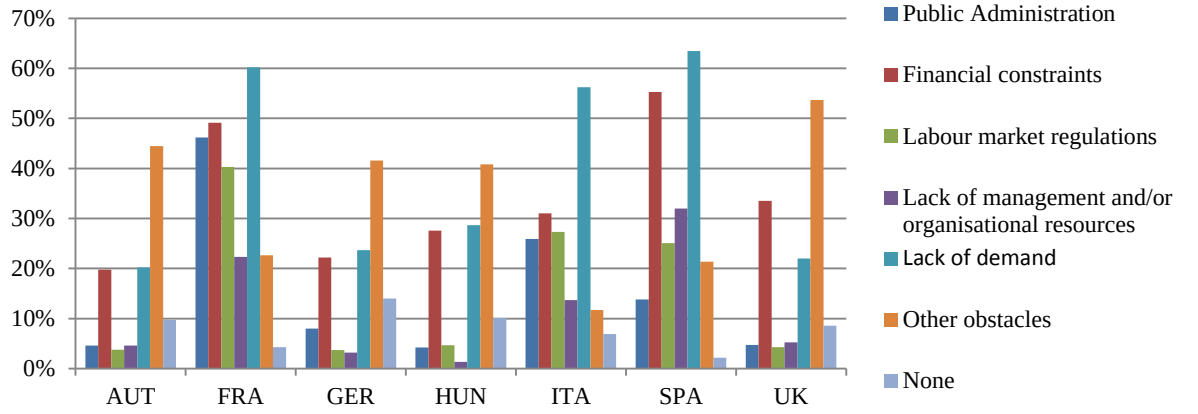
[4] See http://www.bruegel.org/datasets/efigedataset/; retrieved on January 21, 2014.
[5] See https://amadeus.bvdinfo.com/; retrieved on January 21, 2014.

6.2 Public Administration perceived as a growth hampering factor

To obtain a holistic picture, the answers to the public administration question should be interpreted jointly with the other factors that are perceived as growth impediments. In the entire dataset, 42% of the respondents report 'lack of demand' as a growth impeding, which ranks as the most cited obstacle. The next most frequently reported issues are 'financial constraints' (34%) and 'other factors' (31%). At 21%, 'legislative or bureaucratic restrictions' rank fourth, followed by 'labour market regulations' (19%), and 'lack of management and/or organisational resources' (12%). Only 8% reported not to face any impediments to growth.[6]

There is substantial cross-country variance in the perceived growth impediments. For instance, lack of demand is most often cited in Spain, France and Italy, which may reflect the economic downturn that occurred in the survey year. Financial constraints were more often reported in France and Spain; 'other obstacles' were most often cited in the UK, Austria, Germany and Hungary (see Figure 1.5).

Figure 1.5 – Perceived growth hampering factors across countries



Source: EFIGE dataset, WIFO calculations.

The perception of 'legislative or bureaucratic restrictions' as an impediment to growth is not uniformly distributed. It varies across dimensions such as (1) firm size, measured as the total number of employees of the respondent's firm in the home country in 2008, (2) sectors and (3) countries. An Analysis of Variance (ANOVA) explores the effect of these dimensions. The model was mainly driven by country effects, which explained 15.7% of the overall variance; sector effects made for 0.3%. Both were statistically highly significant. The size variable accounted for 2.6%, but was statistically slightly insignificant (p-value: 0.1002). Next, the baseline specification is expanded by country-sector interactions. The results for the country and the sector variable are identical. The interaction term adds 8% to the explanatory power of the model (p-value: 0.0199). The size indicator remains at the same contribution, but turns just significant (p-value: 0.0953).

Descriptive statistics confirm the cross-country variance. The countries with the highest proportions of firms reporting this obstacle are France (46%), Italy (26%), Spain (14%), followed by Germany (8%), Austria and the UK (each 5%) and Hungary (4%). The variance across sectors is less pronounced. Following the Pavitt-taxonomy, 19% of the firms in the subsample of specialised suppliers reported the obstacle, 20% of the firms assigned to scale intensive industries, 22% in science based, high-tech industries, and 22% of the group of traditional, supplier based industries.

6.3 Firm growth

The next produces a firm growth indicator, whose distribution is subsequently discussed. Since the EFIGE data is only available in the cross section, the Amadeus dataset by Bureau van Dijk is used to calculate the average annual employment growth rate. The EFIGE data was collected in 2010, covering the years from 2007 to 2009. Hence, 2008 serves as the final year for the calculations of the growth rate to correspond with the survey year, which refers to the period 2005-2008.

Cognisant of its conceptual drawbacks (Daunfeldt et al., 2014), the OECD-Eurostat definition of firm growth is implemented, as well as high and low growth firms. Firms with fewer than ten employees in the base year 2005

[6] Multiple answers are possible.

were dropped. Entry and exit dynamics are not taken into account so that the focus is on organic growth, i.e., firms were exclude that "have been acquired (totally or partially) or incorporated other firms in the last three years" (question a13), and firms that "have been acquired or incorporated by other firms over the same period" (a14). High growth firms are firms whose annual growth rate is greater than 20%. Low growth firms are firms with an annual growth rate is smaller than -20%.

Table 1.25 – Annual employment growth at the firm level (2005-2008) across countries

Country	Median	Variance	Mean	90% decentile	10% percentile	No. of obs.	Share of HGF	Share of LGF
AUT	0.01	0.29	0.13	0.21	-0.05	208	0.11	0.00
FRA	0.00	0.04	0.02	0.12	-0.07	1085	0.04	0.01
GER	0.00	0.07	0.04	0.11	-0.05	394	0.04	0.02
HUN*	0.02	0.02	0.03	0.20	-0.11	41	0.10	0.02
ITA	0.00	0.02	0.02	0.11	-0.08	1219	0.04	0.01
SPA	0.00	0.05	0.03	0.17	-0.10	1987	0.08	0.02
UK	0.01	0.02	0.02	0.12	-0.09	318	0.04	0.03

*Note: HGF - high-growth firms; LGF - low-growth firms. *The number of observations for Hungary is insufficiently small to obtain viable results.*
Source: EFIGE, WIFO calculations.

The descriptive statistics of the growth indicators reveal a strong country variance (see Table 1.25). In all comparison countries of the sample, the median growth rate is either nil, or close to nil. Also the indicators for variance and means differ substantially. In Austria, 11% of all firms are classified as high growth firms, followed by Spain 8%, and 4% in the UK, Italy, Germany and France.

6.4 Are firm growth rates and responses to the public administration questions related?

This section describes the relationship between the annual firm growth rate and the public administration indicator. The analysis is divided into four sections. First, the relationship between the two indicators at the very firm level is explored. Second, the distributions of firm growth linked the public administration indicator to brackets of firm growth. Third, the emerging picture is complemented by a country-sector analysis. Fourth, a series of regressions identifies attributes of high growth firms, or their fraction in country-sector subsamples of firms.

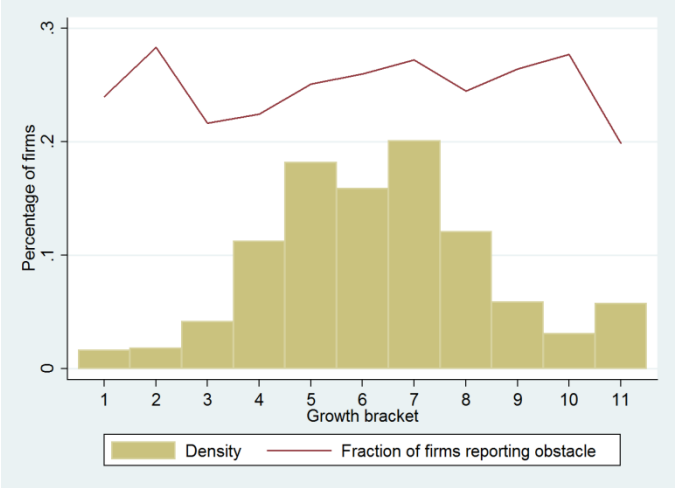
As a first step, the sample is split into firms that perceive 'legislative or bureaucratic restrictions' as a growth hampering factor and firms that do not. Firms that do not report this obstacle grow at an average of 3.1% per year, while firms that do, grow slower at 2.1%. This difference has shown to be weakly significant (p-value: 0.0728) in a t-test with unequal variances. Notably, the directionality remains unclear. Firms that do not report hampering factors might grow slightly faster because they are able to better cope with obstacles than others. Also, the question merely enquires about bureaucracies and legislations as a growth hampering factor; the counterfactual remains unclear. I.e., it is not known what the firm performance would be if are relevant bureaucratic requirements were not in place.

The analysis of the distributions of the growth rates follows Bravo-Biosca (2012) and Bravo-Biosca et al. (2013) by creating 11 growth brackets (see Figure 1.6). Growth intensities are assigned to previously specified intervals, beginning with firms that shrink at an average annual rate of more than 20% on the far left hand side; firms that are stagnant (category 6) and quasi stagnant (category 5 and 7) are in the middle. On the right hand side, there are high-growth firms whose annual growth rate exceeds 20%. The bulk of firms are in the middle, i.e., they exhibit no or little growth. The dataset is slightly biased to fast growing firms. Firms that grow faster than 15% annually account for 8.9% of the sample; firms that shed more than 15% of their staff in the period of interest made for merely 2.5% of all firms.

The graph also shows the proportion of firms that perceive 'legislative or bureaucratic restrictions' as a growth hampering factor to the growth brackets. 25.1% of the firms in the subsample report this obstacle.[7] This indicator varies erratically across growth intervals. In all but one categories, the indicator remains above the 20%-threshold (i.e., 20% of the firm reported bureaucratic or legislative restrictions as an obstacle to growth). Only in the last category that bins high growth firms, the proportion drops to 19.9%.

[7] The firm growth rates generate another subsample, which implies that this figure differs from the statistics in the introduction.

Figure 1.6 – Firm growth distributions and perceived legislative and bureaucratic impediments to growth



Note: the bars correspond to the share of firms relative to the total number of surviving firms in the country (with ten or more employees) with annual average employment growth for the 2005-2008 period: 1: [- ∞;<-20%[; 2: [-20%;-15%[; 3: [-15%;-10%[; 4: [-10%;-5%[; 5: [-5%;-1%[; 6: [-1%;+1%[; 7: [+1%;+5%[; 8: [+5%;+10%[; 9: [+10%;+15%[; 10: [+15%;+20%[; 11: [+20% ;+ ∞].
Source: EFIGE dataset, WIFO calculations.

To check for robustness of these firm level findings the country-sector aggregates are computed. The shares of high and low growth firms are calculated as the fraction of firms that on average grew (or declined) more than 20% annually. The firms' competitive environment is sketched by the means of all other perceived obstacles to growth. Moreover, the table reports the proportion of firms that are labelled 'global exporters'. This distinguishes globally active firms that are likely to face a different competitive environment (see Table 1.26).

Table 1.26 – Descriptive statistics at the country-sector level

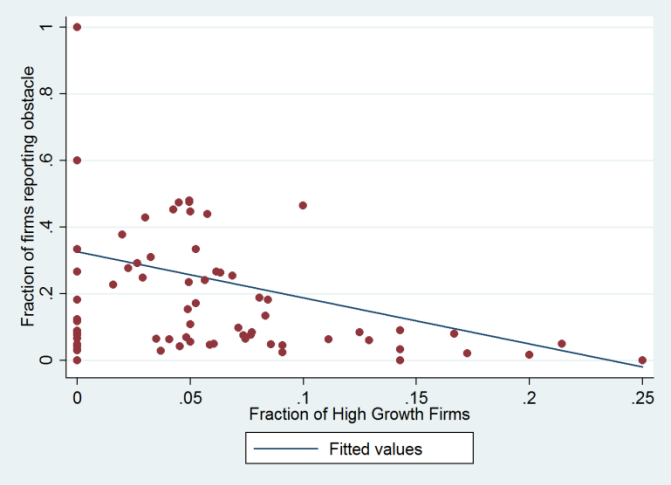
	Median	Variance	Mean	90% decentile	10% percentile	No. of obs.
HGF	2%	0%	4%	10%	0%	74
Public admin.	8%	3%	17%	44%	2%	74
LGF	0%	0%	2%	4%	0%	74
Constraints	24%	1%	26%	40%	17%	74
Global exporter	23%	2%	24%	39%	7%	74

Note: HGF - high-growth firms; LGF - low-growth firms.
Source: EFIGE, WIFO calculations.

Linking firm growth to the public administration constraints produces similar descriptive results as above. The (1) share of high-growth firms at the country-sector level is compared with (2) the share of firms that perceive 'legislative or bureaucratic restrictions' as a growth impediment. The correlation coefficient is negative, with a rho of -0.34, and highly significant (p-value: 0.0031; see Table 1.26).

The correlation coefficient between (i) the proportions of high and low growth firms, as well as (ii) the fraction of the firms that reported public administration as a hampering factor and low growth firms were both statistically insignificant.

Figure 1.7 – Share of high growth firms and share of firms that perceived legislative and bureaucratic impediments to growth (2005-2008)



Source: EFIGE dataset, WIFO calculations

Departing from the descriptive statistics, the next section explores the attributes of high growth firms. Using the OECD-Eurostat definition of high growth firms, a series of regressions identifies differences between high growth firms and other firms in the sample on the firm level. A dummy variable denotes high growth firms (HGF) in country c and industry i, the following Probit baseline regression was estimated:

$$HGF_{c,i} = \alpha + \beta_1 PA_{c,i} + \beta_2 size_{c,i} + \beta_3 age1_{c,i} + \beta_4 \ age1 \ \mu_i + \epsilon_{c,i} \qquad (1.3)$$

PA denotes the main explanatory variable, a dummy that indicates whether the respondent perceived 'legislative or bureaucratic restrictions' as a growth hampering factor. In addition, size measures the number of employees in the base year, age1 denotes firms that younger than 6 years and age2 firms and are older than 15 years. ϵ represents the error term. This specification was expanded in a stepwise approach. In a second regression, a series of other obstacles reflecting the perceptions about the general business environment was included. Third, the competitive situation was included by using information whether the firm is a global exporter, part of a foreign group or if it competes internationally. Eventually, sector and industry dummies were added.

The baseline specification with robust standard errors did not produce significant results. Next, the other perceived constraints to growth are added to the analysis to include information about the perceived business environment. The negative sign of the public administration variable remained, but turned significant, i.e. high growth firms perceive public administration as a slightly less hampering factor than all other firms in the sample. These results resemble recent findings for the same period by Cuaresma et al. (2014), who inter alia explore the characteristics for corruption – a proxy for PA efficiency – as a determinant for HGFS in a similar regression. Furthermore, adding a dummy variable on whether firms export globally, as well as country and industry effects did not change the results. Being a global exporter is positively associated with being a high growth firm.

The analysis is eventually expanded to the country-sector level. In OLS regressions, the share of high growth firms is associated with public administration question (PA), the mean of all reported obstacles as a proxy for the general business environments (OBST), the share of global exporters as a proxy for the sector's degree of internationalisation (EXP). The share of high growth firms is negatively related to the fraction of firms that perceive 'legislative or bureaucratic restrictions' as a growth hampering factor. Let c denote countries and s sectors and ϵ represents the error term, then the estimated regression can be written as:

$$HGF_{c,s} = \alpha + \beta_1 PA_{c,s} + \beta_2 OBST_{,c,s} + \beta_3 EXP_{c,s} + \epsilon_{c,s} \qquad (1.4)$$

This relationship turns weaker when sector effects – approximated by the Pavitt (1984) taxonomy - are included (see Table 1.27 and Table 1.28).[8] The relationship becomes statistically insignificant when country effects are added. This reconfirms the strong country variance in the quality of the public administration, which was indicated in the analysis of variance in the beginning of this section.

[8] The Pavitt taxonomy was chosen over single sector effects to keep the degrees of freedom.

Table 1.27 – Probit regression results, HGF (2005-2008) at the firm level

	High growth firms, firm level			
VARIABLES	1	2	3	4
Public Admin.	-0.01	-0.01**	-0.01**	-0.01*
	(0.006)	(0.006)	(0.006)	(0.007)
Size base year	-0.00	-0.00	-0.00	-0.00
	(0.000)	(0.000)	(0.000)	(0.000)
Age < 6 years	0.03	0.03	0.03	0.03
	(0.020)	(0.021)	(0.021)	(0.021)
Age > 15 years	-0.03***	-0.03***	-0.03***	-0.03***
	(0.007)	(0.007)	(0.007)	(0.007)
Financially constr.		0.01	0.01	0.01
		(0.006)	(0.006)	(0.006)
Labour market constr.		0.01	0.01	0.01
		(0.009)	(0.009)	(0.009)
Lack of man. resources		0.00	0.00	0.01
		(0.008)	(0.008)	(0.009)
Lack of demand		-0.01	-0.01	-0.00
		(0.006)	(0.006)	(0.006)
Other Obstacles		-0.00	-0.00	-0.00
		(0.007)	(0.007)	(0.007)
International Competition			-0.00	-0.00
			(0.006)	(0.006)
Part of foreign group			0.01	0.01
			(0.010)	(0.011)
Global exporter			0.01**	0.02**
			(0.007)	(0.007)
Country dummies	No	No	No	Yes
Industry dummies	No	No	No	Yes
Pavitt dummies	-	-	-	-
Observations	3,444	3,298	3,298	3,298
Pseudo R^2	0.0349	0.0404	0.0462	0.0658

*Note: Standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*
Source: EFIGE, WIFO calculations.

Table 1.28 – Regression results, HGF (2005-2008) at the country-sector level

	Country-Sector fraction of HGF (OLS)		
Public Admin., ave.	-0.06**	-0.05*	0.03
	(0.023)	(0.025)	(0.092)
Constraints, ave.	0.04	0.06	0.04
	(0.051)	(0.050)	(0.138)
Global exporter, avg.	0.06*	0.03	0.11*
	(0.033)	(0.039)	(0.055)
Country dummies	No	No	Yes
Industry dummies	-	-	-
Pavitt dummies	No	Yes	Yes
Observations	74	69	69
Pseudo R^2			
R^2	0.052	0.033	0.248

*Note: Robust standard errors in parentheses; *** p<0.01, ** p<0.05, * p<0.1*

Source: EFIGE, WIFO calculations.

7 SUMMARY AND CONCLUSIONS

This chapter analysed empirically the contribution of public administration (PA) efficiency to the share of high growth firms and employment growth. Three partly interrelated questions have been studied: First, how do public administration quality indicators relate to the observed share of high growth firms? Second, what is the role of public administration innovations such as e-services in the process of firm growth? Third, what are the most important factors of PA quality that affect the share of high growth firms?

Growing firms interact with the public administration in many ways. Firms need to pay taxes, have contract disputes, require licenses or have public procurement contracts. Consequently, the effect of public administration efficiency on firm performance is multidimensional, and many different links how the public administration affects growth performance are imaginable. The present study selected seven different conceptual links that are described by 12 different indicators of public administration quality. The conceptual links from the public administration efficiency to firm performance (measured in the study as share of high growth firms and industry employment growth) range from very general attributes of public administration quality such as general governance and corruption and fraud to very specific links that measure public administration efficiency in terms of availability of e-government services, the time and cost to start a new company or the duration and cost of contract disputes using the legal system. These indicators measure public administration efficiency in a broad sense. Some may capture aspects of the quality of public administration (e.g., specific regulations), others rather relate to efficiency in a more narrow sense.

The use of a variety of indicators on the one hand expresses the multidimensional nature of the interaction of public administration quality with firm performance, and on the other hand reflects the exploratory character of the present study. A literature survey shows that only a few of the links between public administration quality and firm growth have received attention in existing studies. Most studies focus on the interaction between clear identifiable regulations (e.g., start-up regulation, bankruptcy regulation) on firm performance measured in terms of productivity developments.

The existing literature and the discussion of the different links suggests that the impact of public sector efficiency on firm growth is not uniform, varies but varies across countries, industries and firms. The available evidence suggests that a key channel through which public administration quality affects firm growth is the reduction of administrative burdens, lowering transaction costs and thus barriers to the reallocation of market shares to smaller, more dynamic firms. Reallocation processes are the primary reason for the progressive nature of firm growth dynamics, as discussed in economic literature (e.g., Bartelsman et al., 2013).

Firm growth is the outcome of many distinct processes at the firm level that are embedded industry- and country specific environments. Individual firm growth strategies largely depend on the respective market environment and the firm's product portfolio. In the aggregate this leads to different determinants of firm growth across different industries. This suggests that differential links between public administration efficiency and industry characteristics exist, so that certain industries benefit more from a higher quality of public administration or more efficient specific regulations than other industries. The differential link between industry characteristics and public administration efficiency is used as identification scheme in the regression analysis. Due to the high correlation of macroeconomic variables it is not possible to identify the relevant relationships using simple regression analysis. More sophisticated regression techniques are needed to study the impact of high public administration efficiency on firm growth.

The conjecture that public administration efficiency affects firm performance differently across sectors is confirmed by a literature survey that summarises the impact of e-government as an instrument of public sector efficiency on firm growth. Firms that are technologically more advanced benefit more from e-government than other firms. This suggests that the effects of public administration efficiency and public sector innovation on firm growth rates should not only vary across countries due to different country-wide PA-efficiency levels, but also across sectors due to industry-specific characteristics that mediate the effect of public administration efficiency across industries.

The implemented econometric methodology uses specific industry characteristics (firm turnover rate, firm net entry rate, gross value added growth as measure of the realised growth potential, average firm size and capital intensity) to study the differential impact of public administration efficiency on firm performance. This implies that impacts of public sector efficiency that are symmetric across industries cannot be identified. However, it is likely that many of the conserved links between public administration efficiency and firm growth exhibit differential impacts across industries.

The second critical ingredient of the estimation technique is the selection of benchmark countries. The basic idea behind this set in the analysis is that countries that exhibit the most efficient public administration display no (or at least less) friction with regard to public administration efficiency. For this reason, the observed industry characteristics are not used in the in the regression analysis. Instead the industry characteristics of the benchmark country (or the set of benchmark countries) are used. The analysis selected Denmark and Sweden as potential benchmark countries, as these countries can be considered to have the most efficient public administrations according to a large number of rankings. In the analysis these benchmark countries were held constant, even if in specific indicators they do not exhibit the most efficient public administration. An instrumental variable technique is used in order to purge country-specific effects from the industry characteristic indicators.

The regression analysis covers two time periods because of a break in the industrial sector classification. Time periods 2003 to 2007 use NACE Rev. 1.1 data and time period 2008-2010 uses NACE Rev. 2 data. Overall 280 regressions were estimated using the share of high growth firms and industry employment growth as independent variables. 50 of the results showed statistically significant results, of which five contradicted the hypotheses. This shows that specific differential links may be relevant when making public administration more efficient.

The selected indicators measuring the efficiency of public administration cover both dimensions of the general governance and specific, operational aspects of firms' interactions with the public administration. One could assign the indicators general governance, regulatory quality, freedom of corruption and fraud and an independent judiciary as general indicators about the public administration. These are general in a sense that they describe the economy-wide impact of the public administration, and do not refer to specific, singular interactions between firms and the public administration. Indicators related to more operational aspects include starting a business, resolving insolvency, the cost and time to pay taxes or the public payment morale. It is important to note that the dichotomy of general and operational indicators is conceptual, and assigning the used indicators to either group is necessarily arguable.

The results show that PA efficiency has an impact on the rate of high growth firms and employment growth at the NACE 2-digit industry level. More PA-efficiency induces greater rates of fast growing firms, in particular by increasing the firm turnover and net-entry. This holds especially for general indicators that measure the overall governance system, including the presence of an independent judiciary and freedom of corruption. From this perspective, public administration efficiency is tied to the quality of institutions and general (also political) governance at the country level.

The selected indicators that measure PA-efficiency in dimensions related to specific aspects of firms' operations show weaker effects than the above mentioned indicators that measure the general governance. Especially the time to resolve insolvencies and the efficiency in the tax administration can be linked to greater rates of high-growth firms via firm dynamism channels.

The results from the NACE Rev. 2 sample are weaker than the findings from NACE Rev. 1.1, especially for employment growth as an output indicator. It is likely that the economic crisis overshadow the impact of the interaction term.

In addition, the identified patterns suggest that firm-growth and employment-growth are not identical, but different processes. Only for a minority of the results the same statistical significant links were found. PA-efficiency also increases employment growth, especially via investment-related channels such as capital intensity. Again, the general indicators (regulatory quality, general governance, freedom corruption and fraud, independent judiciary, cost to enforce contracts) perform better than indicators that measure specific operational dimension. These results also imply that improvements in the efficiency (and quality) of the public administration is conducive to both firm and overall employment growth, even though these occur via different transmission channels. Thus, the results confirm the view that public administration efficiency affects firm performance and industry-wide competitiveness, especially in more dynamic and growing industries.

To support these findings at the country-industry level, a complementary analysis using the EFIGE database was conducted. There is weak, but statistically significant evidence that perceived 'bureaucratic and legislative obstacles to firm growth' are negatively associated with firm growth for the period 2005-2008. High growth firms report this obstacle less than other firms. This relationship, however, loses its statistical significance when country effects are added, pointing at the country-wide dimensionality of PA-efficiency. Uncertainty remains about the directionality of the relationships in the micro-analysis (see Task 4 for further details).

Eventually, it is important to note that this research faced several limitations. Data availability was restricted, which did not allow exploring the relationships between public administration efficiency and firm growth for all EU countries. The analysis considered 15 countries for the NACE Rev. 1.1 sample, and 12 countries for the NACE Rev. 2 sample. Data limitation also prevented the implementation of longitudinal or panel methods, and

rendered the use of more advanced and recently compiled indicators for public administration efficiency unfeasible (e.g., European Public Sector Innovation Scoreboard).

8 APPENDIX

This appendix provides a quantitative interpretation of the results provided in Section 5 of the present report. More specifically, the results obtained in Table 2.22 can be used to illustrate the impact of an improvement in the efficiency of public administrations in greater detail (see Table 1.29). It displays the implied improvements in the outcome variable (share of high growth firms and employment growth) when the public administration efficiency indicator average indicator values of the three worst performing countries is improved to the average value of the three best performing countries. The effect displayed is the effect of the estimated interaction coefficient.

The set of countries used differs across indicators (see Table 1.30) and the effects are not uniform across industries. Table 1.29 provides information about an upper and lower bound for the statistically significant results obtained by the instrumental variable estimations reported in Table 2.10 to Table 2.21.

The lower and upper bound of the effect is computed by the distribution of the industry-specific characteristics of the benchmarking countries. To estimate the lower bound of the effect, the 10th percentile industry of the respective indicator was selected. Accordingly, the 90th percentile industry was used to compute the upper bound of the effect.

Table 1.29 – Quantification of the results

			NACE Rev. 1.1 - HGF					NACE Rev. 2 HGF					NACE Rev. 1.1 - Industry growth					NACE Rev. 2 - Industry growth				
PALink	Indicator	Bound	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity	Turnover	Net entry	Avg. Firm size	GVA growth	Capital intensity
A) General governance																						
	Government	Lower	2.12	-0.66				1.58	0.02	0.36			3.35		0.05		0.57					
	effectiveness	Upper	4.55	2.10				4.77	4.99	4.92			7.18		1.44		2.99					
	Regulatory Quality	Lower	1.71	-0.60					0.02	0.31			2.96		0.03		0.91					
		Upper	3.66	1.92					0.14	7.18			6.34		0.91		4.79					
B) Egovernment																						
	Availability of E-	Lower																				
	Government	Upper																				
C) Corruption and fraud																						
	Freedom of	Lower	2.29	-0.74					0.02	0.27			5.21		0.16		0.54					
	corruption	Upper	4.91	2.36					6.05	292.01			11.16		4.47		2.84					
D) Starting a business and licensing																						
	Cost required to	Lower																				
	start-up a company	Upper																				
	Time required to	Lower	-1.79	0.34										-0.69	-0.11	-47.96	-1.18					
	start-up a company	Upper	-3.83	-1.08										2.21	-3.13	-52.43	-6.18					
E) Public Payment morale																						
	Average delay in	Lower																				
	payments from	Upper																				
F) Tax compliance and tax administration																						
	Time to prepare and	Lower	-0.63	0.20	0.01																	
	file tax returns and	Upper	-1.35	-0.64	0.18																	
G) Efficiency of civil justice																						
	Enforcing	Lower		0.33	0.01	11.73	0.23						-1.07	0.40	0.03							
	contracts: Cost	Upper		-1.04	0.18	12.83	1.19						-2.30	-1.30	0.92							
	Enforcing	Lower						2.75														
	contracts: Time	Upper						6.65														
	Resolving	Lower	-0.61	0.16									-1.04									
	insolvency: Time	Upper	-1.32	-0.51									-2.22									
	Independent	Lower	1.91	-0.60				1.60	0.02	0.42			1.97		0.01		0.54					
	judiciary	Upper	4.10	1.92				3.88	4.06	4.53			4.22		0.34		2.84					

Source: WIFO elaboration.

Table 1.30 – Comparison countries

NACE Rev. 1.1.	General Governance	Regulatory Quality	E-gov.	Freedom of Corruption	Time to start a business	Cost to start a business	Public payment morale	Time to pay taxes	Time to enforce contracts	Cost to enforce contracts	Time to resolve insolvency	Independent judiciary
Low	RO	RO	EE	RO	ES	PL	IT	CZ	LV	CZ	CZ	RO
	PL	SI	SE	PL	SI	IT	ES	PL	LU	SE	SK	SK
	IT	PL	SI	LV	SK	HU	BE	HU	HU	IT	RO	IT
High	NL	LU	PL	NL	IT	EE	CZ	SE	PL	ES	ES	SE
	SE	NL	SK	SE	NL	SE	SE	EE	IT	HU	NL	NL
	DK	DK	LU	DK	DK	DK	EE	LU	SI	LU	BE	DK

NACE Rev. 2	General Governance	Regulatory Quality	E-gov.	Freedom of Corruption	Time to start a business	Cost to start a business	Public payment morale	Time to pay taxes	Time to enforce contracts	Cost to enforce contracts	Time to resolve insolvency	Independent judiciary
Low	RO	RO	LU	RO	CY	SE	EE	LU	LU	LU	CY	RO
	IT	SI	CY	CZ	FR	FR	SE	EE	HU	PT	ES	IT
	HU	IT	HU	IT	IT	EE	CZ	SE	FR	HU	IT	ES
High	FR	EE	SI	FR	EE	ES	ES	PT	CY	IT	EE	EE
	LU	SE	SE	LU	SI	HU	IT	HU	IT	SE	RO	LU
	SE	LU	EE	SE	ES	IT	PT	CZ	SI	CZ	CZ	SE

Source: WIFO elaboration.

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Chapter 2.
PUBLIC SERVICES AS INPUTS TO THE ECONOMIC SECTORS AND AS COSTS FOR FIRMS

1 INTRODUCTION

The public sector contributes to the level of competitiveness and hence the output of the manufacturing sector mostly via provision of services. Many of these services can be derived from publicly financed infrastructure in areas like health, education, transport etc. Even though those services are indispensable in modern economies and much effort is invested in improving public infrastructure in order to enhance present and future growth prospects, their specific economic contributions are hard to measure. In a recent book review, Kessides (2013) states that "[...] the issues surrounding the economics of public infrastructure are still not well understood and the link between public infrastructure and growth remains controversial." (p. 892). Even though a number of channels through which public capital and activities can impact economic development have been identified, he finds a "lack of analytic clarity due to the multiplicity, complexity, and potential interaction of those channels." (Kessler, 2013, ibid.).

In this study, a system of interlinked international input-output tables (WIOD, see Timmer 2012) will be used to measure the economic contribution of public sector services. In input-output tables these contributions correspond to direct and indirect deliveries of public administration services to other sectors inside and outside the domestic economy. The analysis relies on the assumption that the relevance of these services increases with the extent of their intersectoral and international linkages, Accordingly, the analysis concentrates on measuring these linkages applying different input-output indicators with the hypothesis in mind that intermediate flows of public administration services are equally important as those origination in other service and manufacturing and industries.

It is important to point out the fact that when applying input-output techniques in the context of this chapter, at least two types of difficulties arise, which have to be borne in mind when interpreting results derived from IO analysis.

First, public services are provided by various economic sectors; these comprise public administration and defence as the core sector accounting for public services, but also education and health, transport and other types of services sectors which include both private business and government activities which cannot be separated from each other. For that reason an analysis relying on input-output tables like those published in WIOD has to be restricted to the impact of public services in a narrow sense (with "public administration and defence" as the central economic sector, but also including Health and Education) and thus covers only part of the public activities which are relevant for the economy as a whole.

Secondly, the most tantalising restriction one faces, however, concerns the basic arrangement of data within input-output tables which is extremely disadvantageous for the analysis at hand. Within input-output tables public sector services appear both as a final demand category (general government consumption) as well as sectors / commodities in the make and intermediate use tables. Deliveries of the commodity "public administration services" to other economic sectors are included in the intermediate use table only if service payments are due. In that case, the actual payment for the service is reported as intermediate consumption (of public administration), while the rest of the cost is reported as final consumption expenditures of the general government (see Eurostat Manual of Supply, Use and Input-Output Tables, 2008, p. 149). If a company, for instance, applies for a government permit to extend its production facilities, the fee charged by the public administration in return for granting the permit is included in the intermediate use part of the input-output system. If the cost of administrating the permit application process exceeds the fee paid by the company, the difference will be included in government expenditures. This implies that only a (possibly rather small) share of the output of "public administration" is consumed directly by industries; most of it is recorded in the final demand category "public consumption". Undoubtedly these public goods influence all production activities within the economy, but no direct compensation can be measured by means of input-output analysis. Moreover, values recorded in the row of intermediate consumption of public administration services could both reflect a high service fee or a high transaction volume which cannot be distinguished when only nominal tables are available.

Notwithstanding these restrictions it will be attempted to analyse the economic contribution of public services and their role as a "lubricant" to the working of the economy as a whole. The input-output analysis will proceed along three lines: First, the input-output tables themselves are analysed with a focus not only on intermediate

public services but also on public consumption which is included in the final demand section of the tables. Second, the tables are transformed into an input-output model (which also includes the international trade linkages) using standard assumptions; based on this international IO table multiplier matrices are calculated and linkage measures are derived from them, which provide insights into direct and indirect flows public services across sectors and countries. Finally, the linkage measures are set against quality indicators of public administration services, thereby exploring a possible relationship between a high density of linkages and the accruing benefits.

The main results do not support the hypothesis that intermediate linkages of the public administration sector play a particularly important role in the overall economy; public administration services rather appear in the final demand category "government consumption" (this implies that most public services are provided more or less "free of charge"). As such they exert considerable demand impacts on other sectors of the economy but their supply-side effects remain unclear in an input-output framework. Moreover, observed differences across countries with respect to input-output-linkages fail to lead to clear-cut conclusions and may merely reflect differences in accounting standards and national institutional features of the public sector Furthermore no consistent patterns arise when analysing the statistical correlation between the size of the public sector, its intermediate linkages and indicators of the quality of public administration services. However, when countries are classified according to the significance of two different sources of financing of government activities ("taxes versus fees") and according to the extent of government activities ("strong vs weak government"), some evidence appears that systems that rely more strongly on fees instead of taxes, may be related with a higher quality of their public services.

The report is structured as follows: First, the WIOD database is described in more detail and the theoretical foundations of the input-output analysis applied here will be laid out. Thereafter, the input-output tables of WIOD will be analysed before the contribution of intermediate public services is measured using standard input-output modelling techniques. This part of the study looks at the direct and indirect content of public administration services embodied in sectoral output and roughly follows the line of research carried out by Hummels et. al. (2001) for vertical specialisation. Finally, a simple statistical correlation analysis relates size and linkage indicators of public administration services to indicators on the quality of these services.

2 THE WORLD INPUT-OUTPUT DATABASE (WIOD)

This chapter draws heavily on Dietzenbacher et. al. (2013) as the main source of information on the construction of the tables included in WIOD. The WIOD project (World Input-Output Database) project ran for three years (from 2009 to 2012) with 11 international partners involved. The database – which is publicly available and free of cost – combines detailed information on national production activities and international trade data. For each country, tables are used that reflect how much of each of 59 products is produced and used by each of 35 industries. By linking these tables to trade data, it is estimated, for example, how many dollars of Belgian fabricated metal products are used by the French transport equipment industry. This type of information is available in the WIOD database for 40 countries (all 27 EU countries and 13 major other countries) plus estimates for the rest of the world for the time period 1995-2007 (and estimates for 2008 and 2009). Tables are in current prices; in addition "deflated" information is given in previous year's prices. It should be emphasised that all data in WIOD are obtained from official national statistics and are consistent with the National Accounts.

As building blocks, national supply and use tables (SUTs) were used. These are the core statistical sources from which National Statistical Institutes derive national input-output tables (IOTs). In IOTs it is assumed that each industry produces exactly one product. Consequently, the distinction between industry and product vanishes and the tables become square (or, in statistical parlance, symmetric). SUTs on the other hand are usually non-square and allow for secondary production, better reflecting "reality". The supply table provides information on how much of each product is produced by each domestic industry. The use table indicates the use of each product (combining domestically produced and imported products) by each of the industries and final use categories (e.g., consumption by households and government, investments, and gross exports). Both supply tables and use tables are thus of the product-by-industry dimension. Therefore, linking SUTs with international trade data (which are product based) and with socio-economic and environmental data (which are mainly industry-based) becomes more natural (i.e. does not require a transformation of the source data).

Typically, SUTs are only available for a limited set of years (e.g., every 5 years) and once released by the national statistical institute revisions are rare. National Accounts on the other hand are usually revised. This is because statistical systems develop, new methodologies and accounting rules are used, classification schemes change and new data become available. Occasionally, revisions are also carried through to ensure consistency and comparability over time. These revisions can be substantial, especially at a detailed industry level, implying discrepancies between information from the latest version of the National Accounts for a certain year and the

published SUT for that year. The SUTs in WIOD are therefore benchmarked on the National Accounts. So, any revision of the National Accounts leads to an adaptation of the national SUTs to make them match.

Because national SUTs are only infrequently available and are often not harmonised over time, they have been benchmarked on consistent time series from the national accounts statistics (NAS). Time series for (gross) output and value added by industry, total imports and total exports and final use by use category were taken from the NAS. These data were used as constraints when generating time series of SUTs with the so-called SUT-RAS method. This method is akin to the well-known RAS-technique (a bi-proportional updating method for IOTs). This technique has been adapted for updating SUTs and has been shown to outperform other methods for generating time series of SUTs (see Temurshoev and Timmer, 2011).

Time series of SUTs have been derived for two price concepts: basic prices and purchasers' prices. Basic prices reflect all costs borne by the producer, whereas purchasers' prices reflect the amounts paid by the purchaser. Supply tables are always in basic prices and often have additional information on margins and net taxes by product. Use tables, as available from public data sources, are typically in purchaser prices and had to be transformed to basic prices within the construction procedures. The difference between the two types of use tables is given in the so-called valuation matrices with the trade and transportation margins and the net taxes, which had to be estimated.

In the process of construction, the national SUTs have been combined with information from international trade statistics to construct international SUTs. Recall that use tables include both domestically produced and imported products. They have been split into use of domestic products and use of foreign products first, and in a second stage with respect to the use of foreign products into the country of origin. The standard assumption in most databases is to apply import proportionality (where the same, fixed percentage of total use of a product is assumed to be imported, irrespective of its purchaser). For example, if 40% of the total purchases (by industries and final users) of rubber and plastic products are imported, the same 40% applies to each and every industry-of-use and final demand category. That is, 40% of rubber and plastics used by the transport equipment manufacturing industry (or any other industry) are imported, 40% of the household consumption of rubber and plastics are imported, and the same applies to investment and government consumption.

For the imports of goods an estimation method was developed that does not rely on this standard import proportionality assumption. The UN COMTRADE database provides information on bilateral flows of goods (at the HS6-digit level) for about 5,000 products. For each of these products the shares of its imports that went to "intermediate consumption", to "final consumption", and to "capital goods" were determined (i.e. modifying the end-use categories in the Broad Economic Categories classification as provided by the UN). Imports have been allocated across end-use categories in the following way. The share of any end-use category (intermediates, final consumption, or investment) was used to split up total imports for each of the 59 products in the WIOD classification across the three end-use categories. Within each end-use category, the allocation was based on the proportionality assumption. A similar procedure was used to split the imports table according to country of origin. Unlike is the case for the standard proportionality assumption, country import shares differ across end-use categories (but not within these categories).

Given the types of application the WIOD database was intended for, it is also important to have detailed information on the trade in services. For services trade, however, no standardised database on bilateral flows exists. The data have been collected from various sources (including OECD, Eurostat, IMF and WTO), checked for consistency and integrated into a bilateral services trade database. WIOTs in previous year's prices have been constructed based on exporters' gross output deflators.

The construction of the WIOT's proceeded along the following lines, which are only roughly described here:

1) In the first step, three types of publicly available data have been used. These are national accounts statistics, SUTs, and international trade statistics. The data have been harmonised in terms of industry- and product-classifications, both across time and across countries. The WIOD classification lists 59 products and 35 industries based on the CPA and NACE rev 1 (ISIC rev 2) classifications. To arrive at a common classification, correspondence tables have been made for each national SUT, bridging the level of detail in the country to the WIOD classification. This involved aggregation and sometimes disaggregation based on additional detailed data. While for most European countries this was relatively straightforward, tables for non-EU countries proved more difficult. National SUTs have also been checked for consistencies and adjusted to common concepts (e.g., regarding the treatment of FISIM, financial intermediation services indirectly measured, and purchases abroad). Finally, because national SUTs are in national currencies, official exchange rates from the IMF were used to have all data listed in dollars.
2) The second step led to a time series of SUTs, as described before.

3) In the third step, the national SUTs have been combined with information from international trade statistics to construct what is called international SUTs. Recall that use tables include both domestically produced and imported products. They have been split according to domestic or foreign origin first and then according to country of origin based on import shares. As described before, for goods an improved estimation method was adopted and for services a bilateral service trade database was constructed.
4) In the final step, the international SUTs for all countries were combined into a world SUT first. That is, they were stacked and reordered to resemble a standard supply and use table. Subsequently, this world SUT was transformed into the WIOT. Recall that IOTs are symmetric and can be of the product-by-product type (describing the amount of products needed to produce a particular good or service) or of the industry-by-industry type (describing the flow of goods and services from one industry to another). The choice between the two types depends on the research questions. The choice made was to derive industry-by-industry IOTs because many applications were foreseen that would use industry level data (e.g., value added, employment, energy use, emissions) and because industry-by-industry tables link better with national account statistics. An IOT is a construct on the basis of a SUT at basic prices using additional assumptions concerning technology. The so-called "fixed product sales structure" assumption was used, stating that each product has its own specific sales structure (reflecting the proportions of the output of the product in which it is sold to the respective intermediate and final users) irrespective of the industry where it is produced. This assumption is most widely used, because it is more realistic, because it requires a relatively simple mechanical procedure, and because it does not generate any negatives in the IOT that would require manual rebalancing.
5) The IOT that has been constructed in this way is an inter-country IOT for forty countries with matrices for imports from RoW and a vector of gross exports to RoW. Various modelling purposes and analyses, however, require a full WIOT. Therefore the Rest of the World has been added as a single region, as a proxy for all other countries in the world. The estimation was based on totals for industry output and final use categories from the UN National Accounts, assuming an input structure equal to that of an average emerging country (for which the structures of Brazil, Russia, India, China, Indonesia, and Mexico have been taken into account).

3 FOUNDATIONS OF INPUT-OUTPUT TABLES AND INPUT-OUTPUT MODELLING

The analysis here will be based on symmetric IOT from WIOD[9] by sectors and countries. Therefore final demand does not include exports – these are part of the intermediate use table. Figure 2.8 depicts a stylised IOT similar in its structure to the one applied here.

Figure 2.8 – Inter-country Input-Output Table

		Activities country i							Activities country j							Activities country k							Final Demand by country i			
		Agriculture	Mining	Manufacturing	Energy	Construction	Market Services	Public Services	Agriculture	Mining	Manufacturing	Energy	Construction	Market Services	Public Services	Agriculture	Mining	Manufacturing	Energy	Construction	Market Services	Public Services	Household consumption	Public Consumption	Investment	Total
Activities country i	Agriculture																									
	Mining																									
	Manufacturing																									
	Energy	Intermediate Deliveries country i to i							Intermediate Deliveries country i to j							Intermediate Deliveries country i to k							Final Use			Total production
	Construction																									
	Market Services																									
	Public Services																									
Activities country j	Agriculture																									
	Mining																									
	Manufacturing																									
	Energy	Intermediate Deliveries country j to i							Intermediate Deliveries country j to j							Intermediate Deliveries country j to k							Final Use			Total production
	Construction																									
	Market Services																									
	Public Services																									
Activities country k	Agriculture																									
	Mining																									
	Manufacturing																									
	Energy	Intermediate Deliveries country k to i							Intermediate Deliveries country k to i							Intermediate Deliveries country k to k							Final Use			Total production
	Construction																									
	Market Services																									
	Public Services																									
		Total intermediate use							Total intermediate use							Total intermediate use							Total final use			
		Value added							Value added							Value added										
		Total production							Total production							Total production										

Source: WIFO

[9] All Input-Output Data used in this chapter can be downloaded from the homepage of the WIOD project, www.wiod.org

The table shows the intermediate linkages, including exports and imports for three countries (i, j, k) and seven sectors plus final demand for country i. The last three rows include, respectively, total intermediate use, value added and total production for each country and each sector. Public administration services appear three times in the table: As a sector delivering its services to other sectors (including the public administration sector itself) in its own country as well as other countries; as a sector producing services and demanding inputs from other sectors / countries; and as a final demand category (government consumption) in country i demanding commodities from other sectors / countries.

The mathematical equation defining an input-output model to be derived from a table like the one above is as follows:

$$Ax + f = x \qquad (2.5)$$

A is the technology matrix; each column includes the sectoral shares of intermediate inputs from domestic and foreign sources (by countries) in total production. It is of dimension (sector x country) x (sector x country). x is the total value of production both by sector and country. f is the vector of total final demand aggregated across all final demand categories; its dimension corresponds to that of vector x.

Rearranging that equation leads to the equation of the input-output model that can be applied analytically:

$$x = (I - A)^{-1} f \qquad (2.6)$$

where I is the identity matrix.

$(I - A)^{-1}$ is the so called Leontief-inverse; the column sum of that matrix is the value of the additional output if final demand for the output of the corresponding sector is increased by 1 (say 1 Dollar). The additional output includes both direct effects and indirect effects which are generated by the chain of intermediate deliveries across sectors and countries. Elements on the main diagonal are always greater than 1 since direct effects (increase of sectoral output by one unit) are included. Elements off the main diagonal are less than one and indicate the additional output of a specific sector located in a specific country induced by the increase in final demand. Premultiplying the Leontief inverse by value added or employment coefficients (i.e. value added or employment per unit of production value) delivers impacts in terms of value added or employment.

The Leontief-matrix is a natural first step in exploring the economic contribution of intermediate public services. The columns contain the economic impacts generated by final demand for the commodities provided by a sector in a specific country on all sectors in all countries; the column sum indicates the total economic impact resulting from that demand "shock". Summing across rows attains the so called "forward linkages" as an indicator for how much of a sector's output is used in the production processes of other sectors. Since the focus here lies on public administration services and their contribution to the functioning of other sectors, most attention will be paid to forward linkages with respect to the public administration sector.

4 INPUT-OUTPUT LINKAGES OF PUBLIC ADMINISTRATION SERVICES

As a first step in analysing the WIOD system of international input-output tables selected structural information was extracted. This includes:

- indicators on the importance of foreign trade (share of exports in total value added and the ratio of exports to imports),
- the ratio of government consumption (CG) to total value added,
- the share of sector L (Public Administration) in total value added, and
- the share of sector L's output in government consumption

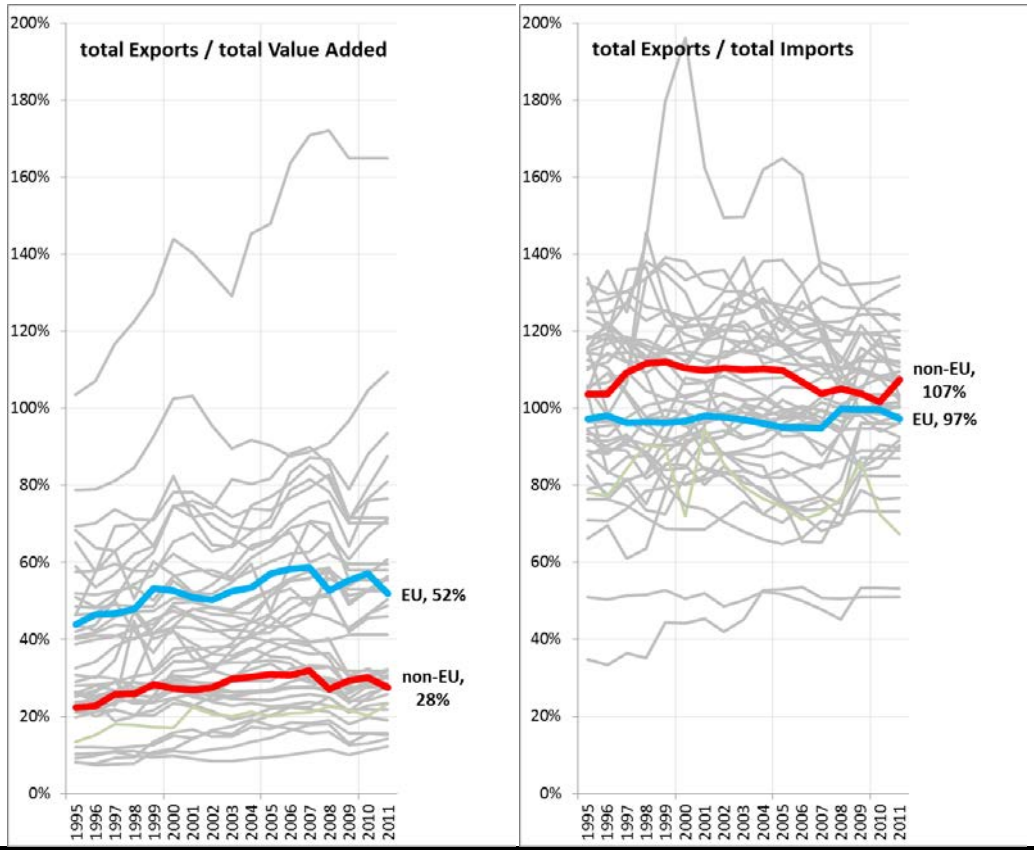
for all countries included in WIOD and the Rest of the World over the years 1995 to 2011 (see Figure 2.9 and Figure 2.10).

Exports have become more important in the period from 1995-2011, both for EU and non-Member States: their value as compared with total Value Added (VA) has expanded quite smoothly until 2007; in 2008 the economic crisis lead to a sharp (but rather short) dip – by 2010, export shares had almost recovered and reached their pre-crisis levels again. In the last year of the observation period, 2011, exports contracted again. In the EU, exports account for a larger share of VA than in non-EU countries. This is mostly due to a size-effect: typically, the larger a country, the lower its share of external trade. The group of EU countries contains a lot of small, open economies, whereas the WIOD non-EU sample mostly encompasses countries with populations which are larger than those of the largest EU country. For net exports (defined here as the ratio of exports to imports), the effect

of the 2008 crisis is rather different for EU and non-EU countries: for the EU group, it resulted in balanced trade volumes (exports fell, but imports fell even more); conversely, the non-EU group reduced its trade surplus (already starting in 2007). At the end of the observation period, both country groups "returned to normal".

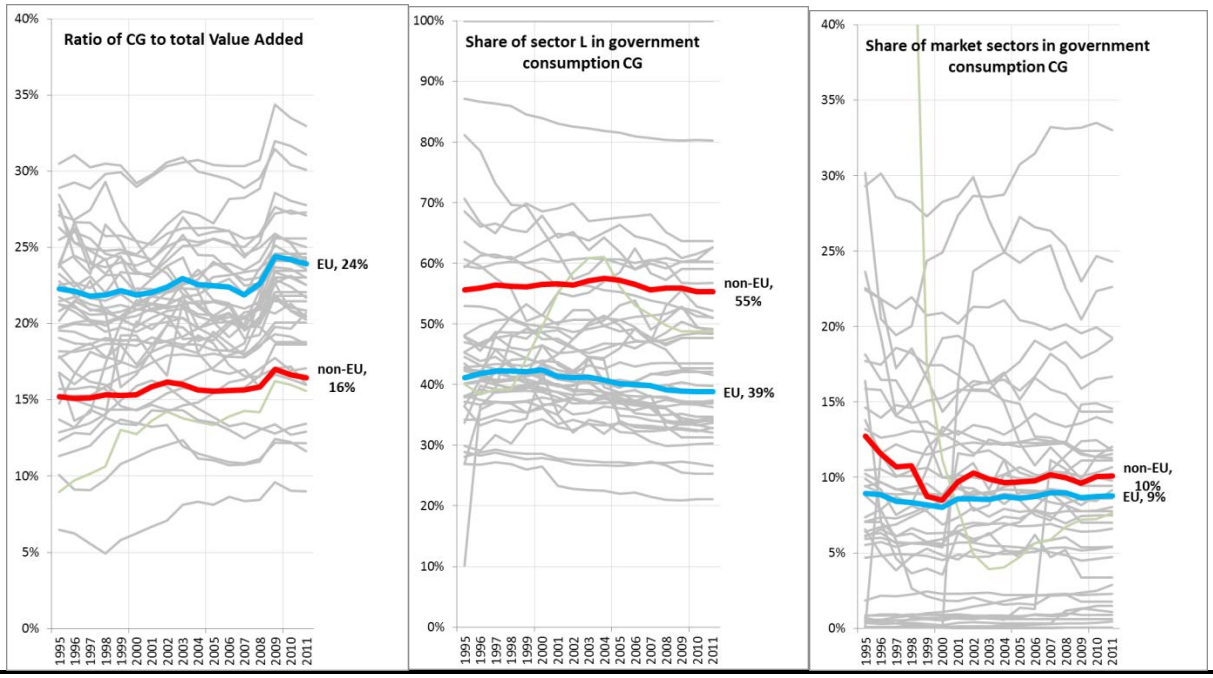
Turning to government related indicators, it can be seen that Member States, on average, exhibit markedly higher ratios of government consumption (CG) to total value added, around 24% in the pre-crisis year against the non-EU's 15-16%. Moreover, the response to the crisis was much more pronounced in the EU: CG's share jumped up by almost 2.5 points in the two years after the crisis; outside the EU, the increase was more moderate at 1.5 points. Sector L, "Public Administration", together with sectors M and N (Health and Education, respectively), make up the bulk of government consumption. Sector L is a more important part of CG in the non-EU group, with a share of around 55%, whereas the EU group exhibits a lower level and a slightly downward trend with respect to L's share in CG (39% in 2011, down from 42% in previous years). The much larger share of L outside the EU is mostly due to the organisation of health and education (and probably accounting conventions): in the USA, for example, government consumption contains almost exclusively sector L's output; health and education are part of "Consumption of Private Households (CP)". On the other hand, market sectors (manufacturing plus market services) account for only around 10% of government consumption. As far as the size of sector L is concerned, EU and non-EU countries are rather similar: about 6-7% of total value added is produced by public administration (see Figure 2.11). As an intermediate product for other sectors, public administration's importance is low (see Figure 2.12): Across all sectors, L accounts for 0.7% of all intermediate inputs. For manufacturing sectors, this share is even lower: only 0.3% of intermediates are directly provided by sector L. The reason is, as already mentioned, that most services rendered by public administration are not directly billed to its consumers, be they enterprises or private households; rather, they are provided as a "public good", whose consumption is essentially free of charge.

Figure 2.9 – Foreign Trade Indicators



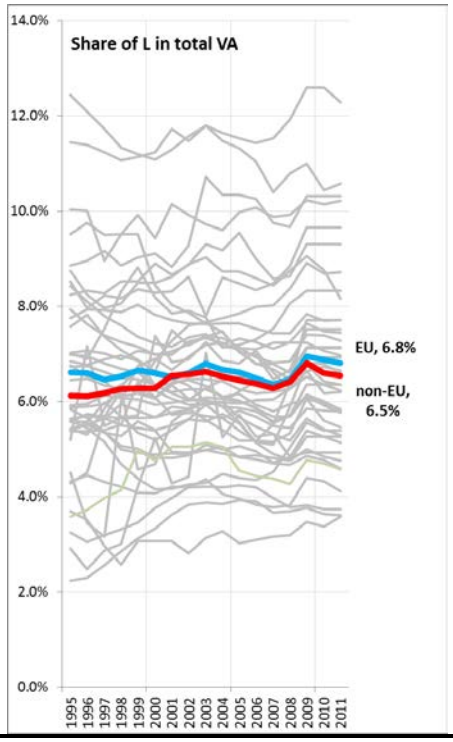
Source: WIOD; own calculations

Figure 2.10 – Government Consumption: Size and composition



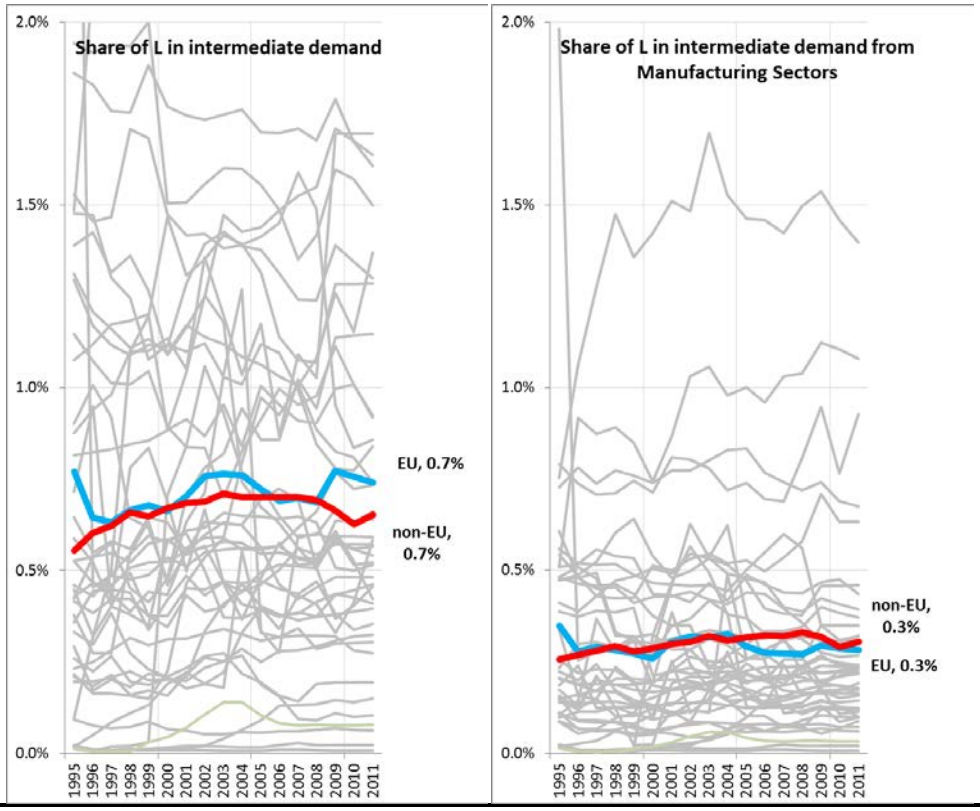
Source: WIOD; own calculations

Figure 2.11 – Share of Value Added of Public Administration in Total Value Added



Source: WIOD; own calculations

Figure 2.12 – Direct Intermediate Consumption of Public Administration Services



Source: WIOD; own calculations

Accordingly, the output of sector L is mostly delivered to government consumption as part of final demand: in EU and non-EU countries alike, this share is around 88%, with a slightly decreasing trend. Conversely – and in line with the low share of L in total intermediate inputs - the share of the value of public administration services consumed as intermediate demand by other sectors in the total value of public administration services is low, though on a rising trend: since 1995, this share has gained about 1 percentage point up to an average of 7.5% for the EU and 5.4% for regions outside Europe. If one looks at manufacturing sectors only, only around 1% of sector L's output is directly consumed by those industries.

The fact that intermediate public administration services are rather insignificant compared to other commodities used by intermediate demand is an indication that the search for a measure of the effects of government services on the working of the economy in general must not be restricted to analysing those inputs alone but needs to be expanded to government activities like those included in government consumption. However, since input-output models treat government consumption as an exogenous variable, the scope of the analysis is somewhat limited in that respect.

The fact that the shares of public administration services in total intermediate inputs are generally low when averaged across sectors (and years) raises the issue of sectoral variation of these shares. Figure 2.13 maps these shares by sector for all countries / regions included in the database.

It is confirmed once more that intermediate public administration shares are somewhat lower for manufacturing industries than they are for service industries. They are also fairly low for construction services (since government fees for construction permits should mostly be accounted for in real estate services) but higher for the energy producing sector. However, differences in mean shares between manufacturing and service sectors seem to be driven by a higher cross-country variation for most service industries: In general, the standard deviation with respect to those shares is much higher for service industries than for manufacturing industries.

Within services, the highest variation is found for the public administration sector itself and the education sector. In Bulgaria, for instance, public administration purchases 16% of its inputs from within the sector, while in Sweden only 1.8% of total public administration inputs are provided intra-sectorally; on the other hand, in Sweden 9% of the inputs used in the education services sector are delivered by public administration against only 0.3% in Bulgaria. How different institutional arrangements within the government sector influence the

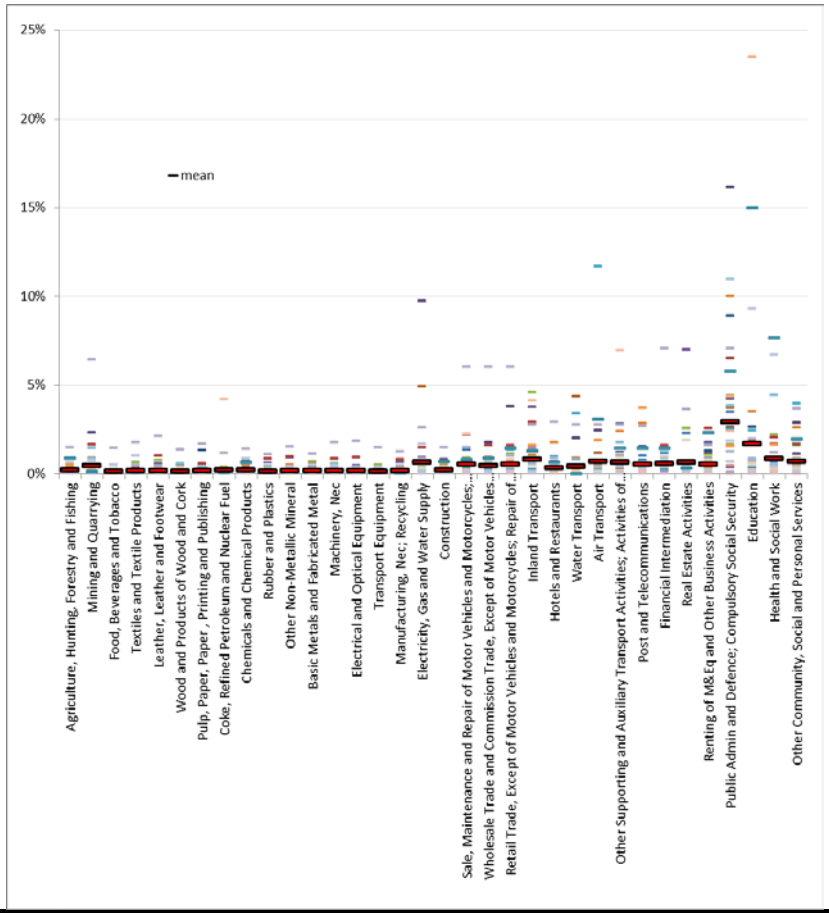
amount of intermediate deliveries of public administration services can also be illustrated by comparing the education sector in Germany and the Netherlands: In Germany, the education sector relies heavily on inputs from itself (share of 40% of intra-sectoral intermediate deliveries) while only 0.6% of total inputs are composed of public administration services. In the Netherlands the share of public administration inputs in the education sector is 9% and thus significantly higher than in Germany, but only 2% of its inputs stem from the education sector itself.

This once more confirms the fact that within national accounts and the system of input-output tables that are embedded in those national accounts, the share of intermediate public administration services in total inputs highly depends on accounting practices and even more on the country-specific organisation of the government sector and of sectors closely related to it like health, education and others. These accounting and organisational factors seem to play less of a role in more market oriented services and manufacturing in particular; however, since the direct flows of services from public administration to companies in those sections of the economy are small, it might be safe to conclude that government regulations and interventions play an even more significant role in terms of the efficiency and the competitiveness of those sectors.

Notwithstanding these limitations, more insights into the inter-industrial linkages of public administration services can be gained by further exploiting the inter-country intermediate use table derived from the WIOD-system. For that purpose, a Leontief multiplier matrix was calculated and then premultiplied with the sectoral share of value added in output. The resulting matrix thus includes value added multipliers by sector and country. The multiplier values express how much value added, differentiated by sectors and countries, is directly and indirectly generated when final demand for the product / service of a certain sector in a certain country is increased by one unit (in monetary terms).

Based on this value added Leontief matrix, forward linkages of public administration services by country – calculated as described above - were analysed to arrive at an indicator for the importance of the public administrations sector as provider of inputs to other sectors of the economy. Higher values of this indicator imply greater importance.

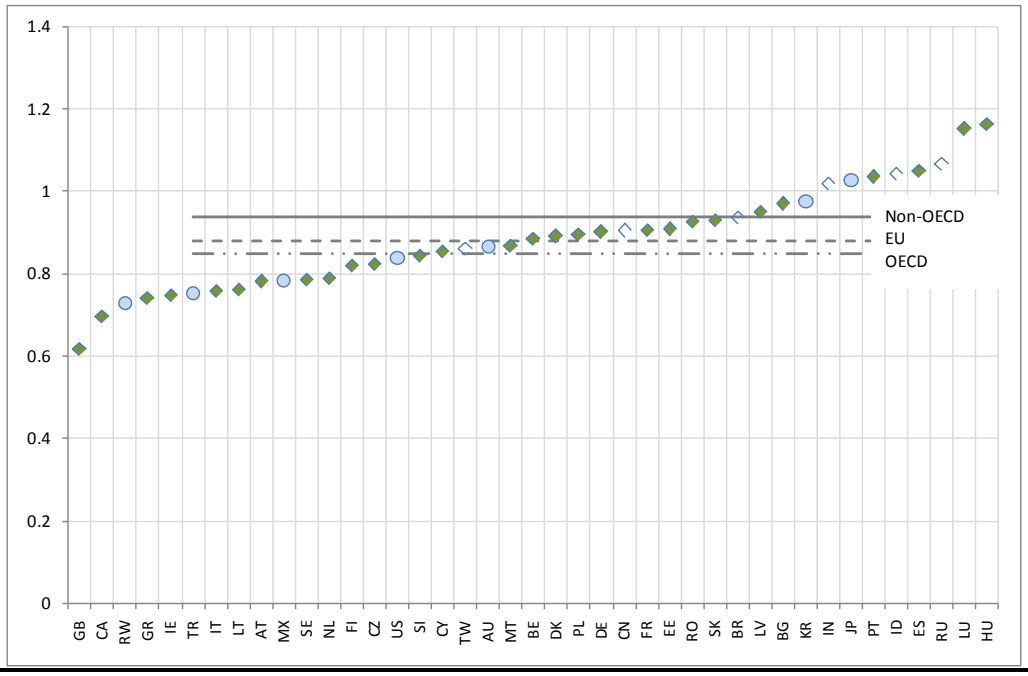
Figure 2.13 – Countries' Shares of Intermediate Public Administration Services in Total Intermediate Inputs by Sector (mean of 1995-2011)



Source: WIOD; own calculations

The values of the indicator range from 0.6 to almost 1.2 with neither country size nor region seemingly influencing the size of the forward linkages (see Figure 2.14). The average values for Member States, OECD- and non-OECD-countries do not differ significantly. What was mentioned several times before applies here as well: Both the input-output table compilation standards as well as the structure and organisation of the public sector might explain a large part of the differences observed so that one needs to be careful when drawing economic conclusions. However, it is safe to state that countries with higher forward linkages of the public administration sector may have a higher share of fee-based services compared to countries with lower forward linkages. Later on in the analysis an attempt is made to find a link between this characteristic organisational feature of the government sector and the quality of the services provided as seen by the "consumers" of these services.

Figure 2.14 Total Forward Linkages by Country / Region (mean of 1995-2011)



Source: WIOD; own calculations

Compared to other sectors, the forward linkages emanating from public administration rank close to the median over all sectors (see Table 2.31). Sectors ranked behind public administration include mainly those that are concentrated on the production of investment or consumption goods (which both show up in the final demand section of the tables). On top of the list one can find many service goods but also manufacturing commodities that are needed in the production of many other sectors. Forward linkages of intermediate public administration services, however, are highly concentrated on the public administration sector as the receiving entity, i.e. most of the intermediate public services are inputs in the production of the public administration sector itself. This implies once more that for other sectors fee-based public service deliveries do not play a significant role as inputs to production – at least in terms of the monetary value of the fees that are included in the intermediate use tables which may not correspond to the actual value of the public service as received by the demanding sector: Since those fees need not cover the whole cost that accrues in the production of the services, their true benefits to the companies using them remains unclear and may very well be underestimated by looking at the forward linkage or other input-output related indicators only. This problem is further addressed below when indicators on the quality of public services are further examined.

Total forward linkages can be split up into domestic and foreign linkages. Foreign linkages, as depicted in Figure 2.15, show which share of the public services produced and delivered in one country end up as inputs to sectors located abroad via indirect input-output linkages. The linkages ranked by size and assigned to the respective country produce three different groups of countries: A first group with foreign forward linkages between 0.01 and 0.07; another group (with Cyprus in between those groups) with 0.2 and 0.28; and finally a group of three countries (China, Indonesia and Luxemburg) with values of foreign linkages above 0.38. The countries within those groups are quite heterogeneous with respect to size or geographic location. Higher forward foreign linkages imply that domestic sectors receiving public administration services are closely linked to foreign economies (e.g., directly through exports or indirectly through deliveries to domestic exporting sectors).

There is no clear cut correlation between the size of total forward linkages of public administration and the size of the respective foreign forward linkages. The three groups of countries identified before do appear again in Figure 2.16; they show similar levels of foreign forward linkages with no positive correlation between total and foreign forward linkages within those groups.

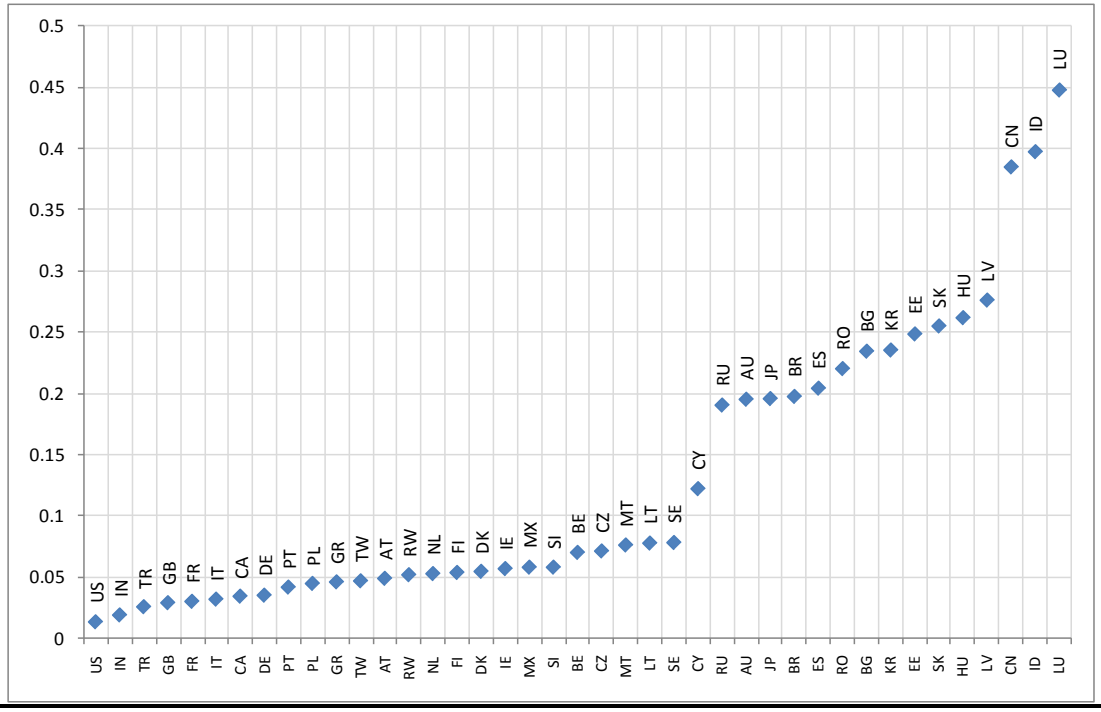
The analysis of the Leontief value added multiplier matrix provides information on the intermediate linkages between sectors and countries, but does not include any structural information about final demand, since the multipliers are derived based on unit value increases across all final demand sectors. In a further step of the analysis the composition of final demand in each country will be taken into account. Therefore, the Leontief value added multiplier matrix will be multiplied by absolute final demand values (including all sectors and countries) to arrive at induced value added by sectors and countries.

Table 2.31 – Total Forward Linkages by Sectors (mean over all countries and years)

Sector	Total Forward Linkages	Sector	Total Forward Linkages
Business Services	4.98	Public Administration	0.87
Financial intermediation	2.30	Office Machinery	0.82
Wholesale Trade	2.04	Construction	0.78
Mining	1.87	Household Services	0.77
Real Estate	1.72	Health	0.76
Retail Trade	1.60	Hotels and Restaurants	0.75
Agriculture and Forestry	1.40	Mineral Products	0.65
Land Transport	1.33	Textiles	0.63
Electricity	1.25	Plastics	0.61
Metals	1.22	Transport Equipment	0.59
Telecommunications	1.19	Wood	0.58
Chemicals	1.10	Food	0.56
Auxiliary Transport Services	1.06	Air Transport	0.51
Machinery	1.01	Other Manufacturing	0.49
Other Services	1.00	Water Transport	0.48
Paper and Pulp, Printing	0.95	Refined Petroleum	0.45
Sale / Repair of Motor Vehicles	0.91	Leather	0.41
Education	0.91		

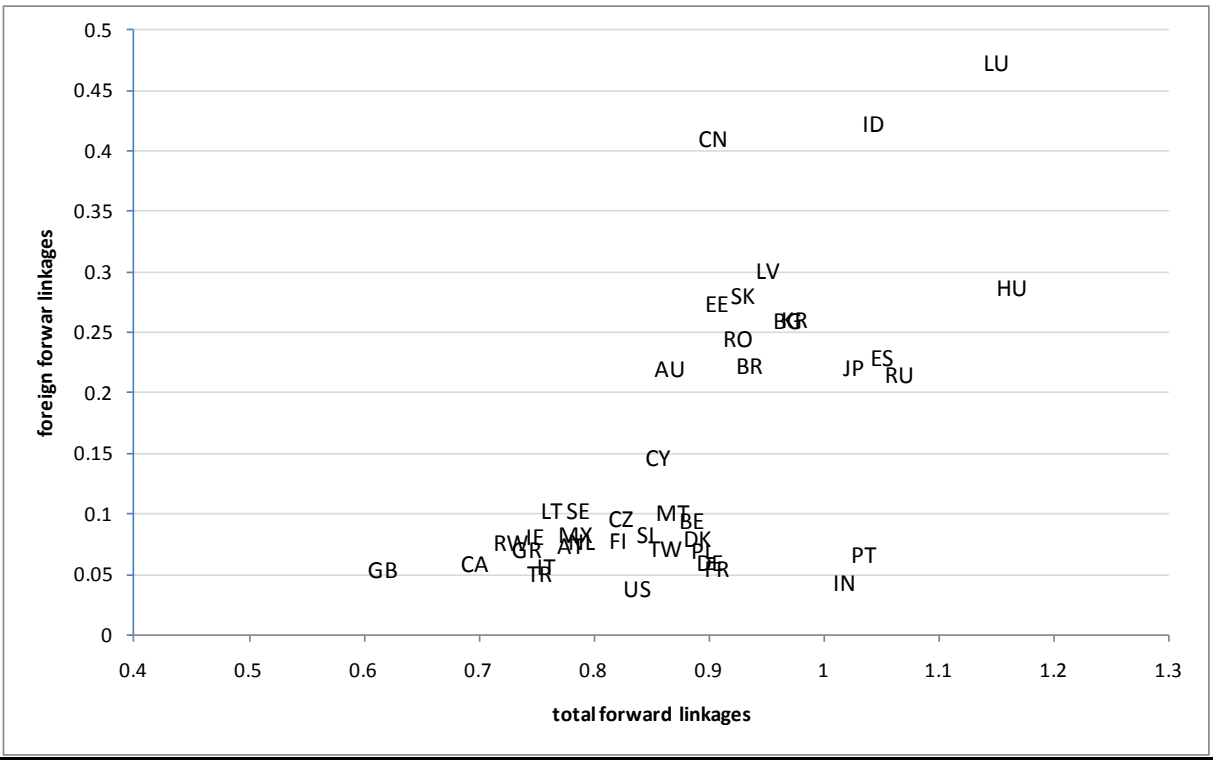
Source: WIOD, own calculations

Figure 2.15 – Foreign Forward Linkages of Public Administration (L) by Country (mean of 1995-2011)



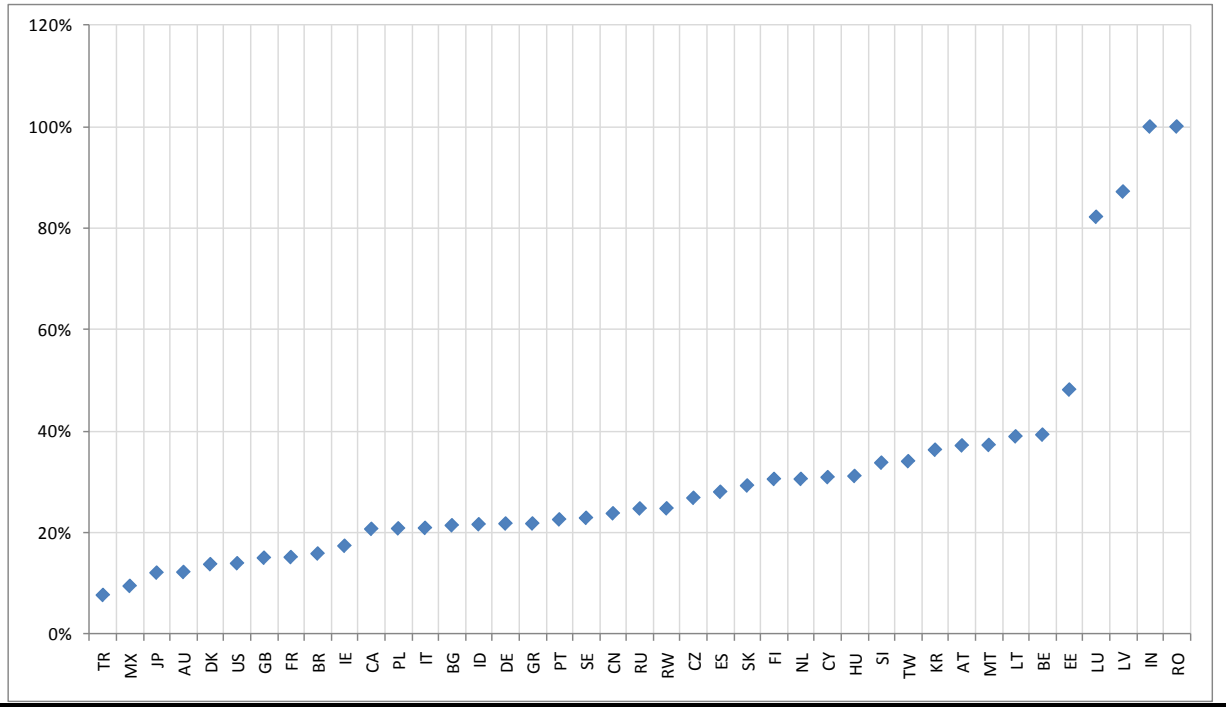
Source: WIOD; own calculations

Figure 2.16 – Total and Foreign Forward Linkages of Public Administration (L) by Country (mean of 1995-2011)



Source: WIOD; own calculations

Figure 2.17 – Share of Foreign Value Added in Public Administration (L) by Country (2007)



Source: WIOD; own calculations

It turns out that a high share of the resulting value added effects from final demand shocks consist of direct effects; with respect to public administration, this mainly concerns the final demand for public administration services (mostly contained in government consumption). The direct effect remains in the country where it originates; the spread of public service value added to other countries is triggered by indirect effects. For this reason, the results presented here include indirect effects only. What is shown in Figure 2.17 is the share of public administration value added generated abroad in total indirect value added of public administration. The shocks inserted into the input-output model are by individual countries: Final demand as observed in each country in the year 2007 was used separately for calculating the value added effects as opposed to introducing the shocks for all countries together.

These shares of foreign value added range from about 10% to up to 50% when ignoring two extreme values for Luxemburg and Latvia which are the result of very low levels of indirect value added for public administration. The results indicate that indirect linkages in combination with the structure of final demand in a specific country results in considerable "outflows" of national public administration value added to other countries. As before, no specific pattern with respect to country size or region can be identified.

5 QUALITY OF PUBLIC ADMINISTRATION SERVICES

Attention now turns to contrasting observed structural differences between countries and with respect to public administration services (as derived from the input-output analysis) with export performance on the one hand (as an indication of "competitiveness", a component of which is assumed to be influenced by the level and quality of public services) and various indicators of efficiency, transparency and accountability of the public sector on the other hand (as an indication of the quality of public services). Both the level of the variables (to be more precise, the average over the last 5-year-period covered by the WIOTS, 2006-2011) and the development during the entire 17-year period from 1995-2011 (measured as mean annual changes) are considered. In all instances, correlation diagrams for the variable under consideration are presented with

- the ratio of exports to total value added;
- the ratio of exports to imports; for both X-related indicators, mean annual changes are applied instead of levels, to correct for country size (typically, the larger a country, the lower its share of external trade).

as well as with the 7 indicators of public administrations' quality (see Pitlik et. al., 2012):

- Governance;

- Tools for administrative modernisation;
- Corruption;
- Starting Business;
- Procurement;
- Tax compliance & tax administration;
- Effective civil Justice.

Correlations are identified, but causalities cannot be inferred, neither running from the variables under consideration to our set of indicators nor vice versa.

Correlation between CG/VA and the development of external trade is nil, as the first two diagrams (Figure 2.18 and Figure 2.19) show. As for the other indicators, correlation seems to be present: the larger government consumption relative to total value added, the better a country's achievement in all 7 quality indicators. However, this positive correlation seems to be driven not least by the position of four countries in particular: the Scandinavians (Denmark, Sweden, Finland) plus the Netherlands ("DFNS"), countries with a large government sector and squeaky clean administration – if these are taken out of the sample, the correlations vanish or even turn slightly negative.

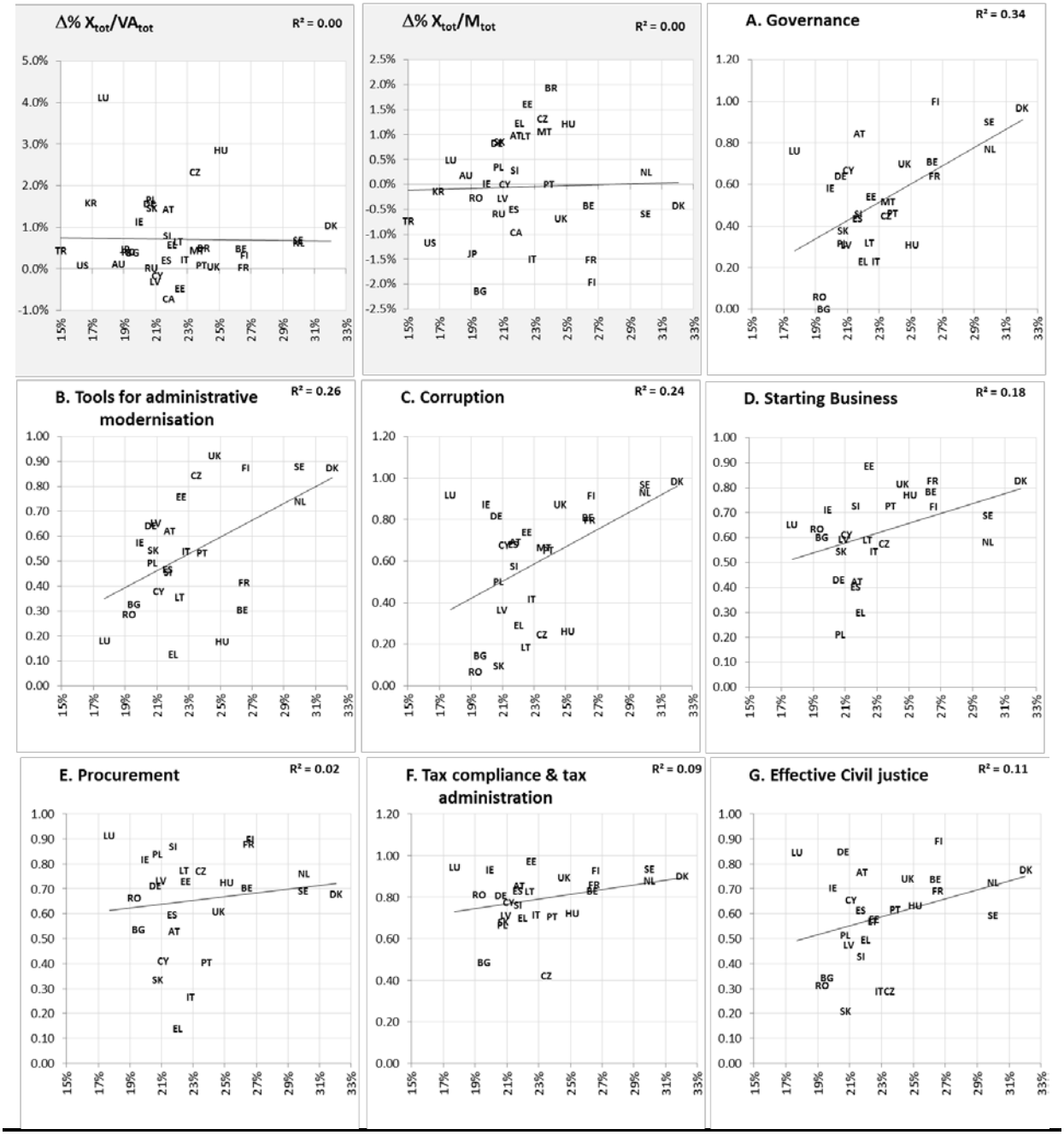
If one looks at the correlation between the indicators and mean annual changes in CG/VA, most correlations vanish. The remaining (very slight) correlation, with indicator "C. Corruption", again suffers from a "Scandinavian bias" – taking away DNK, FIN, NLD and SWE - DFNS - results in an inconclusive relationship.

Interestingly, the correlation is reversed when the share of sector L (public administration) in total value added (in levels) is used (Figure 2.20): whereas the relative amount of government spending was positively correlated with the quality indicators (thanks to DFNS), the relative size of public administration is (slightly) negatively correlated with administrative quality.

When looking at annual changes, countries with an expanding public sector seem to be those with lower rankings in the quality indicators (Figure 2.21): As before, one can identify two countries which most affect this correlation: Bulgaria and Romania, whose public sectors' share is still not particularly large (at 7.1%, Bulgaria's public sector is not much larger than the EU average of 6.8%; Romania's 4.9% are in the lower range), but which has expanded by almost 0.2 percentage points per year (interestingly, the WIOD data base shows for both countries a jump of sector L's share in 1998, which accounts for the better part of the expansion between 1995 and 2011). Exclusion of Bulgaria and Romania, however, does not cause the correlations to break down; they merely become less pronounced.

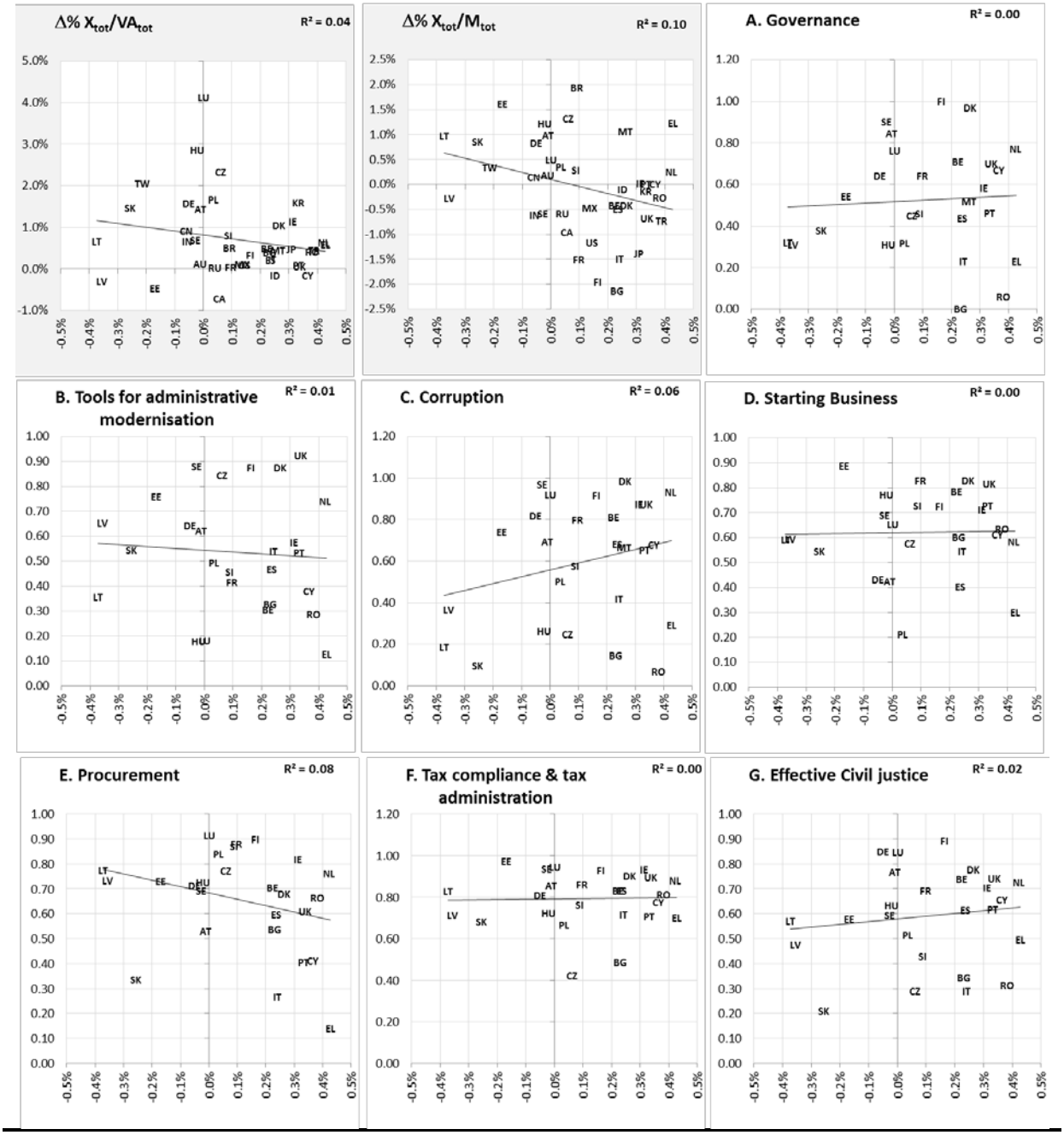
Finally (Figure 2.22 and Figure 2.23), the focus lies on the share of sector L (public administration) in government consumption, both in levels and in annual changes. Again there are similarities to the L/VA-correlations; but while in that case, Bulgaria and Romania were driving the negative correlations, here it is Bulgaria and Slovakia – but again: the correlation itself does not depend on these two countries to be included, only the magnitude of the correlation is influenced.

Figure 2.18 – Ratio of CG to Total Value Added - Levels



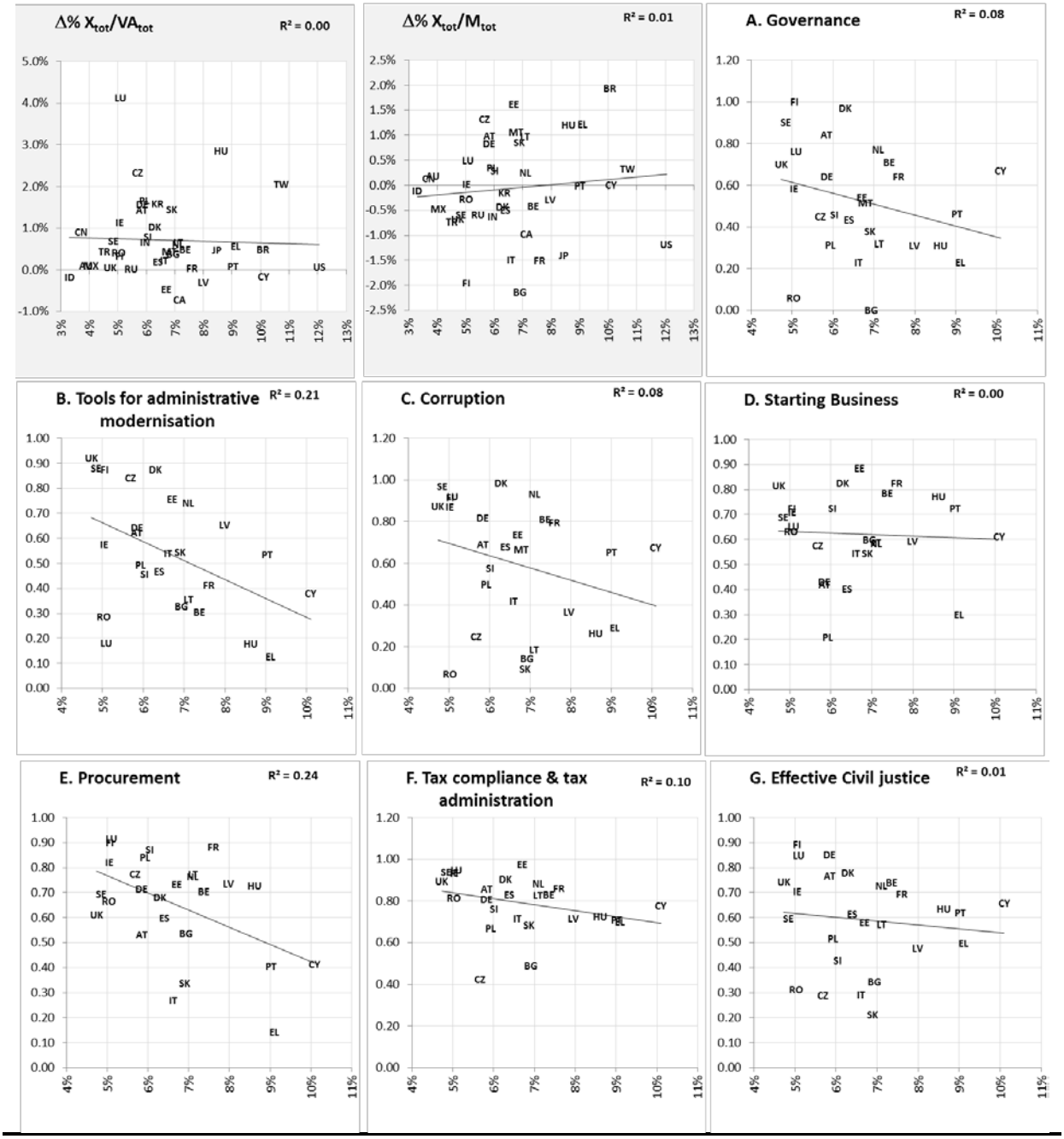
Source: WIOD; own calculations

Figure 2.19 – Ratio of CG to Total Value Added – Annual Changes



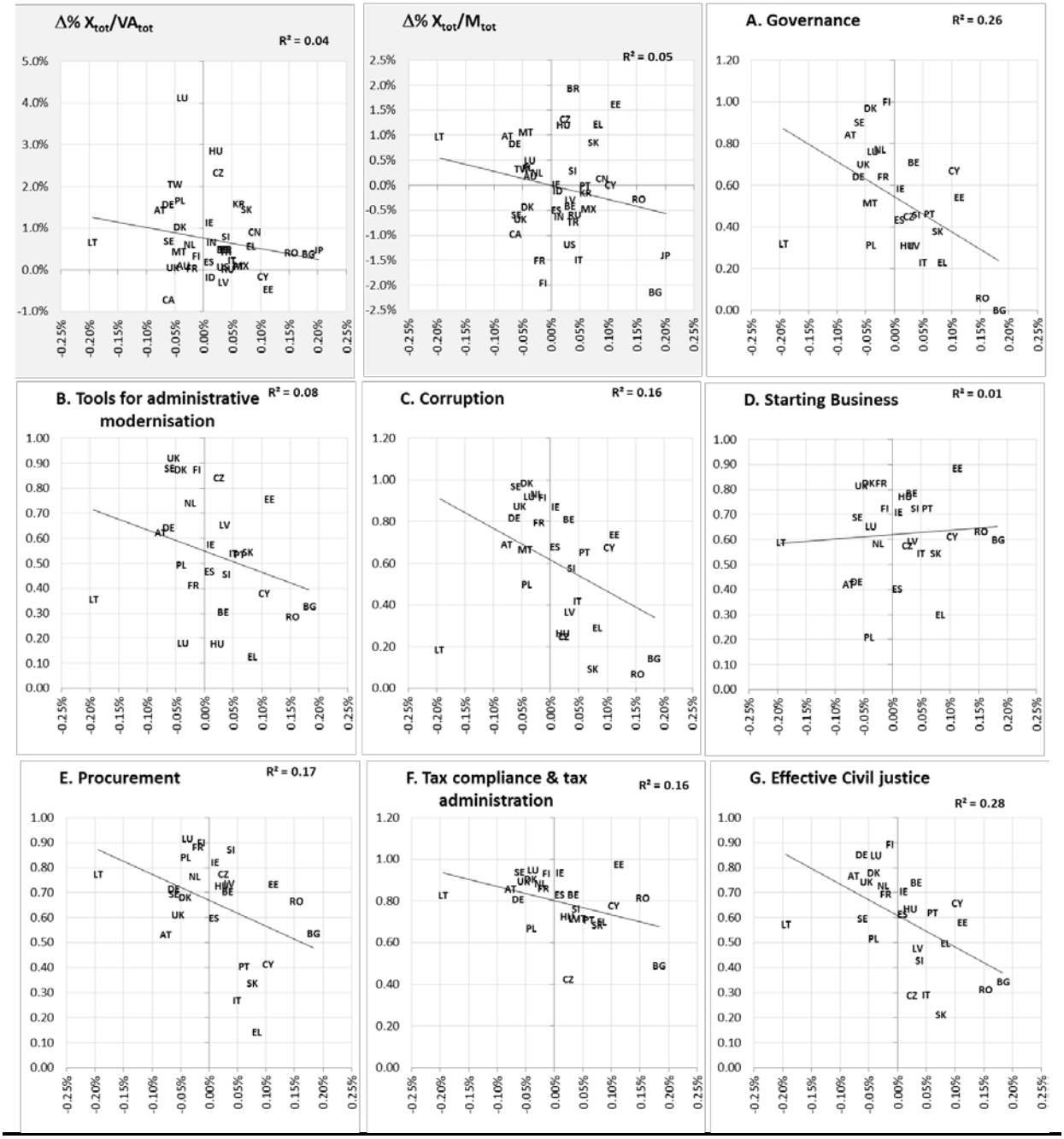
Source: WIOD; own calculations

Figure 2.20 – Share of Sector L (public administration) in Total Value Added - Levels



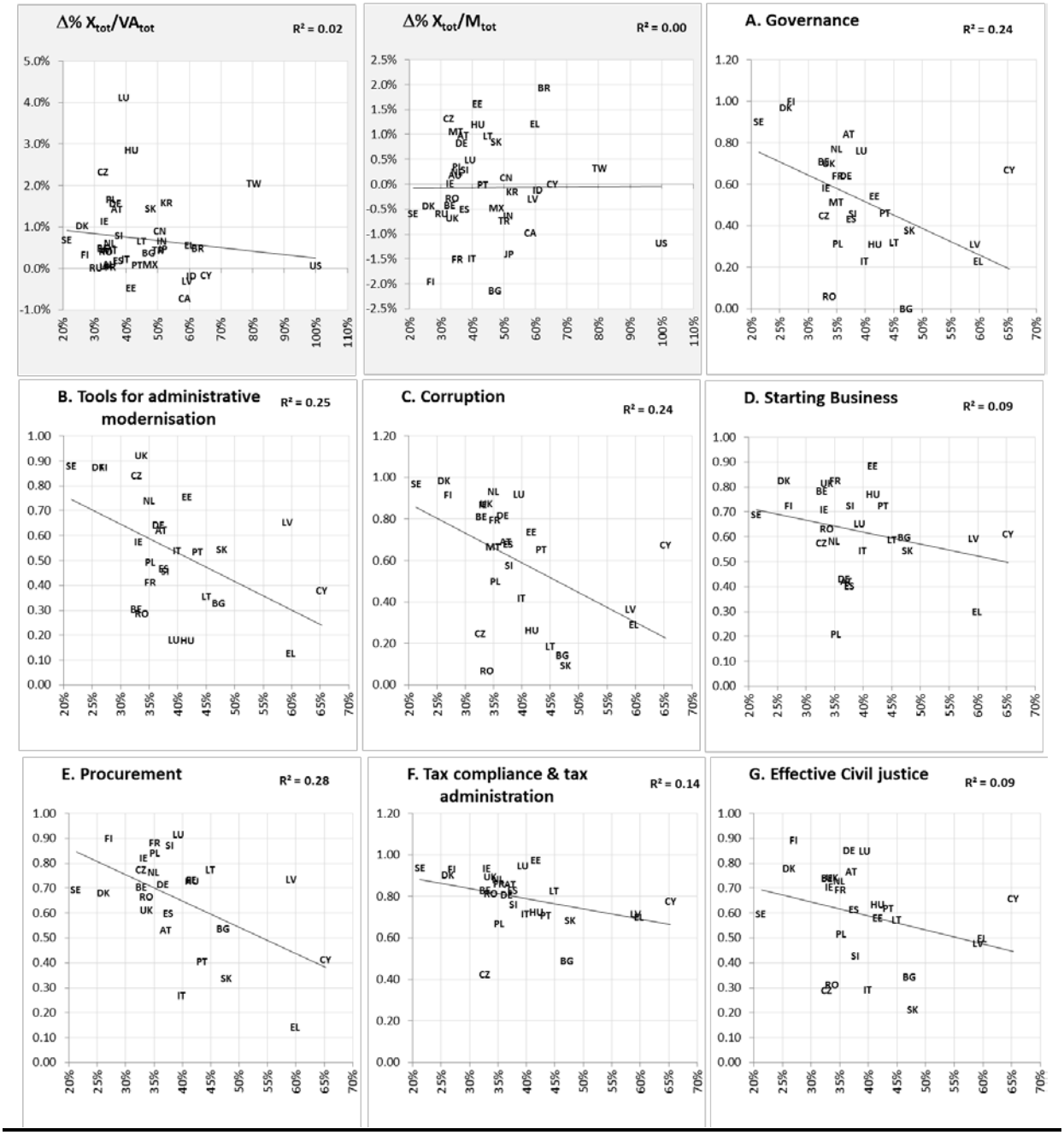
Source: WIOD; own calculations

Figure 2.21 – Share of Sector L (public administration) in Total Value Added – Annual Changes



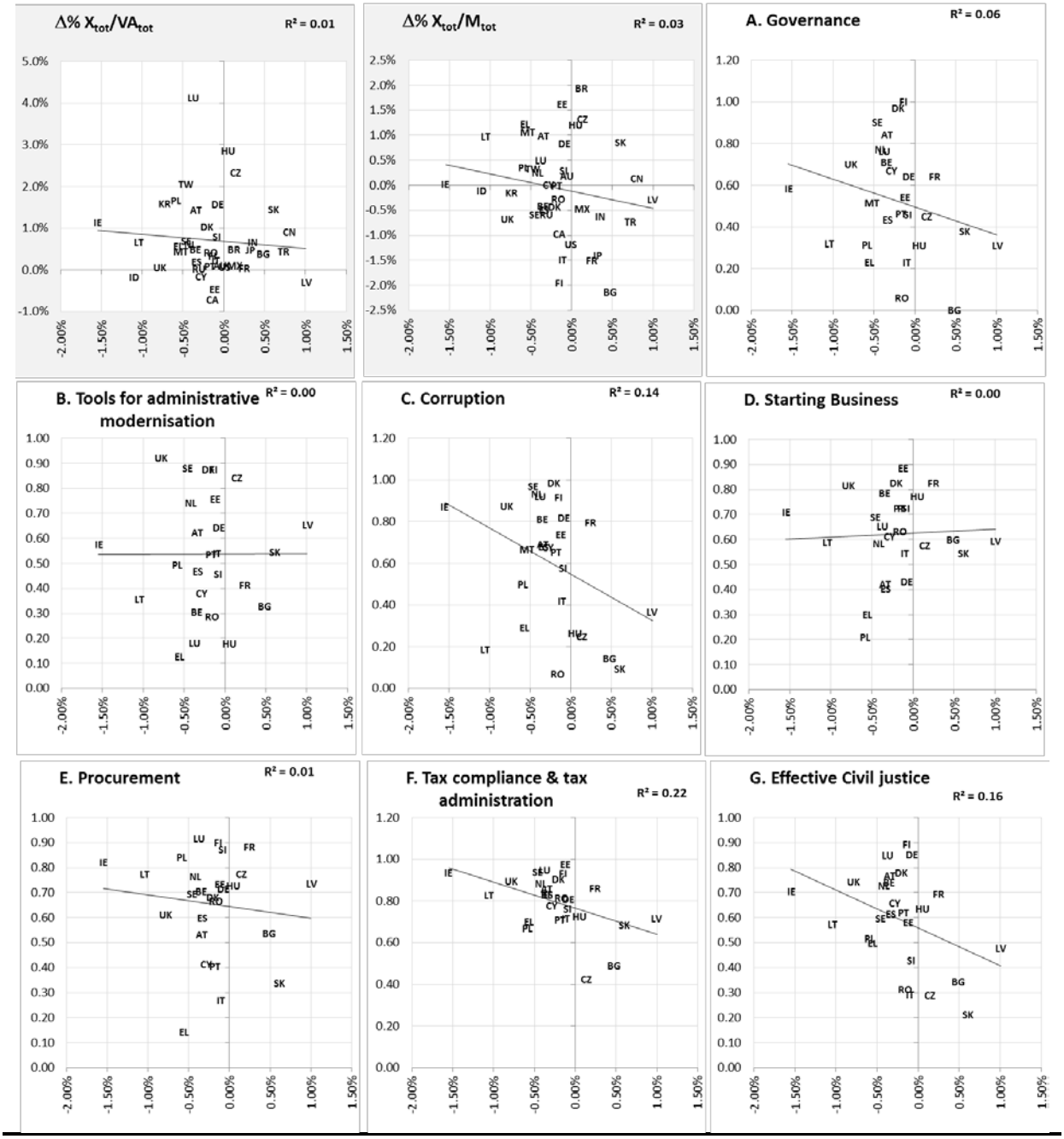
Source: WIOD; own calculations

Figure 2.22 – Share of Sector L (public administration) in Government Consumption – Levels



Source: WIOD; own calculations

Figure 2.23 – Share of Sector L (public administration) in Government Consumption – Annual Changes



Source: WIOD; own calculations

Since the correlation analysis above remains rather inconclusive, another step was taken to shed additional light on the relationship between the quality of public administration on the one and the characteristics of the sector as seen from the results of the input-output analysis on the other hand.

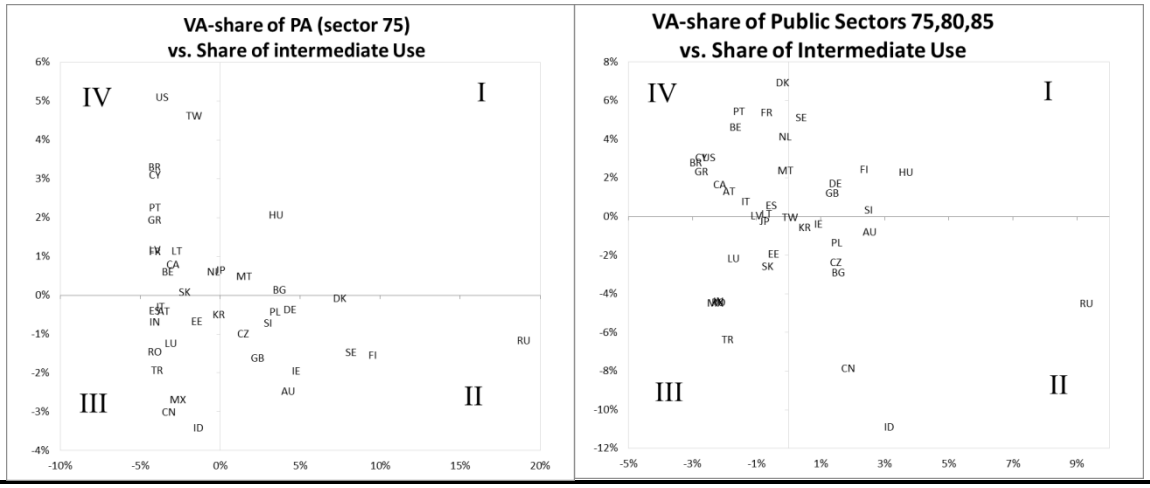
First the value added-share of sector L (Public Administration) is contrasted with the share of sector L's output delivered to intermediate use; the second comparison relies on a broader definition of the public sector; it relates the value-added shares of sectors L, M and N (Public administration, Education, Health & Social Work, respectively) and the shares of those sectors' output going to intermediate use. Based on these shares, countries are classified according to one of the following four groups:

- countries with above-average VA-share ("strong government") and above-average share of intermediate use ("fee-based government", Quadrant I);
- countries with below-average VA-share ("weak government") and above-average share of intermediate use ("fee-based government", Quadrant II);
- countries with below-average VA-share ("weak government") and below-average share of intermediate use ("tax-based government", Quadrant III);
- countries with above-average VA-share ("strong government") and below-average share of intermediate use ("tax-based government", Quadrant IV).

Accordingly the left hemisphere, which is characterised by a below-average share of intermediate use of the public sectors' output implying that more of the government's annual revenues are generated via tax income might be termed "tax-based" and the right hemisphere "fee-based". Furthermore, "strong government" is the term for countries with an above the average value added share of sectors L, M and N taken together in total value added (upper hemisphere of the diagrams) while others would fall into the "weak government" category being located in the lower part of the diagrams.

The following Figure 2.24 shows the location of the 40 countries along these two dimensions; the left diagram in each figure is based on a narrow definition of government – only sector L (Public Administration) is included; the right diagram takes an aggregate of sectors L, M and N (Public administration, Education, Health & Social Work) and thus a broader definition of the government sector as its starting point.

Figure 2.24 – Share of Public services in Total Value Added vs. Share of Public Services used in Intermediate Demand



Source: WIOD; own calculations

Interestingly enough, quite a few countries switch quadrants depending on the definition of the public sector applied (Table 2.32; countries switching quadrants are shaded grey).

Table 2.32 – Location of Countries by Definition of the Public Sector

Definition	AU	AT	BE	BG	BR	CA	CN	CY	CZ	DE	DK	ES	EE	FI	FR	GB	GR	HU	ID	IN	IE	IT	JP	KR	LT	LU	LV	MX	MT	NL	PL	PT	RO	RU	SK	SI	SE	TR	TW	US
L	2	3	4	1	4	4	3	4	2	2	2	3	3	2	4	2	4	1	3	3	2	3	1	3	4	3	4	3	1	4	2	4	3	2	4	2	2	3	4	4
L,M,N	2	4	4	2	4	4	2	4	2	1	4	4	3	1	4	1	4	1	2	3	2	4	3	2	4	3	4	3	4	4	2	4	3	2	3	1	1	3	2	4

Source: WIOD, Pitlik et. al. 2012; own calculations

Taking Sweden (SWE) as an example, it has a below-average share of public administration (sector L), but above-average share of public services (sectors L, M, N), in both cases accompanied by above-average reliance on fee-based provision of the respective services.

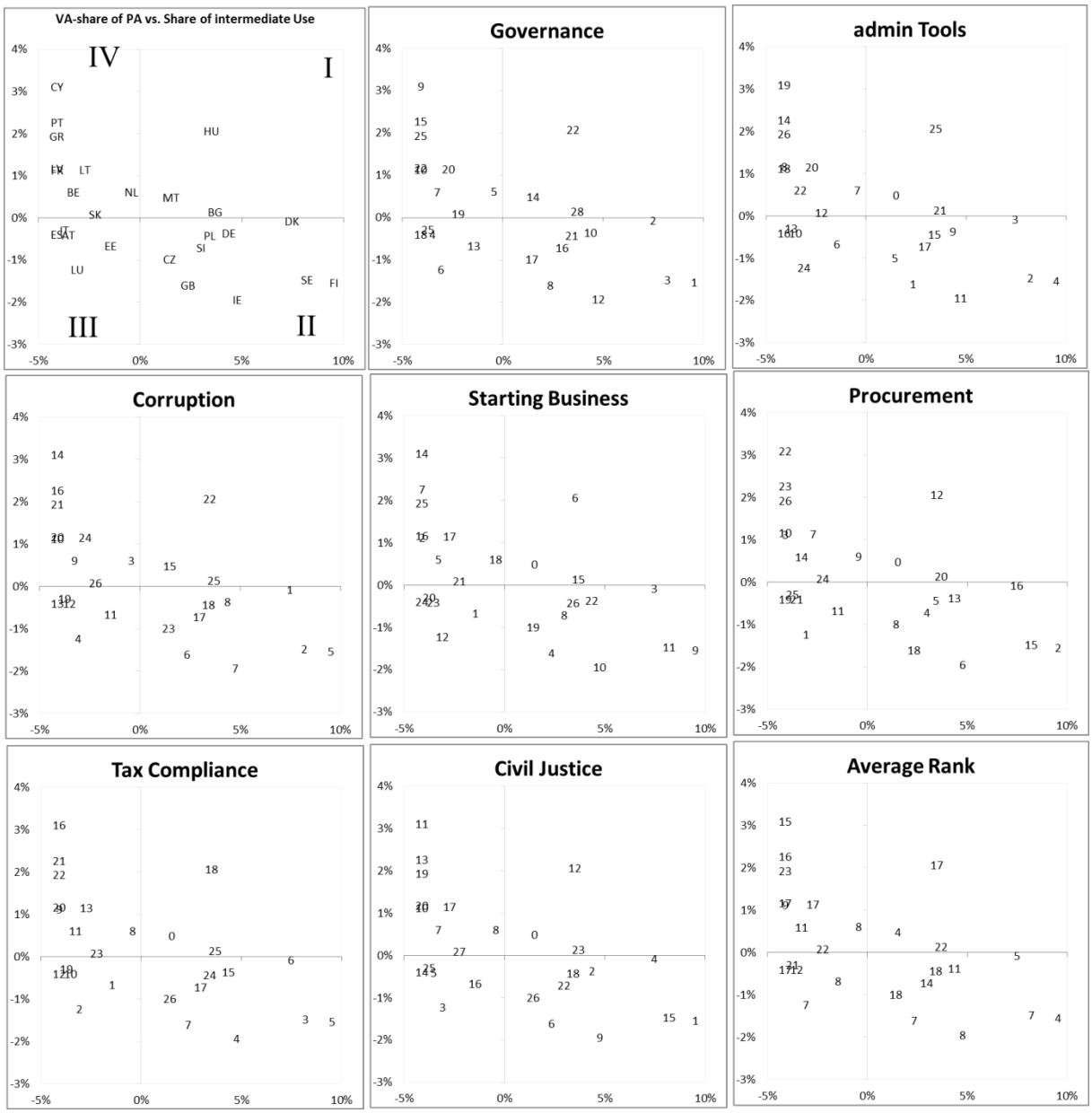
In the following diagrams, the country labels are substituted by their ranking according to the seven indicators of public administrations' quality. Looking at sector L (Public administration) alone first (Figure 2.8), quadrant II seems to contain countries with higher average ranking in our seven indicators than the other quadrants; this is borne out by averaging the scores of the countries in each quadrant (Table 2.33; the highest average scores are in bold text, the lowest in italics). With one exception, the highest average score can be found in Quadrant II (in indicator D. "Starting Business", Quadrant II has the second-highest average): A relatively small public administration sector accompanied by a more fee-based provision of its services, seems to be conducive to a higher quality of administration.

Next, attention turns to the broader definition 2 of "public services" – the sectoral aggregate L, M and N (Public administration, Education, Health & Social Work – see Figure 2.26). Here, Quadrant I seems to be the one with the highest-ranked countries, which is also confirmed by the quadrant averages of the quality scores (Table 2.34). Again, there is a clear winner: Quadrant I contains the countries with the highest average scores in all quality indicators but one (F. "Tax Compliance"), where it comes second (incidentally, the five countries which are in the best quadrants according to both definitions of "public services" are DEU, FIN, GBR, SVN, and SWE). The outcome thus confirms the analysis based on sector L alone for one dimension: a more fee-based system is correlated with better quality of administration. As for the other dimension, the value added share, now it seems that "more (of government) is better than less (of government)".

At a first glance, only the fee-based approach seems to be vindicated, as it is accompanied with higher quality in both approaches. What about the second dimension, (relative) size of public services? Here, the results seem contradictory: According to one definition, higher quality of public administration is correlated with a below-average share of sector L; in the other definition, an above-average value added-share of public service sectors (L, M, N) seems to be good in terms of administrative quality. Reconciliation might be found in specialisation and dedication of purpose: a somewhat larger share of public services is accompanied by higher administrative quality, as long as these public services are not dominated by "administration". Additionally, a more fee-based provision is to be preferred to the essentially free supply of public services.

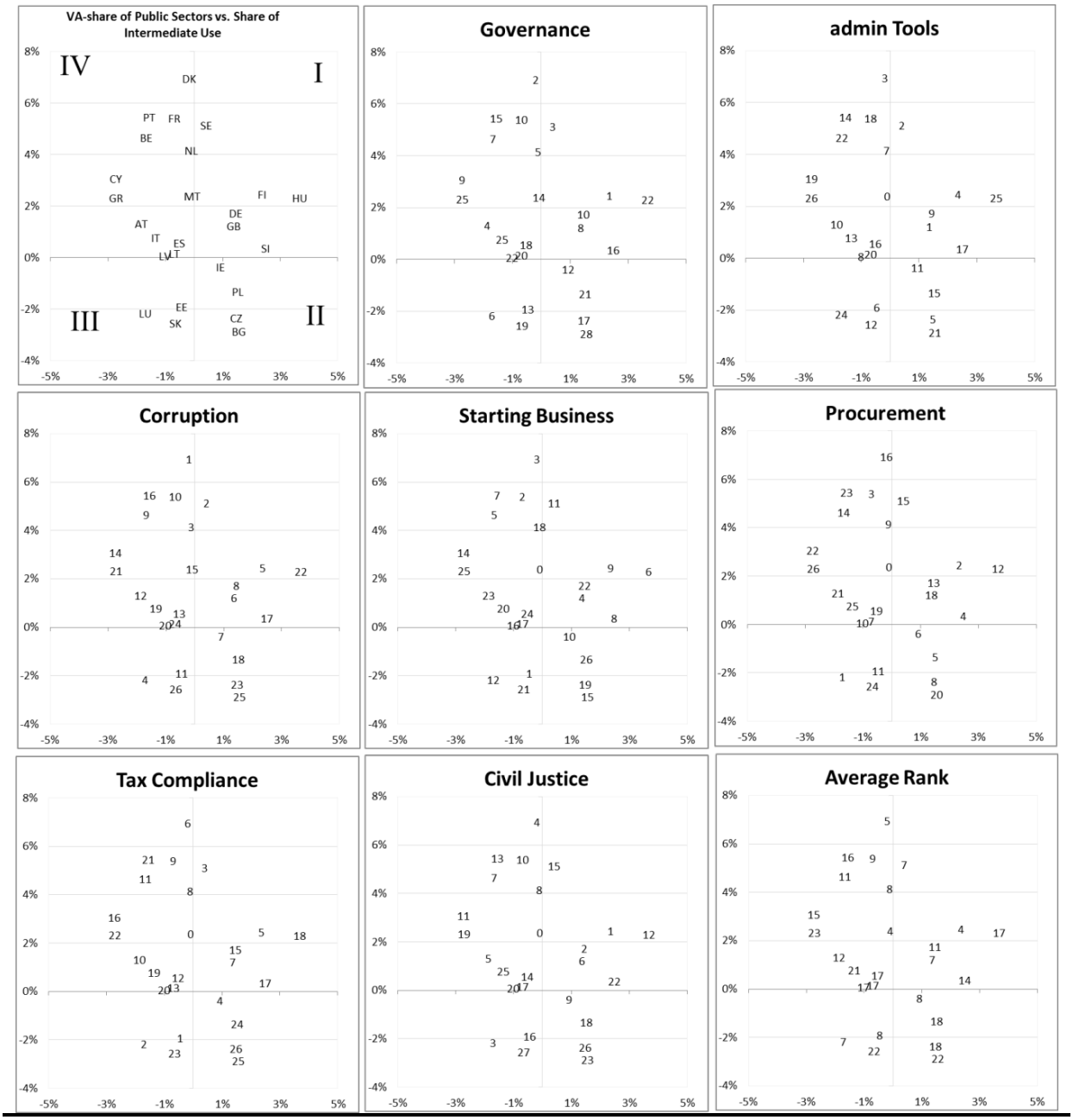
Finally the robustness of our previous results, which were calculated based on the average over the time period 1995 to 2009, was tested by looking at the same indicators (for the broad definition of the public sector) at points in time: First for an average of the period 1995-97 and second for an average over 2007-09 (Figure 2.27; the country abbreviation marks the first period position). Even though countries do change their locations, switching between quadrants is more of an exception than the rule – our results seem to be rather robust over the time period covered here.

Figure 2.25 – Share of Public Services (definition 1: Sector L, Public Administration) in total Value Added vs. Share of Public Services used in Intermediate Demand plus Country Rank in Administrative Quality



Source: WIOD, Pitlik et. al. 2012; own calculations

Figure 2.26 – Share of Public Services (definition 2: Sector L, M and N) in total Value Added vs. Share of Public Services used in Intermediate Demand plus Country Rank in Administrative Quality



Source: WIOD, Pitlik et. al. 2012; own calculations

Table 2.33 – Average Scores of Administrative Quality; Sector L (Public Administration)

Quadrant	A. Governance	B. Tools for administrative modernisation	C. Corruption	D. Starting Business	E. Procurement	F. Tax compliance & tax administration	G. Effective Civil justice	Average
I	*0.15*	*0.25*	*0.20*	**0.68**	0.63	*0.61*	*0.49*	*0.43*
II	**0.67**	**0.73**	**0.75**	0.63	**0.77**	**0.81**	**0.64**	**0.71**
III	0.56	0.51	0.69	*0.58*	0.61	0.86	0.62	0.63
IV	0.50	0.45	0.53	0.62	0.57	0.78	0.58	0.58

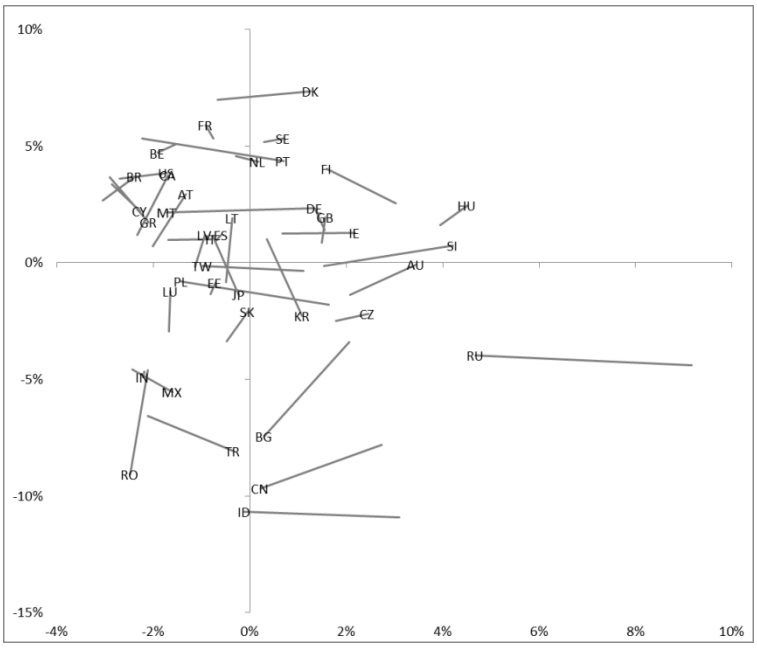
Source: WIOD, Pitlik et. al. 2012; own calculations

Table 2.34 – Average Scores of Administrative Quality; Sector Aggregate L, M, N (Public Administration, Education, Health & Social Work)

Quadrant	A. Governance	B. Tools for administrative modernisation	C. Corruption	D. Starting Business	E. Procurement	F. Tax compliance & tax administration	G. Effective Civil justice	Average
I	**0.67**	**0.66**	**0.74**	**0.69**	**0.75**	0.84	**0.69**	**0.72**
II	*0.34*	0.56	*0.44*	*0.52*	0.74	*0.63*	*0.46*	*0.53*
III	0.56	*0.49*	0.58	**0.69**	0.66	**0.87**	0.55	0.63
IV	0.55	0.50	0.62	0.60	*0.57*	0.80	0.62	0.61

Source: WIOD, Pitlik et. al. 2012; own calculations t

Figure 2.27 – Changes in the Position of Countries over Time (average 1995-97 vs. average 2007-09)



Source: WIOD, Pitlik et. al. 2012; own calculations

6 SUMMARY AND CONCLUSIONS

Input-output modelling, though based on some rather restrictive assumptions, is a very appropriate and widely used tool for analysing both economic impacts from changes in final demand as well as intermediate sectoral linkages which represent an important structural feature of an economic system. When applied to public administration services and their contribution to the economic well-being of other economic sectors the analysis needs to focus on the latter thereby assuming that any intermediate deliveries by the public sector are an appropriate indicator for the wider benefits of these services. However, the analysis clearly shows that these intermediate public administration flows are very minor compared to the values contained in the final demand category "government consumption". This implies first that most public services are provided more or less "free of charge" (being financed out of the general tax pool) and secondly that by concentrating on intermediate flows only, which the application of an input-output modelling tool implicitly requires, a considerable part of the potential supply-side benefits of public services will be left out.

Even if those restrictions are accepted, the main results of the analysis of intermediate public administration linkages do not support the hypothesis that these linkages play a particularly important role in the overall economy when compared to intermediate flows emanating from other sectors. Their share in total intermediate inputs is far too low to have any highly widespread impacts to show.

Moreover, observed differences across countries with respect to the input-output-linkages fail to lead to clear-cut conclusions or explanations with respect to observed national differences. It is highly likely that resulting country patterns merely reflect differences in accounting standards and national institutional features of the public sector – even within the statistical system of the European Union with standardised national accounting standards such differences might still play a role and they definitely do when countries / regions outside the EU are considered.

When trying to examine if a statistically significant relationship can be observed between the size of the public sector, its intermediate linkages and indicators of the quality of public administration services no consistent pattern arises either. However, when driving that type of analysis one step further some insights might be derived By classifying countries according to the significance of two different sources of financing of government activities ("taxes versus fees") on the on hand and the extent of government activities ("strong vs weak government") on the other, empirical results suggest that systems relying more strongly on fees instead of taxes may be related with a higher quality of their public services. Further research along those lines might prove fruitful in the future.

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Chapter 3.
BUSINESS PERCEPTIONS OF THE COST OF PUBLIC ADMINISTRATION

1 INTRODUCTION

From market entry and until the closure, firms frequently interact with public administration on many different occasions throughout their lifecycle. These involve situations, for instance, in which firms apply for various types of licenses, pay taxes or when they are involved in legal disputes. Such interactions are always costly for firms, as either employees need to deal with a variety of bureaucratic tasks instead of pursuing productive activities, or firms have to pay external advisers that support them to deal with public administration. Ultimately, in both cases, internal resources necessary for investment and firm growth are reduced. This, in turn, is likely to have adverse effects on overall competitiveness and firm growth.

The European Commission has therefore stressed the importance of an efficient, effective and transparent public administration in the Europe 2020 strategy and has already taken several measures to reduce the costs incurred by firms when dealing with public administration. These involve, for instance, the Small Business Act, the Service Directive or the Action Programme for Reducing Administrative Burdens in the European Union. While the first two include more general targets with respect to public administration, the latter provides dedicated recommendations for particular dimensions of public administration. However, given limited political capital and administrative capacity in Member States, identifying and prioritising those dimensions of public administration which are the most impeding for firm operations is crucial. To this end, the objective of this Chapter is to propose an innovative approach to measure the severity of obstacles arising from particular dimensions of public administration thereby providing a valuable tool for policy that allows for more targeted policy recommendations.

To understand whether and to what extent various dimensions of public administration constrain firms in their operations and therefore ultimately in their growth, this chapter uses business perceptions. In particular, the objective of this chapter is to compare the costs that inefficiencies in public administration impose on firms across different dimensions of public administration and across different countries.

Business perceptions are subjective assessments by leading managers of firms, and they are now routinely included in various business surveys, in particular the World Bank Enterprise Surveys, where respondents are asked the following question: “Is [dimension of public administration] no obstacle, a minor, a moderate, a major or a very severe obstacle to the current operations of this establishment?” While respondents are asked to rate a range of obstacles, there are several which directly relate to public administration and which this chapter considers: corruption, courts, customs and trade, business inspections, permits and licensing, tax administration, as well as transport.

The data used in the analysis of this chapter comes from the World Bank Enterprise Surveys. Compared to other firm-level surveys, the business perceptions data are much more detailed and therefore are more suitable for the purposes of this analysis, namely to measure the quality of different dimensions of public administration in different European countries. In addition, and in contrast to EFIGE data for instance, the severity is rated on a 5-point scale, and firms are not simply asked to indicate if a particular issue is an obstacle or not.

This chapter argues that business perceptions are a powerful source of information for policy makers to understand the extent to which public administration constrains firms. In particular, using business perceptions to measure the extent to which public administration constrain firms has a number of advantages: (1) business perceptions can be interpreted as measures of the costs; (2) they are comparable indicators of the costs that public administration imposes on firms as different obstacles are measured on a single scale; (3) they are based on first-hand experience with public administration; (4) and since they come from firm-level evidence, it is possible to (dis)aggregate them in various ways, for instance by subnational regions or industries.

However, despite these strengths, business perceptions are often not sufficiently appreciated due to concerns about their credibility and representativeness leading to biases (e.g., Bertrand and Mullainathan, 2001). First, there is the concern that business perceptions are dependent to the subjective views of individual managers which are driven by idiosyncratic factors. Second, there is the concern that they are driven by the characteristics of firms in the sense that the performance, industry and size determine which issues are seen as obstacles in line with Carlin, Schaffer and Seabright (2010). Third, it is sometimes argued that firm managers are short-sighted

and do not understand what it takes to remove a particular obstacle; for instance if a particular obstacle is judged as very severe, it may still be too costly to remove it.

Using two novel empirical methodologies, the first two of the hypothesised biases in perceptions data are tested and corrected for. In case of the first approach proposed by Carlin, Schaffer and Seabright (2010), raw business perceptions of public administration-related obstacles are corrected for differences in firm characteristics by regressing firm-level perceptions on indicators of the sector, the level of employment, ownership and export status of the firm. The second approach controls for the overall tendency to complain by the individual firm by expressing the perception of particular public administration-related constraints relative to the average level of complaint thereby cancelling out idiosyncratic factors of the individual respondent. The third bias does not arise for the types of obstacles considered and therefore does not require any correction.

Using the findings from both approaches, the results section provides rankings of different dimensions of public administration both across and within countries. The latter shows which dimension of public administration is considered as most costly for firms in a particular country, whereas the former shows how a particular country ranks internationally in one specific dimension of public administration. In case of the within-country analysis, both methodologies identify tax administration, corruption and courts to be the most severe obstacles to firm growth. These results are highly robust and show only little variation over time during the period under consideration.

In case of the between-country evaluation, the results reveal a high correlation in terms of performance between different dimensions of public administration in a particular country. More precisely, countries show similar results across several dimensions at one point in time. Typically, the best or worst performing country with respect to one constraint also performs very good or poorly, respectively, across several other dimensions. In contrast to the within-country analysis, the results for the between-country evaluation show some time variation as the worst and best performing countries alter several times throughout the time period covered in the analysis.

To understand the intuition of the results and the methodological approach, it is helpful to compare this analysis with the one from Chapter 1. Both analyses complement each other. The analysis in Chapter 1 puts emphasis on the *impact* of the quality of public administration on firm performance by running regressions with indicators of firm growth as the dependent variable. In the main analysis, Chapter 1 successfully addresses the challenge to estimate a causal relationship. A priori, it is not immediately clear, whether the causality runs exclusively from the quality of public administration to firm performance due to concerns about reverse causality and more importantly about omitted variable bias. Omitted and hard-to-observe variables that may be correlated with indicators measuring the quality of public administration and with firm growth could bias results, and it appears to be likely that a plethora of such variables exist. By contrast, using a sophisticated estimation strategy, the results of Chapter 1 are free of such a bias because unobserved variables at the country and industry level are controlled for.

In this chapter, the emphasis is on *measurement*, in particular how to measure and compare inefficiencies of various dimensions of public administration and the costs they impose on firms correctly, but not to estimate the impact. Measuring the quality of public administration is challenging for various reasons. For instance, Doing-Business indicators provide quantifications of the quality of public administration only at the country level but not at the sub-national level. Yet, where such sub-national data is available, for instance in the case of Italy, it becomes evident that national averages constructed from few individual observations may be misleading. While dealing with construction permits takes on average 164 days in Bologna, 316 days are needed in Palermo. 234 days are reported on average at the country level (World Bank, 2013). However, in this chapter, it is not possible to directly test econometrically for the impact of public administration on different definitions of firm growth but rather to deduct the impact qualitatively from the magnitude of the costs.

The remainder of the chapter is organised as follows. Section 2 discusses business perceptions more generally. Section 3 discusses the methodology used in greater detail. Section 4 presents the data, and Section 5 presents the results. Section 6 concludes.

2 BACKGROUND

2.1 Interpretation of Business Perceptions

Carlin, Schaffer and Seabright (2010) interpret perceptions of firm managers about the severity of obstacles related to various dimensions of public administration as subjective assessments of relative costs that firms incur due to public administration. This view combines two key features, namely the notion of costs and the measurement in relative terms. In case of the former, survey responses can be thought of as the difference in firm profits between the hypothetical state in which public administration poses no obstacle to firm operations and the

actual state. Here, the idea of public administration being a public input to private production is essential. Business perceptions may then reflect shadow prices of these public inputs (Carlin, Schaffer and Seabright, 2013). Rather than in absolute terms, these costs are expressed in relative terms due to the nature of perceptions. With this interpretation of business perceptions, their key advantages, which are discussed in the next sub-section, become more obvious.

2.2 Strengths of Business Perceptions

Business perceptions have a number of advantages. First, given the way the survey question is posed, business perceptions in essence measure the costs that obstacles impose on firms as Carlin, Schaffer and Seabright (2012) argue. Intuitively, this interpretation is appealing as this is the most obvious measure that comes to mind when firm managers rate the severity of obstacles for the operations of their firms. If a particular obstacle is rated as more severe than other obstacles, this means that it more adversely affects firm profits and hence increases costs more than respective other dimensions. Through its impact on costs, this particular dimension then also creates an adverse impact on firm growth.

Second, while the rating scale does not allow making inferences about the absolute magnitude of the costs, they nevertheless reflect the costs in relative terms. The latter is sufficient to identify the bottleneck with respect to public administration and to make comparisons. Ultimately, it is therefore the relative costs which policy makers need to understand. Governments face a wide range of possible interventions and policy reforms which all supposedly help to promote firm performance and firm growth. However, given limited political capital and limited administrative capacity, it is imperative to prioritise such interventions and reforms. To this end, it is not necessary that governments know the absolute costs that obstacles impose on firms, but rather understand which one is the most pressing. Other indicators of public administration lack an assessment of the relative importance or relevance of a particular public service or good for the private sector. Business perceptions, on the contrary, may reflect the relevance of respective dimensions of public administration for the private sector and may therefore complement existing objective indicators (Carlin, Schaffer and Seabright, 2013).

Third, given that business perceptions measure the costs in a comparable way, they complement regression-based evidence, i.e., evidence from regressing indicators of firm growth on indicators of public administration. Of course, business perceptions do not contain information with respect to the magnitude of firm growth when a particular obstacle is removed. However, using them to measure the constraints that public administration imposes allows deducing an indirect effect on firm performance and does not require addressing any econometric issues.

Fourth, there is of course a variety of measures of public administration. For instance, it could be measured in terms of the time spent by firms to complete specific bureaucratic tasks, or in terms of the time spent by public administration on issuing permits or licenses. However, which measure is the correct one may of course be subject to debate. Using business perceptions resolves to some extent this issue as firms rate the severity of public administration as an obstacle. It can likewise be argued that firm managers are best placed to evaluate and understand the adverse effects of inefficiencies in public administration and their transmission channels on firm growth and performance. By contrast, measuring the quality of public administration in another way requires the researcher to essentially impose a unit or relevant dimension for measurement which may not be the relevant one for firms.

Fifth, business perceptions come from comparable firm surveys with hundreds of respondents per country. This allows to aggregate and average them in different ways, for instance by subnational region, by different types of firms or by industry. This allows addressing concerns about significant subnational heterogeneity of the quality of public administration. Related to this point, business perceptions therefore also allow making more precise statements about the costs of inefficiencies with respect to a specific dimension of public administration in a particular setting or country.

2.3 Concerns about Business Perceptions

While business perceptions have key advantages over other measures of public administration, they have nevertheless weaknesses. In particular, their subjectivity imposes challenges for correct interpretation.

First, there is the concern that business perceptions are dependent to the subjective views of individual managers which are driven by idiosyncratic factors. This may, in turn, render raw perceptions incomparable between different entities, and this becomes especially evident in the case of corruption (Veenhoven, 2002). For instance, it is likely that the evaluation of corrupt practices differs within as well as between countries. Even if two respondents consider the same practice as evidence of corruption, their assessment in terms of severity may still

differ. Consequently, some individuals may assess the administration as highly corrupt, whereas others as only moderately corrupt based on the same set of information.

Second, there is the concern that they are driven by the characteristics of firms in the sense that the performance, industry and size determine which issues are seen as obstacles. In other words, business perceptions may be demand-driven in the sense that firms' demand for different services supplied by public administration differs according to their characteristics which in turn affects whether and to what extent they see a particular issue as an obstacle. For instance, public servants asking for bribes could be more prevalent in the case of highly productive firms, or business inspections could be more common in large or high-growth firms. Therefore, firm performance and other firm characteristics may be closely correlated with the way potential obstacles including those related to public administration are perceived.

Related to the last point, a firm may argue that low-quality internet access is a severe obstacle, while another firm may report the opposite as its business does not rely on internet access. Simply aggregating answers from all firms in the sample would therefore not provide conclusive information about the quality of internet access in that particular country. It would rather identify the share of firms which relies on a well-functioning internet access. Consequently, it is necessary to control for firm characteristics in a given country when making cross-country comparisons.

Third, it is sometimes argued that firm managers are short-sighted and do not understand what it takes to remove a particular obstacle; for instance if a particular obstacle is judged as very severe, it may still be too costly to remove it. Misch, Gemmell and Kneller (2013) use endogenous growth models in which the government levies an income tax to provide public inputs to the production of private firms to examine the usefulness of business perception data. The paper demonstrates that business perceptions of growth constraints are subject to systematic biases; in particular, it can be shown that firms systematically overestimate the growth-enhancing effects of lower tax rates, and underestimate the growth-enhancing effects of greater provision of public capital. The reason is that they ignore the government budget constraint in the sense that they do not take into account that lower taxes result in lower spending on public services and infrastructure. However, such biases do not arise in the context of business perceptions about public administration.

Finally, it may be argued that business perceptions are at best representative of the population of existing firms, but not of potential market entrants. Needs and expectations related to public administration are likely to differ between incumbents and potential entrants. Therefore, surveys of incumbents may not properly reflect problems of the latter. However, while the measurement of the impact of public administration for prospective firms is not feasible, assessments made by small and young firms may be reasonably close to those of market entrants. In addition, this is a general issue and not exclusively linked to business perceptions; indeed, any firm level data come from existing firms only.

3 METHODOLOGY

The analysis in the previous section clearly points out that accounting for country-specific and firm-specific characteristics is necessary to construct perception-based measures of the quality of public administration that are comparable across firms and countries. This requires a dedicated methodology. Two of such methodologies are used in this chapter: first the main and more formal approach referred to as the 'benchmarking approach', and second, the less complex approach referred to as the 'mean correction approach'. Both approaches will propose procedures to obtain bias-free measures of business perceptions of public administration that allow for the assessment of relative performance both within and across countries.

3.1 Benchmarking Approach

The benchmarking approach is based on Carlin, Schaffer and Seabright (2010, 2013) and tackles issues related to perceptions data. It is adapted to the purposes of this report. In particular, it is well suited to address the problem that business perceptions depend on firm characteristics. Compared to the usual approaches applied in the economic literature, the framework proposed by Carlin, Schaffer and Seabright (2010) exhibits a distinctive feature. Rather than augmenting existing specifications by adding a further regressor containing business perceptions, they are used as dependent variable in the econometric analysis. More precisely, while a classic approach, for example, would extend an estimation of total factor productivity at the firm level by business perceptions to account for a potential impact of the quality of public administration on firm performance, under the framework by Carlin, Schaffer and Seabright (2010), perceptions are regressed on a set of specific control variables to infer the costs imposed on firms by public administration. Given the advantages of perceptions data discussed above, this approach provides a more accurate measure to quantify the costs of public administration incurred by firms and ultimately their impact on firm performance.

In order to deal with the dependence of survey responses on firm characteristics, the approach by Carlin, Schaffer and Seabright (2010) proposes to control for several dimensions of firm characteristics. These dimensions consist of the number of employees, the sector a particular firm operates in, the type of ownership, the share of foreign ownership as well as the share of exports in sales. The firm characteristics, except for employment, are codified as dummy variables which are either zero or one. The benchmark firm that is common across all countries corresponds to the case when all dummy variables are set to 0.

Initially, the definition of the dummy variables will closely follow Carlin, Schaffer and Seabright (2013) and define the benchmark firm as having 30 employees, operating in the manufacturing sector, being privately owned, exhibiting a share of less than 10 per cent of foreign ownership and exhibiting a share of less than 10 percent of exports in sales. Employment is codified as log(L/30), where *L* refers to the actual level of employment of a particular firm. By definition, coding in such a way will result in a value of zero when the actual number of employees is identical to the benchmark case. In the subsequent analysis, these assumptions will be varied in order to check the robustness of the results.

In the first step of the framework, individual firm perceptions are regressed on these dummy variables, in order to obtain an assessment independent from firm characteristics. This regression takes the form according to equation (3.7).

$$perception_{jict} = \beta_1\, empl_{ict} + \beta_2\, sector_{ict} + \beta_3\, own_{ict} + \beta_4\, foreign_{ict} + \beta_5\, exports_{ict} + \eta_{jc} + \epsilon_{jic} \qquad (3.7)$$

Here $perception_{jict}$, refers to the individual assessment with respect to the administrative dimension *(j)*, of firm *(i)*, in country *(c)*, at time *(t)*. The variables $empl_{ict}$ to $exports_{ict}$ refer to the respective firm characteristics codified as dummy variables. η_{jc} refers to a country fixed effect and captures unobserved, but time-constant, heterogeneity at the country level. ε_{jict} denotes the idiosyncratic and firm-specific error term.

Assessments independent of firm characteristics are obtained by setting the dummy variables equal to zero following the definition of the benchmark firm. Given this calibration, η_{jc} would not only capture unobserved heterogeneity, but could also be interpreted as the assessment by a typical or benchmark firm in country *c* with respect to dimension *j* of public administration. As explained above, these assessments can then be interpreted as country-specific costs of the administrative dimension *j* used as public input to private production and measured in relative units of forgone profits. Based on the estimation results, reported relative costs ($\hat{rc}_{jict}$) are calculated according to equation (3.8).

$$\hat{rc}_{jict} = \hat{\eta}_{jc} + \hat{\varepsilon}_{jict} \qquad (3.8)$$

From these equations, it becomes evident that this measure of relative costs can also be interpreted as the conditional mean of perceptions. Given the independence from firm characteristics, results can be used to rank the relative importance of dimensions of public administration within a country and allows identifying the most impeding factor for firm growth.

It is important to note one specific characteristic of the estimated reported costs $\hat{rc}_{jict}$. As stated above, its component $\hat{\eta}_{jc}$ is the crucial element, since it is interpreted as the quantification of costs arising from public administration independent from biases due to firm characteristics. By definition, however, it only captures a time-constant country-specific impact of public administration on firm growth. Its particular value, while unique for every country in the sample of analysis, will be constant over time and identical for every year covered. Consequently, variation over time in estimated costs from public administration used as public input to private production exclusively arises from the firm-specific error term $\hat{\varepsilon}_{jict}$.

In principle, it would be possible to include time variation in a more formal way, given the framework by Carlin, Schaffer and Seabright (2010). This could be achieved by including time-fixed effects. These would capture time-specific unobserved heterogeneity, assuming simultaneously that this heterogeneity is identical for every country in the sample. However, given the general framework of the benchmarking approach, this would be at odds with its conceptual idea. The key idea of the benchmarking approach is to control for firm- as well as country-specific factors that may determine the assessments made by firms. Time-fixed effects, however, would introduce country-unspecific common time trends and would therefore contradict the idea to filter out country- and sample-specific factors. Thus, the analysis will not include time-fixed effects. It would still be possible to

incorporate country-specific time-fixed effects. However, while technically feasible, this would cancel out all variation in the data except for the variation at the firm level. This would render subsequent steps of analysis of the benchmarking approach impossible, and hence, country-specific time-fixed effects will not be included either.

Apart from these aspects, it is important to shed some further light on the error term $\hat{\varepsilon}_{jict}$. While being the main source of time variation in the analysis, it also incorporates the impact of all variables not taken explicitly into account in the econometric specification. A key variable among these factors is firm productivity. It cannot be observed directly in the data and is therefore only part of the error term. To capture its potential impact in a more systematic way, robustness checks will include a proxy for firm productivity.

In principle, it would be possible to control for unobserved time-constant heterogeneity at the firm-level in a more formal way using firm-fixed effects. However, as in the case of time-fixed effects, their inclusion would not be technically feasible. The reason for this is given by the mechanics of the benchmarking approach. In the process of quantifying the unbiased costs from public administration, the approach relies on the numerical estimation of every single firm-specific effect. This is a crucial distinction between the benchmarking approach and a standard econometric estimation including firm-fixed effects. Consequently, this would result in a situation in which more than ten thousand coefficients would have to be estimated in a single regression. This, in turn, would cause a significant drop in the degrees of freedom of the estimation and ultimately in a significant loss of precision. Therefore, the analysis will not include firm-fixed effects.

The robustness of the general methodology is tested in several ways. First, the number of employees of the benchmark firms is changed. The initial value was equal to 30 employees. In the sample of analysis, median employment is equal to 20 full-time equivalents. In order to account for a potential non-linear effect of employment, it is also necessary to compare this value to the logarithm of employment. Here, the mean of the logarithm of employment is equivalent to 26 employees. The value of 23 employees is therefore used as the average between both values in the context of the robustness check.

Second, it is checked whether firm age may also influence perceptions with respect to costs imposed on firms by public administration. Differences in assessments may simply arise from the experience of older firms in dealing with administrative tasks. Furthermore, with increasing age and size, firms become more likely to exhibit dedicated departments dealing with administrative tasks. This would reduce the perceived burden of public administration on firms. Firm age may, therefore, be a relevant firm characteristic neglected in the analysis proposed by Carlin, Schaffer and Seabright (2013). The robustness check will include a dummy for firm age in the econometric analysis. The age of the benchmark firm will be defined by the median age of firms covered in the sample of analysis, which is equal to 12 years. The initial specification will be adapted to the estimation equation given by (3.9).

$$perception_{jict} = \beta_1\, empl_{ict} + \beta_2\, sector_{ict} + \beta_3\, own_{ict} + \beta_4\, foreign_{ict} + \beta_5\, exports_{ict} + \beta_6\, age_{ict} + \eta_{jc} + \epsilon_{jict} \qquad (3.9)$$

Third, a proxy for firm productivity is also included; it is defined as sales per employee with sales deflated and measured in US Dollar for all countries in the sample. Median productivity of firms covered in the sample will be used to define the benchmark firm. Productivity is much more heterogeneous and complicated to summarise in a single dummy variable; therefore, the same approach as in the case of employment is used. The productivity variable is defined as $log(productivity_i/median(productivity))$. Note that productivity can only be computed for smaller number of observations. The estimation equation then becomes equivalent to (3.10).

$$perception_{jict} = \beta_1\, empl_{ict} + \beta_2\, sector_{ict} + \beta_3\, own_{ict} + \beta_4\, foreign_{ict} + \beta_5\, exports_{ict} + \beta_6\, age_{ict} + \beta_7\, productivity_{ict} + \eta_{jc} + \epsilon_{jict} \qquad (3.10)$$

3.2 Mean-Correction

Business perceptions can also be corrected for their dependence on firm characteristics using an alternative methodology. Rather than taking particular firm characteristics explicitly into account, this approach tries to capture the participating firms' individual tendency to complain in the survey. This is achieved by calculating the mean across all dimensions of public administration for every individual firm according to the equation (3.11).

$$\overline{tc}_{ict} = \frac{1}{J}\sum_{j=1}^{J} perception_{jict} \qquad (3.11)$$

This kind of approach would not only control for a potential dependence on firm characteristics, but could also take into account the individual mood of the respondent at the time of the survey, which could again be independent from firm characteristics. In case of the benchmarking approach, the respondents' mood was assumed to be correlated with firm characteristics. The tendency to complain $\overline{tc}_{ict}$ itself is then used to correct individual assessments of every administrative dimension following equation (3.12). Subsequently, these adjusted firm-specific perceptions are used to calculate a country-specific mean according to the equation (3.13).

$$\widetilde{perception}_{jict} = \frac{perception_{jict}}{\overline{tc}_{ict}} \qquad (3.12)$$

$$\tilde{rc}_{jct} = \frac{1}{N}\sum_{i=1}^{N} \widetilde{perception}_{jict} \qquad (3.13)$$

3.3 Related Literature

Compared to the usual economic literature studying the effects of the quality of public administration on economic outcomes, two features of the benchmarking approach developed by Carlin, Schaffer and Seabright (2010) stand out.[10] The first key distinction is given by the application of survey data to measure the extent of public administration being an obstacle to firm operations. Inherent to this is also the interpretation of responses to survey questions as measures of costs of public administration being a public input to private production. The second key distinction is given by formally dealing with potential biases that may be associated with firm surveys. While the former can be observed increasingly frequent in the economic literature, acknowledging and dealing with the latter can only be observed very rarely.

For instance, Dollar, Hallward-Driemeier and Mengistae (2005) exploit firm-level data to investigate whether the investment climate in general and public administration in particular affect the level of international integration of firms. While the latter is measured by the probability of being an exporting firm and being foreign owned, the impact of the business environment is measured by perception data from Enterprise Surveys. In the context of the probit analysis however, only raw business perceptions are employed as exogenous independent variables without accounting for the potential bias that may be associated with survey data.

Beck, Demirgüc-Kunt and Maksimovic (2005) analyse the effects of financial, legal and corruption obstacles on the firm growth rate. As in the benchmarking approach, the analysis relies on perception data from Enterprise Surveys and shares the interpretation that these measure the costs from public administration being a public input to private production. While acknowledging that in principle a bias might be associated with survey data, the applied methodology takes this exclusively into account for the dependent variable, namely the firm growth rate, and leaves all other variables from the survey unchanged. In the main regressions, again only raw perceptions data are directly included as independent variable without considering their potential dependence on firm characteristics. The closely related study by Ayyagari, Demirgüc-Kunt and Maksimovic (2008) proposes an analysis along the same lines but again exclusively relies on raw perception data.

The impact of perceived obstacles on firm revenue is explored by Commander and Svejnar (2011). Besides using firm-level data for approximately 6000 enterprises in 26 countries, a wide range of perceptions of public administration is used from Enterprise Surveys to measure the costs that firms incur due to public administration. Rather due to issues of endogeneity than due to the consent of a potential dependence on firm characteristics, perception data used in the empirical analysis has been averaged along sectors. Compared to the benchmarking

[10] For early versions of the benchmarking approach see Carlin, Schaffer and Seabright (2007) or Carlin and Seabright (2009)

approach though, this is not fully convincing as this would implicitly imply that firms in a particular sector share on average features like size or ownership structure.

Using survey data for Bulgaria and Russia, Pissarides, Singer and Svejnar (2003) explore the determinants for the absolute and relative severity of perceived obstacles to firm operations. As in case of Enterprise Surveys, firm managers were asked about the relative importance of obstacles in relation to public administration. The empirical analysis is more closely related to the benchmarking approach as responses to survey questions are not used as independent but rather as dependent variable. More precisely, the empirical analysis involves a multinomial logit approach in which the frequency with which a particular dimension of public administration is identified as the most important one is regressed on a set of controls including firm characteristics such as age, size or capital per employee. Indeed, the empirical results support the hypothesis that perceived obstacles seem to be driven by firm characteristics to some extent as some of the firm characteristics are shown to be statistically related to assessments made by firm managers.

An alternative approach to control for a dependence of survey data on firm characteristics is proposed by Desai and Olofsgard (2011). Their analysis studies the differential impact of obstacles from public administration in case of politically connected firms. Firm-level data as well as data on perceived obstacles are again obtained from Enterprise Surveys. Biases in firm responses are addressed by calculating the difference between the respective individual assessment and those from three other peer firms or groups of firms. By calculating the perceived influence gap, Pissarides, Singer and Svejnar (2003) argue to cancel out potential biases that may be associated with self-assessments made in survey data.

An application of the benchmarking approach in the context of economic history is made by Carlin, Schaffer and Seabright (2013). Their analysis investigates whether central planning in former soviet countries left firms with different constraints to firm growth compared to their non-planning peers. Data is obtained from Enterprise Surveys and incorporates a share of 17 percent of observations drawn from formerly planned economies. After accounting for the potential bias in survey data using the benchmarking approach described in Section 3.1, reported costs from public administration are compared between formally planned and market economies for both high and low income. Results show that especially tax administration, courts and customs are perceived to be relatively greater obstacles to firm growth in formerly planned economies in case of both high and low income countries.

4 DATA

The primary data source for the analysis of business perceptions comes from the World Bank's Enterprise Surveys (World Bank, 2014). Its early implementation in Eastern European and Central Asian countries is also referred to as the Business Environment and Enterprise Performance Survey (BEEPS) and was co-financed by the European Bank for Reconstruction and Development. In more recent waves, these surveys have also been implemented in further regions including Central- and South-America as well as Africa. Panel data is provided for 75 countries, whereas cross-sectional data is available for more than 100 countries. With respect to the European Union, 11 Member States, four Candidate States, one Applicant State as well as one potential Candidate State are included. The first main wave of the survey was implemented in 2002 and the latest in 2013. Most recent data is currently only provided for seven Member States. The publication of recent data for the remaining countries in the sample has unfortunately been postponed by the World Bank. Country and time coverage is summarised in Table 3.35.

Enterprise Surveys are targeted at formally registered firms that are not fully owned by the government. Base information for the sampling of firms is usually obtained from national statistical offices and tax or business licensing agencies. Standardised sampling methods and questionnaires are used in order to obtain internationally comparable data. Sample selection is carried along strata according to firm size, business sector and region of operation. The latter is driven by the concentration of economic activity within a country and results in surveyed firms typically being located at the economic hubs of their respective countries of origin. Sector coverage of the data set according to the ISIC Revision 3.1 classification is depicted in Figure 3.28.

Enterprise Surveys comprise business perceptions for up to 15 different dimensions of the business environment. These are compulsory certificates, corruption, courts, crime and disorder, customs and trade, electricity, competition from the informal sector, business inspections, labour regulation, access to land, permits and licensing, tax administration, tax rates, telecommunication as well as transport.

Along all covered dimensions, perceptions are collected using an identical scale of measurement as well as identical survey question. This is crucial for the common interpretation of survey responses in terms of units of foregone profit. The standard question to capture business perceptions is framed as follows: 'To what degree is

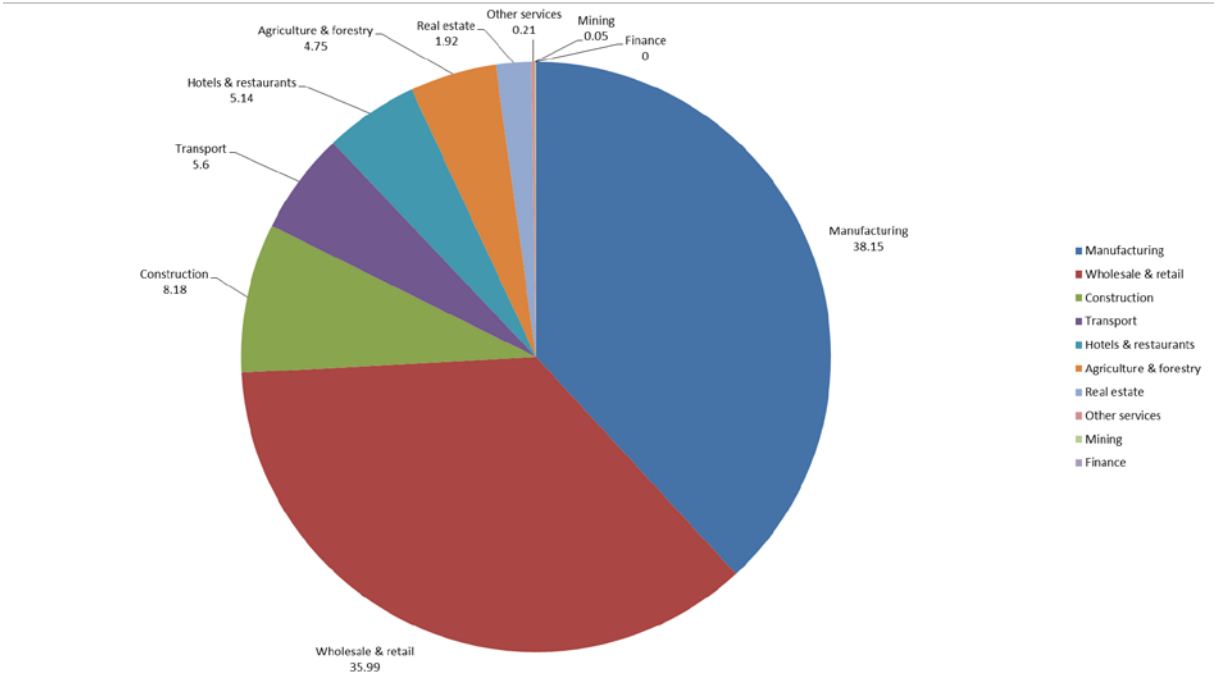
[respective dimension of public administration] an obstacle to current operations of this establishment?' Answers are given on a 5-point-scale which ranges from 0 'no obstacle' to 4 'very severe obstacle'.

Table 3.35 – Country and time coverage of the data set

	Year of Survey						
	2002	2005	2007	2008	2009	2013	Total
Albania	170	204	304	54	0	0	732
Bosnia and Herzegovina	182	200	0	347	14	360	1103
Bulgaria	250	300	1015	288	0	293	2146
Croatia	187	236	633	55	49	360	1520
Czech Republic	268	343	0	80	170	0	861
Estonia	170	219	0	273	0	0	662
Hungary	250	610	0	289	2	0	1151
Latvia	176	205	0	271	0	0	652
Lithuania	200	205	0	159	117	0	681
FYROM	170	200	0	361	5	360	1096
Montenegro	20	18	0	90	26	150	304
Poland	500	975	0	185	270	0	1930
Romania	255	600	0	541	0	0	1396
Serbia	230	282	0	388	0	360	1260
Slovak Republic	170	220	0	266	9	0	665
Slovenia	188	223	0	153	123	270	957
Turkey	514	1880	0	1152	0	0	3546

Source: ZEW calculations based on Enterprise Surveys (World Bank, 2014)

Figure 3.28 – Sector coverage of Enterprise Surveys



Note: Sector definition according to ISIC Revision 3.1
Source: ZEW calculations based on Enterprise Surveys (World Bank, 2014)

Evidently, not every dimension mentioned above relates to the role of public administration in a particular country. For instance, tax rates refer exclusively to legislation and do not reflect the quality of public administration. A similar argument holds for crime and disorder as well as competition from the informal sector, although both dimensions are to some extent influenced by the quality of public administration. Hence, respective dimensions are not part of the analysis.

The dimensions electricity, telecommunication as well as access to land will not be part of the analysis either. The privatisation and liberalisation of electricity and telecommunication markets in the countries covered in the sample of analysis already took place in the 1990s. Consequently, providers are not fully owned by the government anymore and therefore do not necessarily exhibit the nature of public administration.[11]

The dimension compulsory certificates is dropped from the analysis as it only covers the years 2008 and 2009 and exhibits a very low number of observation. However, this does not necessarily result in a loss of information, as the correlation between compulsory certificates and the dimension permits and licensing is quite high so that its impact is partly captured by the latter. Table 3.37 provides an overview of the pairwise Pearson correlation coefficients between all covered dimensions of business perceptions in the Enterprise Surveys.

Descriptive statistics for the dummy variables defining the benchmark firm are provided by Table 3.36. Approximately 6 per cent of the firms in the sample exhibit an age equal to the benchmark case. Slightly more than 94 percent are either younger or older. Roughly 70 per cent exhibit a share of exports in sales below 10 per cent as requested in the benchmark setting. Approximately 30 percent report a share above that threshold. Only 11 percent of the firms in the sample feature a share of foreign ownership larger than 10 per cent. Approximately 92 per cent are privately owned. As already evident from Figure 3.28, slightly more than 38 percent operate in the manufacturing sector. Approximately 62 percent report other main sectors of operation. Due to the method of calculation, the mean of productivity as well as employment cannot be similarly interpreted.

Table 3.36 – Descriptive Statistics

	Mean	Standard deviation	Minimum	Maximum	Observations
Age	0.943	0.232	0	1	20536
Export	0.297	0.457	0	1	20582
Foreign	0.116	0.320	0	1	20585
Employment	-0.165	1.612	-3.401	6.544	20524
Employment (robustness)	0.101	1.612	-3.135	6.809	20524
Ownership	0.079	0.270	0	1	20584
Productivity	0.092	1.421	-10.805	9.688	16305
Sector	0.619	0.486	0	1	20662

Note: Reported statistics refer to the definitions for the benchmark firm.
Source: ZEW calculations based on Enterprise Surveys (World Bank, 2014)

[11] It may be argued that compared to the remaining obstacles, transport is of a different nature as it more strongly depends on the stock of public capital that is accumulated over time. Misch, Gemmell and Kneller (2014) show that this is one reason of why transport is often seen as the least impeding constraint irrespective of actual transport barriers or costs in within-country rankings. This implies that when this is the case, there are no clear implications for policies that intend to remove transport barriers. However, this potential bias does not affect the remaining obstacles or between-country rankings, and changes in the perception over time, and it does not represent a potential problem when transport is indeed seen as a major constraint.

Table 3.37 – Pairwise correlation across covered dimensions of public administration

	Covered dimensions														
	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
1-Certificates	1														
2-Corruption	0.214	1													
3-Courts	0.263	0.592	1												
4-Crime & Disorder	0.283	0.462	0.415	1											
5-Customs & Trade	0.282	0.302	0.326	0.277	1										
6-Electricity	0.208	0.236	0.200	0.285	0.224	1									
7-Informal Sector	0.178	0.349	0.302	0.322	0.235	0.194	1								
8-Business Inspections	0.399	0.238	0.295	0.339	0.243	0.232	0.168	1							
9-Labour Regulation	0.308	0.305	0.348	0.296	0.331	0.225	0.249	0.350	1						
10-Access to Land	0.291	0.226	0.246	0.280	0.247	0.279	0.195	0.270	0.270	1					
11-Permits & Licensing	0.375	0.393	0.393	0.309	0.382	0.247	0.242	0.276	0.408	0.292	1				
12-Tax Administration	0.240	0.397	0.404	0.303	0.380	0.217	0.229	0.328	0.398	0.223	0.420	1			
13-Tax Rates	0.162	0.357	0.328	0.264	0.282	0.217	0.238	0.224	0.370	0.202	0.337	0.608	1		
14-Telecommunication	0.257	0.208	0.189	0.275	0.228	0.636	0.142	0.200	0.205	0.285	0.244	0.216	0.183	1	
15-Transport	0.281	0.231	0.213	0.282	0.362	0.513	0.207	0.257	0.269	0.321	0.302	0.243	0.238	0.514	1

Note: Pairwise correlation coefficients are depicted
Source: ZEW calculations based on Enterprise Surveys (World Bank, 2014)

5 RESULTS

5.1 Results using the Benchmarking Approach

Main Results

Results are obtained using the least squares dummy variables estimation approach. Regressions are executed separately for every dimension of public administration included in the analysis. Cluster-robust standard errors at the firm level are computed to account for potential correlation and heteroscedasticity among error terms. As a showcase, Table 3.38 will provide estimation results for the case of business perceptions of courts.

Table 3.38 – Results for business perceptions of courts

	Coefficient	Standard error	t-value	p-value
$exports_{ict}$	0.081	0.022	3.74	0.000
$employment_{ict}$	0.044	0.006	7.43	0.000
$foreign_{ict}$	-0.051	0.027	-1.87	0.061
$ownership_{ict}$	-0.138	0.030	-4.54	0.000
$sector_{ict}$	-0.047	0.020	-2.34	0.019
AL	1.607	0.051	31.73	0.000
BG	1.318	0.032	41.27	0.000
BA	1.176	0.041	28.39	0.000
CZ	1.367	0.046	29.89	0.000
EE	0.516	0.036	14.23	0.000
HR	1.263	0.038	33.04	0.000
HU	0.629	0.032	19.75	0.000
LT	1.224	0.051	24.16	0.000
LV	0.924	0.051	18.18	0.000
$FYROM$	1.260	0.047	26.83	0.000
ME	0.452	0.052	8.66	0.000
PL	1.478	0.031	47.23	0.000
RO	1.623	0.036	44.86	0.000
RS	1.202	0.041	29.44	0.000
SK	1.359	0.051	26.71	0.000
SI	0.985	0.044	22.50	0.000
TR	1.361	0.027	49.85	0.000
N		19424		
R-sq		0.5153		

Note: Results are obtained using the least squares dummy variables approach, cluster-robust standard errors at the firm level are reported
Source: ZEW calculations

The Estimation included 19,424 firm-level observations. Except for one case, all coefficients exhibit a statistically significant impact on individual assessments at the 5 per cent level. Based on the results for this particular dimension, increasing shares of exports in sales are on average associated with more severe assessments of the costs associated with courts. A similar effect on individual assessments can be observed if firm size deviates from the benchmark case. The severity of assessments is on average reduced with increasing shares of foreign ownership. Results point into the same direction if the main sector of operations differs from manufacturing, i.e. the benchmark case.

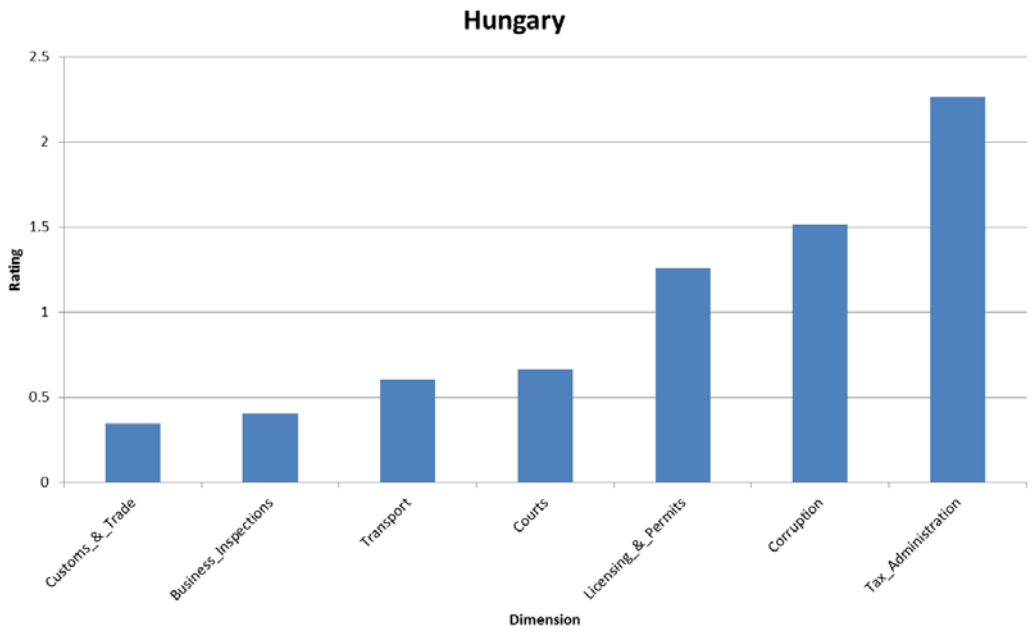
The explanations for these results may be the following. An increasing share of exports in sales may heighten the complexity of lawsuits as these may more frequently involve firms located abroad. Two different arguments may explain the sign of the coefficient in case of employment. A deviation from the benchmark case either means a reduction or an increase in firm size. A negative sign in case of smaller firms may be due to the potential lack of capacities and experience in dealing with courts or lawsuits. In case of increasing firm size, this argument is less likely to hold. Increases in size are likely to be associated with increasing sales and therefore with potentially more frequent lawsuits. Belonging to a sector other than manufacturing may reduce the frequency of lawsuits as firms may then belong to sectors such as wholesale or the services sector which may exhibit a lower probability for lawsuits.

Country-specific assessments independent from firm characteristics are given by the respective country codes in Table 3.38. These coefficients depict the results for $\hat{\eta}_{jc}$ as described in Section 3.1. The scale of these estimated coefficients is equivalent to the one of raw perceptions. Consequently, on average and throughout all time periods covered in the sample, firms in Romania assess courts as being a minor to moderate obstacle to firm growth. In case of Estonia, courts are perceived to be no or just a minor obstacle to firm growth.

Estimation results for all covered dimensions of public administration are summarised in Table 3.39. Throughout all specifications, country-specific assessments are highly significant at the 1 per cent level. With a few exceptions, this is also the case for firm characteristics included in the estimation. The signs of estimated coefficients are quite stable across dimensions of public administration. One exception is given by the coefficient on firm size in case of the specification for tax administration. However, the estimated coefficient is statistically indistinguishable from zero, so that the resulting sign cannot be credibly interpreted. Another exception, which however is statistically different from zero, is given by the coefficient on foreign ownership in case of the specification for customs. Rather than reducing reported costs, here an increase in the share of foreign ownership is associated with a more severe assessment of the costs incurring from customs and trade. This may be explained by the circumstance that an increasing share of foreign ownership may be accompanied with an increasing reliance on trading across borders.

Based on the estimation results for all covered dimensions of public administration from Table 3.39, country-specific analyses for the identification of the most impeding factor for firm growth are feasible. Figure 3.29 again serves as a showcase and summarises the results for Hungary in 2008. Figure 3.32 to Figure 3.40 in the Appendix provide the results for the remaining countries and years covered in the sample.

Figure 3.29 – Within-country analysis for Hungary 2008



Source: ZEW calculations

Evident from Figure 3.29, there is substantial heterogeneity in firm assessments with respect to the severity of particular dimensions of public administration on firm growth in Hungary. Tax administration is perceived to be the most impeding factor for firm growth. Managers assess tax administration to be a moderate to major obstacle. Corruption is perceived to be a minor to moderate obstacle to firm growth. The lowest ratings are assigned to customs and trade as well as business inspections. Both dimensions of public administration are perceived to be no or just a minor obstacle to firm growth in Hungary in 2008.

Table 3.39 – Estimation results of the baseline specification

	(1) Corruption	(2) Courts	(3) Customs	(4) Inspections	(5) Permits	(6) Tax-admin	(7) Transport
exports	0.0484	0.0806	0.389	0.000778	0.0614	0.0880	0.0375
	[2.12]**	[3.74]***	[19.45]***	[0.02]	[3.03]***	[4.25]***	[1.95]*
employment	0.00218	0.0438	0.0250	0.0436	0.0311	-0.00256	0.0388
	[0.35]	[7.43]***	[4.57]***	[4.18]***	[5.62]***	[-0.44]	[7.33]***
foreign	-0.141	-0.0513	0.160	-0.0210	-0.0241	-0.0789	-0.00632
	[-4.90]***	[-1.87]*	[6.02]***	[-0.43]	[-0.93]	[-2.98]***	[-0.25]
ownership	-0.390	-0.138	-0.127	-0.205	-0.194	-0.251	-0.245
	[-11.84]***	[-4.54]***	[-4.43]***	[-2.55]**	[-6.46]***	[-8.02]***	[-8.99]***
sector	-0.0170	-0.0472	-0.0817	0.0171	-0.0131	-0.0953	-0.0408
	[-0.79]	[-2.34]**	[-4.52]***	[0.51]	[-0.71]	[-4.91]***	[-2.29]**
AL	2.095	1.607	1.356	0.878	1.105	1.638	1.060
	[43.11]***	[31.73]***	[27.42]***	[6.21]***	[24.41]***	[35.37]***	[22.51]***
BG	1.680	1.318	0.549	1.008	0.999	1.325	0.769
	[49.57]***	[41.27]***	[22.01]***	[15.04]***	[33.59]***	[44.66]***	[26.60]***
BA	1.676	1.176	0.929	0.665	0.966	1.473	0.816
	[35.13]***	[28.39]***	[24.22]***	[10.61]***	[25.87]***	[36.69]***	[23.17]***
CZ	1.337	1.367	0.990	1.314	1.091	1.947	1.076
	[28.68]***	[29.89]***	[24.27]***	[17.40]***	[27.26]***	[46.78]***	[23.69]***
EE	0.734	0.516	0.469	0.509	0.673	0.658	0.652
	[17.16]***	[14.23]***	[12.08]***	[8.65]***	[16.03]***	[16.49]***	[14.46]***
HR	1.195	1.263	0.561	0.825	0.732	1.301	0.590
	[30.83]***	[33.04]***	[18.45]***	[7.25]***	[23.55]***	[35.22]***	[20.12]***
HU	0.978	0.629	0.592	0.403	0.849	1.562	0.534
	[25.09]***	[19.75]***	[18.17]***	[7.00]***	[24.40]***	[39.41]***	[17.96]***
LT	1.491	1.224	0.611	1.322	1.007	1.609	0.725
	[27.34]***	[24.16]***	[13.85]***	[17.13]***	[20.72]***	[33.63]***	[15.63]***
LV	1.263	0.924	0.750	1.197	0.949	1.852	0.896
	[22.35]***	[18.18]***	[16.24]***	[15.21]***	[19.39]***	[36.60]***	[17.33]***
FYROM	1.279	1.260	0.776	0.702	0.850	1.115	0.679
	[27.75]***	[26.83]***	[19.88]***	[11.16]***	[21.19]***	[27.48]***	[19.25]***
ME	0.503	0.452	0.650	0.558	0.551	0.916	0.566
	[9.19]***	[8.66]***	[11.78]***	[6.54]***	[10.24]***	[15.19]***	[10.86]***
PL	1.410	1.478	1.105	1.547	1.094	1.951	0.739
	[42.76]***	[47.23]***	[35.09]***	[23.53]***	[36.79]***	[65.59]***	[26.64]***
RO	1.918	1.623	1.069	1.319	1.542	2.088	0.936
	[50.32]***	[44.86]***	[29.10]***	[21.29]***	[43.81]***	[59.93]***	[26.91]***
RS	1.446	1.202	0.865	0.831	0.846	1.469	0.692
	[32.83]***	[29.44]***	[23.26]***	[12.72]***	[24.00]***	[37.22]***	[21.44]***
SK	1.443	1.359	0.681	1.153	0.947	1.147	0.835
	[26.96]***	[26.71]***	[15.00]***	[15.97]***	[21.46]***	[25.15]***	[18.11]***
SI	0.751	0.985	0.380	0.955	0.573	1.115	0.578
	[17.66]***	[22.50]***	[11.59]***	[12.69]***	[16.01]***	[27.53]***	[16.02]***
TR	1.864	1.361	0.942	0.463	1.327	1.853	0.936
	[62.93]***	[49.85]***	[37.17]***	[14.13]***	[50.22]***	[71.18]***	[39.17]***
N	19402	19424	18798	5492	19560	20017	20026
R-sq	0.571	0.515	0.431	0.463	0.463	0.628	0.331

Note: Least Squares Dummy Variables approach applied in all specifications, cluster-robust t-statistics at the firm level are reported
** p<0.10, ** p<0.05, *** p<0.001*
Source: ZEW calculations

Table 3.40 – Summary of the least and most impeding factors for firm growth

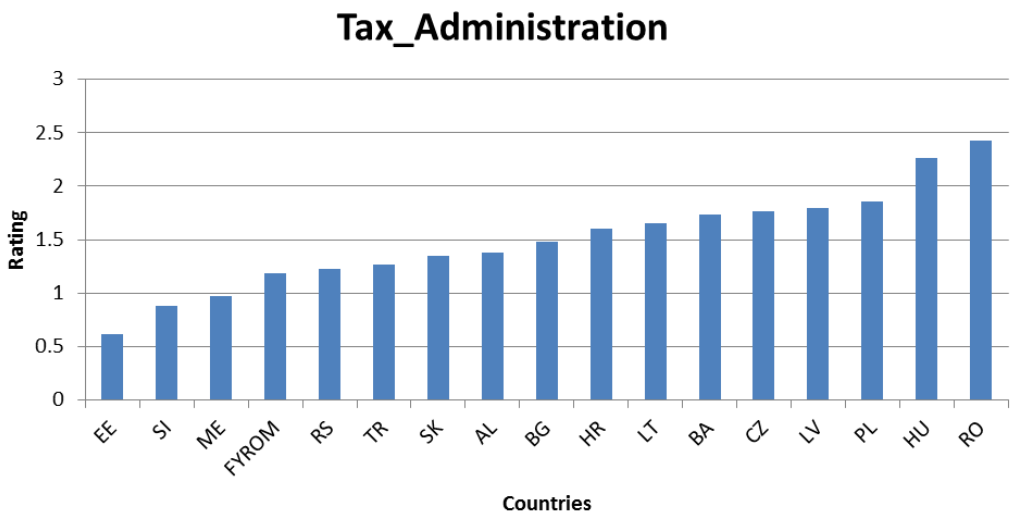
	2002		2005		2008		2009		2013	
	least	most	least	most	least	most	least	most	least	most
AL	Licensing & Permits	Corruption	Transport	Corruption	Customs & Trade	Corruption	.	.	.	.
BG	Transport	Corruption	Transport	Corruption	Customs & Trade	Corruption	.	.	Customs & Trade	Corruption
BA	Transport	Corruption	Transport	Corruption	Business Inspections	Corruption	Business Inspections	Tax Administration	Transport	Corruption
CZ	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Courts	Customs & Trade	Transport	.	.
EE	Customs & Trade	Licensing & Permits	Transport	Corruption	Courts	Transport	.	.	.	.
HR	Transport	Courts	Transport	Courts	Customs & Trade	Courts	Customs & Trade	Tax Administration	Licensing & Permits	Tax Administration
HU	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	.	.	.	.
LT	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Corruption	Customs & Trade	Tax Administration	.	.
LV	Transport	Tax Administration	Customs & Trade	Tax Administration	Customs & Trade	Tax Administration	.	.	.	.
FYROM	Transport	Courts	Transport	Corruption	Business Inspections	Courts	.	.	Licensing & Permits	Corruption
ME	Corruption	Customs & Trade	Transport	Tax Administration	Courts	Tax Administration	Licensing & Permits	Tax Administration	Licensing & Permits	Tax Administration
PL	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	Customs & Trade	Tax Administration	.	.
RO	Transport	Corruption	Transport	Tax Administration	Customs & Trade	Tax Administration	.	.	.	.
RS	Transport	Tax Administration	Transport	Courts	Business Inspections	Corruption	.	.	Transport	Tax Administration
SK	Transport	Corruption	Customs & Trade	Courts	Customs & Trade	Corruption	Customs & Trade	Transport	.	.
SI	Transport	Courts	Transport	Tax Administration	Customs & Trade	Transport	Customs & Trade	Courts	Customs & Trade	Tax Administration
TR	Transport	Tax Administration	Transport	Tax Administration	Business Inspections	Corruption	.	.	.	.

Note: To improve readability, results for 2007 are omitted. '.' indicate missing data for respective countries. In case of 2009, HU and FYROM are excluded from the ranking due to the very low number of observations.
Source: ZEW calculations

Table 3.40 summarises, separately for every country, the least as well as the most impeding factor for firm growth. Furthermore, the Table also illustrates the variation over time and documents changes in the dimensions perceived to be the most and least binding constraint. From Table 3.40, the three most impeding factors for firm growth are tax administration, corruption as well as courts. These results show very little variation over time. However, this is not the case for the least severe obstacle to firm growth. In the first two waves covered in the data set, the least impeding factor shows little variation over time. However, this changes taking the waves after 2008 into account. In the first survey wave after accession, the least impeding factor for firm growth switches to customs and trade and is among the most frequent dimensions of public dimension identified to be the least severe obstacle to firm growth potentially reflecting the benefits for firms associated with the accession to the EU.

Beside the within-country analysis, results from the benchmarking approach also allow for a between country evaluation. This permits the identification of the best and worst performing country for a particular dimension of public administration. Figure 3.30 serves as a showcase and depicts the results for tax administration in 2008.

Figure 3.30 – Between-country analysis for tax administration in 2008



Source: ZEW calculations

Figure 3.30 reveals a substantial heterogeneity between Member States covered in the sample. Estonia and Slovenia exhibit the lowest perceived costs and firm managers assess the tax administration to be no or just a minor obstacle to firm growth in 2008. Romania as well as Hungary exhibit the highest reported costs. Here, firms perceive tax administration to be a moderate to major obstacle for firm growth. The majority of Member States' reported costs range between 1 and 2 and is equivalent to a minor to moderate obstacle to firm growth. Figure 3.41 to Figure 3.46 illustrate the results for the remaining dimensions of public administration and years included in the sample of analysis.

Table 3.41 summarises the results for every dimension of public administration included in the analysis. It depicts respective countries with the highest and lowest perceived costs for a particular dimension of public administration. Furthermore, Table 3.41 also allows the identification of shifts in the relative performance of countries over time.

One striking result of Table 3.41 is the high correlation in terms of performance between different dimensions of public administration in a particular country. In 2002 for instance, Albania exhibits the highest reported costs in four out of six dimensions of public administration. The same pattern can also be observed in case of the lowest costs. Here, Slovenia performs best in four out of six dimensions. A substantial shift occurs in 2005 with respect to the worst performing countries. Here, Turkey exhibits the highest perceived costs in four out of six dimensions of public administration. A similar alteration of results can be observed in 2008. Here, Romania exhibits the highest costs in four out of seven dimensions. In case of the best performing countries, Estonia stands out and exhibits the lowest costs in four out of seven dimensions of public administration.

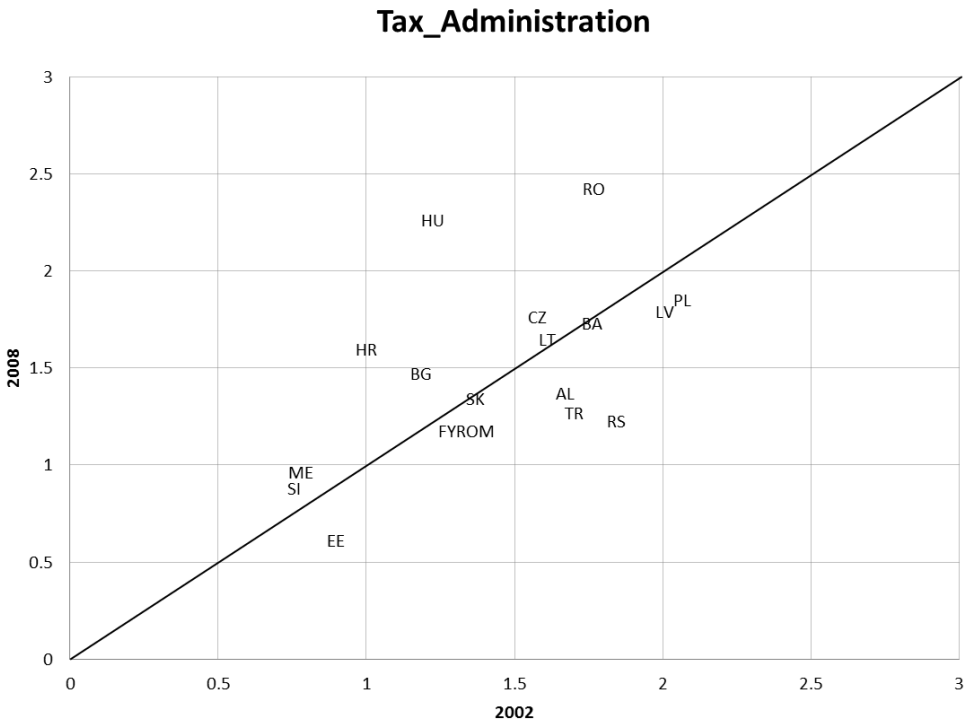
Table 3.41 – Summary of the worst and best performing countries for all covered dimensions of public administration

	2002		2005		2008		2009		2013	
	lowest	highest	lowest	highest	lowest	highest	lowest	highest	lowest	highest
Corruption	ME	AL	SI	TR	ME	RO	ME	LT	ME	BA
Courts	ME	AL	EE	TR	EE	HR	ME	HR	ME	SI
Customs & Trade	SI	AL	SK	AL	EE	RO	SK	HR	BG	BA
Business Inspections	.	.	.	.	HU	PL	ME	LT	.	.
Licensing & Permits	SI	RO	SK	TR	EE	RO	ME	PL	ME	BA
Tax Administration	SI	PL	EE	CZ	EE	RO	SK	HR	BG	HR
Transport	SI	AL	SI	TR	HU	CZ	ME	CZ	BG	BA

Note: To improve readability, results for 2007 are omitted. '.' indicate missing data for respective dimensions of public administration. In case of 2009, HU and FYROM are excluded from the ranking due to the very low number of observations.
Source: ZEW calculations

Figure 3.31 depicts the variation of country-specific results over time not limited to the best and worst performing countries. Reported costs are compared between the years 2002 and 2008 for perceptions of tax administration. Figure 3.31 again serves as a showcase. Respective results for the remaining dimensions are provided by Figure 3.47 in the Appendix. While results below the bisecting line indicate improvements in the country-specific perceived costs with respect to tax administration, results above it indicate deterioration. Results on the bisecting line denote an identical assessment in 2002 and 2008. In case of tax administration, seven countries in the sample of analysis exhibited an increase in costs associated with tax administration on firms. Seven countries exhibited a reduction in their costs. For three countries, assessments remained virtually the same. The largest increase in costs occurred in Hungary, Romania and Croatia. Here, the growth was up to 1, i.e. a complete step on the scale of measurement. The remaining countries exhibited an increase of up to 0.5 in their assessment. The usual improvements in the country-specific perceived costs were up to 0.5 as well. Here, Serbia exhibited the largest reduction in costs incurred by firms from tax administration compared between 2002 and 2008.

Figure 3.31 – Scatterplot of between-country comparisons with respect to tax administration



Note: Scores for 2002 and 2008 are compared, as this maximises the country coverage for this particular analysis
Source: ZEW calculations

Robustness checks

As described in Section 3.1, the robustness checks introduce two new variables to the estimation specification. This is done separately as the introduction of the proxy-variable for firm productivity reduces sample size substantially. Table 3.43 and Table 3.44 in the Appendix summarise estimation results for all dimensions of public administration covered in the analysis.

Following the introduction of firm age to the definition of the benchmark firm, its estimated coefficient is statistically insignificant in case of all covered dimensions of public administration. Beyond that, the introduction of firm age leaves the signs and statistical significance of remaining firm characteristics mostly unaffected.

Qualitatively similar results are obtained following the introduction of a proxy for firm productivity. In cases where results are statistically significant, a deviation from the productivity of the benchmark firm is on average associated with a more severe assessment of costs incurred by firms from public administration. A deviation

from the benchmark again either means a reduction or an increase in firm productivity. In case of perceptions of corruption, two different arguments may explain the sign of the coefficient. A positive sign in case of more productive firms may indicate that rent-seeking public servants may indeed target high-productive firms. In case of lower productivity compared to the benchmark, firms may depend more intensely on bribes to get things done. Again, the introduction of the productivity proxy has only small effects on estimation results for the remaining firm characteristics. In a few cases, obtained results are statistically indistinguishable from zero anymore. However, this could also be due to the substantial reduction in sample size. As in the baseline specification, country-specific assessments independent from firm characteristics are highly significant.

Table 3.45 and Table 3.46 in the Appendix summarise the least and most impeding factor for firm growth in case of the robustness checks. Obtained results indicate a high robustness to the inclusion of firm age as well as firm productivity. In cases where differences to the baseline occur, virtually always the second most or second least impeding factor for firm growth changed positions with the former first ranked dimension.

The same pattern can also be observed in the case of the between-country analysis. Table 3.47 and Table 3.48 in the Appendix summarise the results for the worst and best performing country for every dimension of public administration in a particular year. The absolute majority of results is robust and reproduced by the robustness checks. Again, in case of deviations from the baseline results first and second ranked countries changed places.

In addition, the Appendix also provides Figures for the within- (Figure 3.48 to Figure 3.65), as well as between-country analysis (Figure 3.66 to Figure 3.77) and scatter plots (Figure 3.78 to Figure 3.79) in case of the robustness checks.

5.2 Results using the Mean-Correction Approach

As Section 3.2 pointed out, business perceptions can also be corrected for their dependence on firm characteristics using the mean-correction approach. Table 3.42 summarises the results for the least and most impeding dimension of public administration for firm growth.

Compared to the baseline results of the benchmarking approach, findings are quite similar. The absolute majority of identified least and most impeding factors are identical. Again, tax administration, corruption as well as courts are among the three most frequent dimensions of public administration identified to be the most severe obstacle to firm growth. In cases where the most impeding factor for firm growth deviates from the results of the benchmarking approach, tax administration is identified by the mean-correction approach. The clear cut difference in the least impeding factor for firm growth between the first two and the subsequent waves can be observed here as well.

While qualitative results point into the same direction, quantitative results differ quite substantially. In many cases, obtained results using the mean correction approach are smaller compared to those from the benchmarking approach. However, this pattern is due to a methodological limitation of the mean correction approach. Given the transformation of the data, obtained results cannot be interpreted on the initial scale ranging from 0 – no obstacle to 4 very severe obstacle anymore. But results are still comparable at an ordinal scale. Thus, the mean-correction approach provides an attractive and less computationally intensive alternative to the benchmarking approach.

6 CONCLUSIONS

The objective of this chapter is to measure and compare the costs that public administration imposes on firms across different dimensions of public administration and different countries using business perceptions. To this end, this chapter proposes two innovative approaches to measure the severity of obstacles arising from particular dimensions of public administration using business perceptions which account and correct for the potential biases that may be inherent to them.

In the case of the first approach, raw business perceptions of public administration-related obstacles are corrected for differences in firm characteristics by regressing firm-level perceptions on indicators of the sector, size, ownership and export status of the particular firm. In the case of the second approach, individual assessments related to a particular dimension of public administration are corrected for the potential impact of idiosyncratic factors by expressing assessments relative to the overall tendency to complain in the respective firm.

Table 3.42 – Summary of the least and most impeding factors for firm growth using the mean-correction approach

	2002		2005		2008		2009		2013	
	least	most	least	most	least	most	least	most	least	most
AL	Licensing & Permits	Corruption	Transport	Corruption	Transport	Corruption	.	.	.	.
BG	Transport	Corruption	Transport	Courts	Customs & Trade	Corruption	.	.	Customs & Trade	Corruption
BA	Transport	Tax Administration	Transport	Tax Administration	Business Inspections	Corruption	Transport	Tax Administration	Transport	Corruption
CZ	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	Customs & Trade	Tax Administration	.	.
EE	Transport	Licensing & Permits	Transport	Corruption	Courts	Transport	.	.	.	.
HR	Transport	Courts	Transport	Courts	Customs & Trade	Courts	Business Inspections	Tax Administration	Licensing & Permits	Tax Administration
HU	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	Corruption	Tax Administration	.	.
LT	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	Customs & Trade	Tax Administration	.	.
LV	Transport	Tax Administration	Courts	Tax Administration	Customs & Trade	Tax Administration	.	.	.	.
FYROM	Transport	Tax Administration	Transport	Corruption	Licensing & Permits	Courts	.	.	Licensing & Permits	Tax Administration
ME	Courts	Customs & Trade	Transport	Tax Administration	Courts	Tax Administration	Licensing & Permits	Tax Administration	Courts	Tax Administration
PL	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	Customs & Trade	Tax Administration	.	.
RO	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	.	.	.	.
RS	Transport	Tax Administration	Transport	Courts	Licensing & Permits	Corruption	.	.	Transport	Tax Administration
SK	Transport	Courts	Customs & Trade	Courts	Customs & Trade	Corruption	Customs & Trade	Transport	.	.
SI	Transport	Courts	Transport	Tax Administration	Corruption	Transport	Customs & Trade	Business Inspections	Licensing & Permits	Tax Administration
TR	Transport	Tax Administration	Transport	Tax Administration	Business Inspections	Corruption	.	.	.	.

Note: To improve readability, results for 2007 are omitted. '.' indicate missing data for respective countries. In 2009, HU and FYROM are excluded due to the very low number of observations.
Source: ZEW calculations

The results of this analysis allow for a better measurement of whether and to what extent public administration constrains firms in their operations and ultimately in their growth. In particular, our results show which dimension of public administration may be considered to be the most costly one for firms in a particular country. Along the same lines, between-country evaluations are feasible which show how a particular country ranks internationally in one specific dimension of public administration. Both dimensions of the analysis allow for prioritising policy measures in Member States considered in the analysis of this chapter.

In case of the within-country analysis, the results show that tax administration, corruption and courts are considered to be the most impeding factors for firm growth in virtually all countries in the sample of analysis. These findings are recurring across the time period under consideration and may indicate that there seems to be room for improvement in Member States with respect to these dimensions of public administration. Furthermore, these results are also confirmed in the robustness checks as well as by the mean-correction approach. In cases where differences to the results of the baseline specifications occur, virtually always the second most or second least impeding factor for firm growth changed positions with the former first ranked dimension.

In addition, a striking pattern emerges with respect to the least impeding factors for firm growth. In the first survey wave after accession, the least impeding factor for firm growth switches to customs and trade potentially reflecting the benefits for firms associated with the accession to the EU.

In case of the between-country evaluation, the results reveal a high correlation in terms of performance between different dimensions of public administration in a particular country. More precisely, countries have similar rankings across several dimensions at one point in time. Typically, the best or worst performing country with respect to one constraint also performs very good or poorly, respectively, across several other dimensions of public administration.

In contrast to the within-country analysis, the results for the between-country evaluation show some time variation as the worst and best performing countries change several times throughout the time period considered in the analysis. Not restricted to the best and worst performance, the results from the between-country analysis reveal that a large group of Member States included in the analysis exhibited an increase in the costs associated with several dimensions of public administration compared between the first three waves of the survey. With respect to tax administration, corruption and courts, the number of countries showing an increase in cost exceeds the number of countries showing a decrease in costs; in addition, the change for the former countries is larger in absolute terms compared to the latter countries. This again may serve as clear indication that improving tax administration, courts and reducing corruption should rank high on the political agenda for countries considered in the analysis of this chapter.

Table 3.43 – Estimation results of the robustness check (including firm age)

	(1) Corruption	(2) Courts	(3) Customs	(4) Inspections	(5) Permits	(6) Tax-admin	(7) Transport
exports	0.0463	0.0789	0.390	0.000150	0.0604	0.0862	0.0359
	[2.03]**	[3.65]***	[19.46]***	[0.00]	[2.98]***	[4.16]***	[1.86]*
employment	0.00245	0.0439	0.0245	0.0415	0.0309	-0.00276	0.0381
	[0.39]	[7.42]***	[4.48]***	[3.95]***	[5.57]***	[-0.48]	[7.19]***
foreign	-0.139	-0.0512	0.162	-0.0180	-0.0240	-0.0770	-0.00578
	[-4.83]***	[-1.87]*	[6.06]***	[-0.37]	[-0.93]	[-2.90]***	[-0.23]
ownership	-0.389	-0.137	-0.127	-0.202	-0.196	-0.254	-0.243
	[-11.78]***	[-4.49]***	[-4.41]***	[-2.46]**	[-6.50]***	[-8.11]***	[-8.92]***
sector	-0.0180	-0.0472	-0.0810	0.0167	-0.0148	-0.0958	-0.0419
	[-0.84]	[-2.34]**	[-4.48]***	[0.50]	[-0.80]	[-4.92]***	[-2.35]**
age	-0.0620	-0.0380	-0.0411	0.0434	0.0265	0.000946	0.0466
	[-1.56]	[-1.01]	[-1.21]	[0.70]	[0.78]	[0.03]	[1.43]
AL	2.153	1.631	1.389	0.801	1.075	1.639	1.008
	[35.11]***	[26.45]***	[23.52]***	[5.21]***	[19.37]***	[28.34]***	[18.07]***
BG	1.739	1.344	0.583	0.959	0.967	1.324	0.717
	[34.24]***	[27.97]***	[14.32]***	[10.31]***	[21.95]***	[28.93]***	[16.98]***
BA	1.735	1.202	0.958	0.614	0.932	1.475	0.759
	[28.67]***	[21.91]***	[19.15]***	[7.13]***	[18.82]***	[27.84]***	[16.33]***
CZ	1.387	1.383	1.023	1.263	1.055	1.942	1.021
	[23.37]***	[24.15]***	[20.02]***	[13.07]***	[20.67]***	[36.16]***	[18.89]***
EE	0.791	0.540	0.499	0.459	0.643	0.658	0.600
	[14.14]***	[10.87]***	[10.10]***	[5.54]***	[12.38]***	[12.58]***	[11.14]***
HR	1.255	1.289	0.592	0.772	0.703	1.302	0.536
	[23.42]***	[24.72]***	[13.57]***	[6.04]***	[15.70]***	[25.71]***	[12.84]***
HU	1.035	0.652	0.623	0.348	0.817	1.560	0.480
	[19.31]***	[13.95]***	[13.83]***	[4.26]***	[17.44]***	[29.93]***	[11.54]***
LT	1.548	1.247	0.636	1.262	0.968	1.605	0.666
	[23.49]***	[20.23]***	[11.85]***	[13.16]***	[16.79]***	[27.20]***	[12.13]***
LV	1.325	0.950	0.780	1.139	0.910	1.854	0.841
	[19.40]***	[15.21]***	[13.81]***	[11.52]***	[15.34]***	[29.99]***	[13.84]***
FYROM	1.341	1.285	0.807	0.646	0.818	1.117	0.620
	[22.49]***	[21.81]***	[15.90]***	[7.33]***	[15.76]***	[20.84]***	[13.29]***
ME	0.564	0.480	0.684	0.502	0.533	0.917	0.518
	[8.37]***	[7.47]***	[10.54]***	[4.83]***	[8.34]***	[13.01]***	[8.44]***
PL	1.469	1.501	1.135	1.488	1.057	1.949	0.680
	[29.27]***	[31.61]***	[25.23]***	[16.49]***	[24.10]***	[42.49]***	[16.49]***
RO	1.968	1.643	1.095	1.251	1.506	2.086	0.873
	[37.10]***	[32.74]***	[22.79]***	[14.49]***	[31.89]***	[42.84]***	[19.34]***
RS	1.507	1.228	0.898	0.780	0.816	1.472	0.638
	[26.11]***	[22.89]***	[18.38]***	[8.86]***	[17.00]***	[28.01]***	[14.41]***
SK	1.495	1.377	0.704	1.092	0.909	1.140	0.774
	[23.02]***	[22.39]***	[12.69]***	[11.83]***	[16.71]***	[19.99]***	[14.26]***
SI	0.811	1.009	0.408	0.903	0.543	1.114	0.525
	[14.33]***	[18.00]***	[8.98]***	[9.21]***	[11.20]***	[20.85]***	[11.17]***
TR	1.925	1.387	0.975	0.413	1.295	1.855	0.881
	[39.83]***	[30.60]***	[23.58]***	[6.14]***	[30.94]***	[42.64]***	[22.72]***
N	19310	19333	18708	5424	19466	19919	19931
R-sq	0.571	0.515	0.432	0.460	0.462	0.628	0.331

Note: Least Squares Dummy Variables approach applied in all specifications, cluster-robust t-statistics at the firm level are reported
** p<0.10, ** p<0.05, *** p<0.001*
Source: ZEW calculations

Table 3.44 – Estimation results of the robustness check (including firm age and productivity)

	(1) Corruption	(2) Courts	(3) Customs	(4) Inspections	(5) Permits	(6) Tax-admin	(7) Transport
exports	0.0112	0.0648	0.387	0.0239	0.0532	0.0873	0.0253
	[0.44]	[2.70]***	[17.43]***	[0.65]	[2.35]**	[3.77]***	[1.17]
employment	-0.00507	0.0428	0.0213	0.0375	0.0290	-0.00513	0.0332
	[-0.72]	[6.45]***	[3.52]***	[3.29]***	[4.64]***	[-0.79]	[5.51]***
foreign	-0.127	-0.0389	0.138	-0.0268	-0.0246	-0.0472	-0.0127
	[-3.94]***	[-1.25]	[4.62]***	[-0.51]	[-0.85]	[-1.58]	[-0.44]
ownership	-0.355	-0.103	-0.0856	-0.196	-0.173	-0.249	-0.205
	[-9.64]***	[-3.02]***	[-2.65]***	[-2.34]**	[-5.08]***	[-7.05]***	[-6.64]***
sector	0.0110	-0.0166	-0.0549	0.0208	-0.0146	-0.0683	-0.0640
	[0.46]	[-0.74]	[-2.75]***	[0.56]	[-0.71]	[-3.14]***	[-3.21]***
age	-0.0731	-0.0391	-0.0379	0.0868	0.0299	0.0231	0.0485
	[-1.66]*	[-0.92]	[-1.00]	[1.31]	[0.78]	[0.55]	[1.33]
productivity	0.0370	0.0195	0.0234	0.00584	0.0217	-0.00973	0.0625
	[4.37]***	[2.42]**	[3.20]***	[0.43]	[2.92]***	[-1.28]	[8.34]***
AL	2.079	1.597	1.333	0.927	1.045	1.626	0.888
	[29.58]***	[22.17]***	[18.97]***	[4.52]***	[15.92]***	[24.29]***	[13.62]***
BG	1.790	1.354	0.577	0.919	0.966	1.296	0.770
	[32.21]***	[25.44]***	[12.92]***	[9.16]***	[19.84]***	[25.43]***	[16.52]***
BA	1.758	1.198	0.945	0.610	0.917	1.440	0.759
	[25.23]***	[18.91]***	[16.47]***	[6.32]***	[16.16]***	[23.26]***	[14.27]***
CZ	1.446	1.410	1.029	1.225	1.092	1.956	1.106
	[21.66]***	[21.79]***	[17.70]***	[11.59]***	[18.84]***	[32.10]***	[17.54]***
EE	0.756	0.503	0.471	0.415	0.626	0.596	0.601
	[12.63]***	[9.34]***	[8.90]***	[4.71]***	[11.29]***	[10.50]***	[10.49]***
HR	1.197	1.242	0.534	0.741	0.649	1.290	0.473
	[20.29]***	[21.47]***	[11.15]***	[5.46]***	[13.04]***	[22.74]***	[10.25]***
HU	1.078	0.643	0.578	0.300	0.824	1.552	0.489
	[18.15]***	[12.23]***	[11.66]***	[3.45]***	[15.73]***	[26.42]***	[10.45]***
LT	1.552	1.236	0.612	1.203	0.977	1.549	0.709
	[22.19]***	[18.51]***	[10.72]***	[11.65]***	[15.49]***	[23.88]***	[12.14]***
LV	1.342	0.935	0.760	1.095	0.914	1.829	0.894
	[18.18]***	[13.85]***	[12.48]***	[10.63]***	[14.24]***	[27.35]***	[13.47]***
FYROM	1.309	1.260	0.733	0.581	0.767	1.038	0.641
	[19.50]***	[18.80]***	[13.15]***	[6.16]***	[13.18]***	[16.99]***	[12.13]***
ME	0.576	0.504	0.685	0.549	0.555	0.906	0.510
	[6.65]***	[6.36]***	[8.78]***	[4.53]***	[7.13]***	[10.32]***	[6.77]***
PL	1.448	1.475	1.108	1.405	1.024	1.914	0.692
	[25.69]***	[27.58]***	[21.78]***	[13.80]***	[20.53]***	[36.55]***	[14.85]***
RO	1.949	1.609	1.060	1.159	1.453	2.012	0.861
	[32.82]***	[28.53]***	[19.84]***	[11.92]***	[27.44]***	[36.62]***	[17.50]***
RS	1.549	1.198	0.841	0.756	0.779	1.399	0.675
	[23.69]***	[19.28]***	[15.05]***	[8.08]***	[14.17]***	[23.38]***	[13.27]***
SK	1.415	1.326	0.650	1.064	0.860	1.107	0.729
	[19.34]***	[18.93]***	[10.24]***	[9.39]***	[13.72]***	[16.64]***	[11.84]***
SI	0.789	0.987	0.359	0.834	0.521	1.072	0.479
	[12.88]***	[16.19]***	[7.31]***	[8.10]***	[9.90]***	[18.32]***	[9.43]***
TR	1.938	1.335	0.937	0.334	1.296	1.789	0.929
	[35.41]***	[26.05]***	[20.14]***	[4.57]***	[26.95]***	[35.58]***	[21.10]***
N	15436	15491	14973	4524	15544	15931	15926
R-sq	0.569	0.511	0.421	0.451	0.453	0.623	0.331

Note: Least Squares Dummy Variables approach applied in all specifications, cluster-robust t-statistics at the firm level are reported
** p<0.10, ** p<0.05, *** p<0.001*
Source: ZEW calculations

Table 3.45 – Summary of the least and most impeding factors for firm growth (robustness check including firm age)

	2002		2005		2008		2009		2013	
	least	most	least	most	least	most	least	most	least	most
AL	Transport	Corruption	Transport	Corruption	Customs & Trade	Corruption	.	.	.	.
BG	Transport	Corruption	Transport	Corruption	Customs & Trade	Corruption	.	.	Customs & Trade	Corruption
BA	Transport	Corruption	Transport	Corruption	Business Inspections	Corruption	Transport	Tax Administration	Transport	Corruption
CZ	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Courts	Customs & Trade	Transport	.	.
EE	Transport	Courts	Transport	Corruption	Courts	Transport	.	.	.	.
HR	Transport	Courts	Transport	Courts	Business Inspections	Courts	Transport	Tax Administration	Licensing & Permits	Tax Administration
HU	Transport	Tax Administration	Transport	Tax Administration	Business Inspections	Tax Administration	.	.	.	.
LT	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Corruption	Customs & Trade	Tax Administration	.	.
LV	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	.	.	.	.
FYROM	Transport	Corruption	Transport	Corruption	Business Inspections	Courts	.	.	Licensing & Permits	Corruption
ME	Courts	Customs & Trade	Transport	Tax Administration	Courts	Tax Administration	Licensing & Permits	Tax Administration	Licensing & Permits	Tax Administration
PL	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	Customs & Trade	Tax Administration	.	.
RO	Transport	Corruption	Transport	Tax Administration	Customs & Trade	Tax Administration	.	.	.	.
RS	Transport	Tax Administration	Transport	Courts	Business Inspections	Corruption	.	.	Transport	Tax Administration
SK	Transport	Corruption	Transport	Corruption	Customs & Trade	Corruption	Customs & Trade	Transport	.	.
SI	Transport	Courts	Transport	Tax Administration	Customs & Trade	Transport	Customs & Trade	Courts	Licensing & Permits	Tax Administration
TR	Transport	Tax Administration	Transport	Tax Administration	Business Inspections	Corruption	.	.	.	.

Note: To improve readability, results for 2007 are omitted. '.' indicate missing data for respective countries. In case of 2009, HU and FYROM are excluded from the ranking due to the very low number of observations.
Source: ZEW calculations

Table 3.46 – Summary of the least and most impeding factors for firm growth (robustness check including firm age and productivity)

	2002		2005		2008		2009		2013	
	least	most	least	most	least	most	least	most	least	most
AL	Transport	Corruption	Transport	Corruption	Transport	Corruption	.	.	.	.
BG	Transport	Corruption	Transport	Corruption	Customs & Trade	Corruption	.	.	Customs & Trade	Corruption
BA	Transport	Corruption	Transport	Corruption	Business Inspections	Corruption	Transport	Tax Administration	Transport	Corruption
CZ	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Courts	Customs & Trade	Transport	.	.
EE	Transport	Courts	Transport	Corruption	Courts	Transport	.	.	.	.
HR	Transport	Courts	Transport	Courts	Business Inspections	Courts	Transport	Tax Administration	Licensing & Permits	Tax Administration
HU	Transport	Tax Administration	Transport	Tax Administration	Business Inspections	Tax Administration	.	.	.	.
LT	Transport	Tax Administration	Transport	Courts	Customs & Trade	Corruption	Customs & Trade	Corruption	.	.
LV	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	.	.	.	.
FYROM	Transport	Corruption	Transport	Corruption	Business Inspections	Courts	.	.	Licensing & Permits	Corruption
ME	.	.	Transport	Licensing & Permits	Business Inspections	Tax Administration	Transport	Courts	Licensing & Permits	Tax Administration
PL	Transport	Tax Administration	Transport	Tax Administration	Customs & Trade	Tax Administration	Customs & Trade	Tax Administration	.	.
RO	Transport	Corruption	Transport	Tax Administration	Customs & Trade	Corruption	.	.	.	.
RS	Transport	Tax Administration	Transport	Courts	Business Inspections	Corruption	.	.	Transport	Tax Administration
SK	Transport	Corruption	Customs & Trade	Corruption	Customs & Trade	Corruption	Licensing & Permits	Transport	.	.
SI	Transport	Courts	Transport	Tax Administration	Customs & Trade	Transport	Customs & Trade	Courts	Customs & Trade	Tax Administration
TR	Transport	Tax Administration	Transport	Tax Administration	Business Inspections	Corruption	.	.	.	.

Note: To improve readability, results for 2007 are omitted. '.' indicate missing data for respective countries. In case of 2009, HU and FYROM are excluded from the ranking due to the very low number of observations.
Source: ZEW calculations

Table 3.47 – Summary of the worst and best performing countries for all covered dimensions of public administration (robustness check using firm age)

	2002		2005		2008		2009		2013	
	lowest	highest	lowest	highest	lowest	highest	lowest	highest	lowest	highest
Corruption	ME	AL	SI	TR	ME	RO	ME	LT	ME	BA
Courts	ME	AL	EE	TR	EE	HR	ME	HR	ME	SI
Customs & Trade	SI	AL	SK	AL	EE	RO	SK	HR	SI	BA
Business Inspections	.	.	.	.	HU	PL	ME	LT	.	.
Licensing & Permits	SI	RO	SK	TR	EE	RO	ME	PL	ME	BA
Tax Administration	SI	PL	EE	CZ	EE	RO	SK	HR	BG	HR
Transport	SI	AL	SI	TR	HU	CZ	BA	CZ	BG	BA

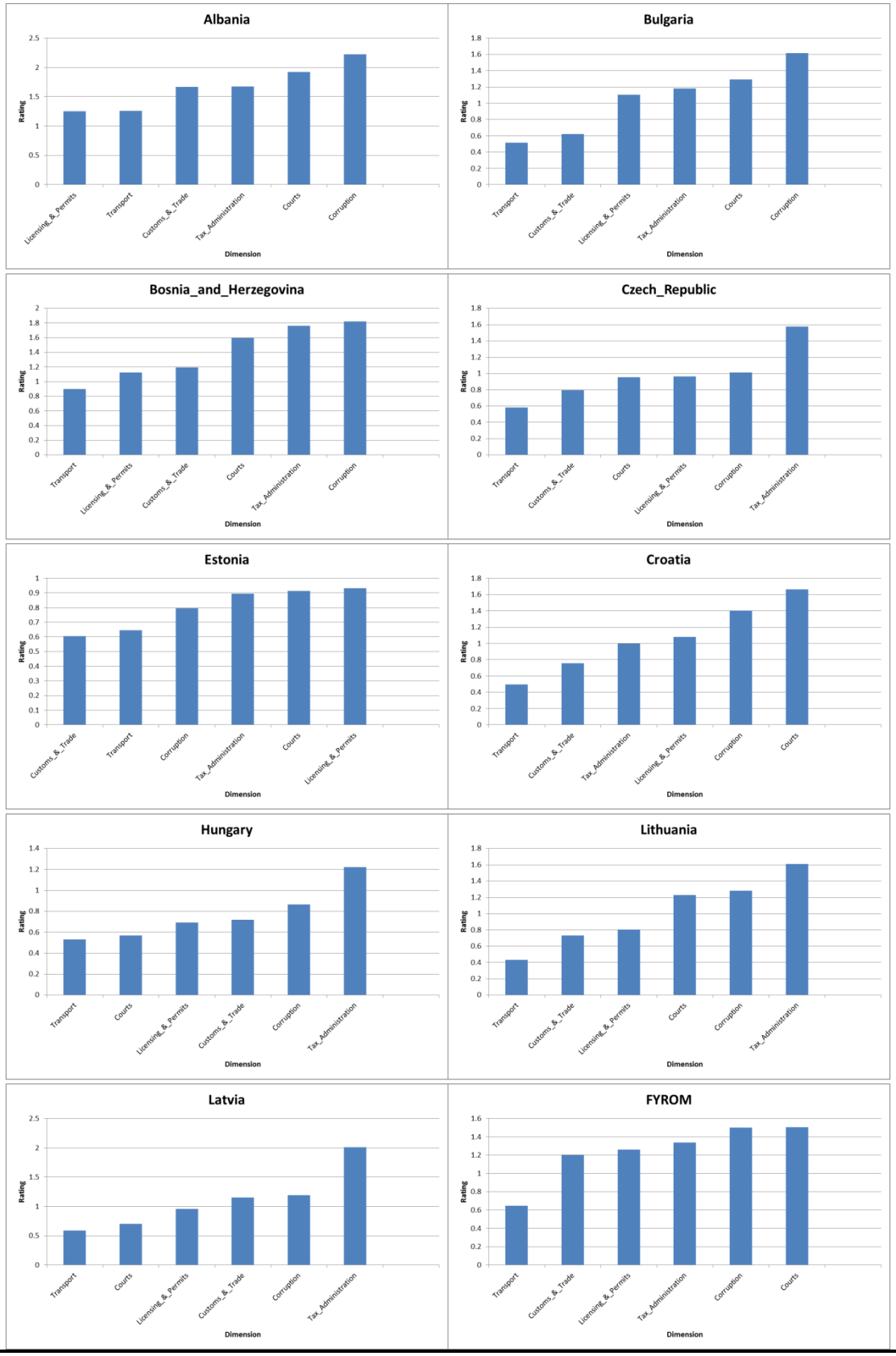
Note: To improve readability, results for 2007 are omitted. '.' indicate missing data for respective dimensions of public administration. In case of 2009, HU and FYROM are excluded from the ranking due to the very low number of observations.
Source: ZEW calculations

Table 3.48 – Summary of the worst and best performing countries for all covered dimensions of public administration (robustness using firm age and productivity)

	2002		2005		2008		2009		2013	
	lowest	highest	lowest	highest	lowest	highest	lowest	highest	lowest	highest
Corruption	EE	AL	ME	TR	ME	RO	SI	LT	ME	BA
Courts	HU	AL	EE	RS	EE	HR	BA	HR	ME	SI
Customs & Trade	SI	AL	SK	AL	EE	RO	SK	ME	SI	BA
Business Inspections	.	.	.	.	HU	PL	BA	LT	.	.
Licensing & Permits	SI	RO	SK	TR	EE	RO	SK	LT	SI	BA
Tax Administration	SI	PL	EE	CZ	EE	RO	SI	HR	BG	HR
Transport	SI	AL	ME	TR	HU	CZ	BA	CZ	SI	BA

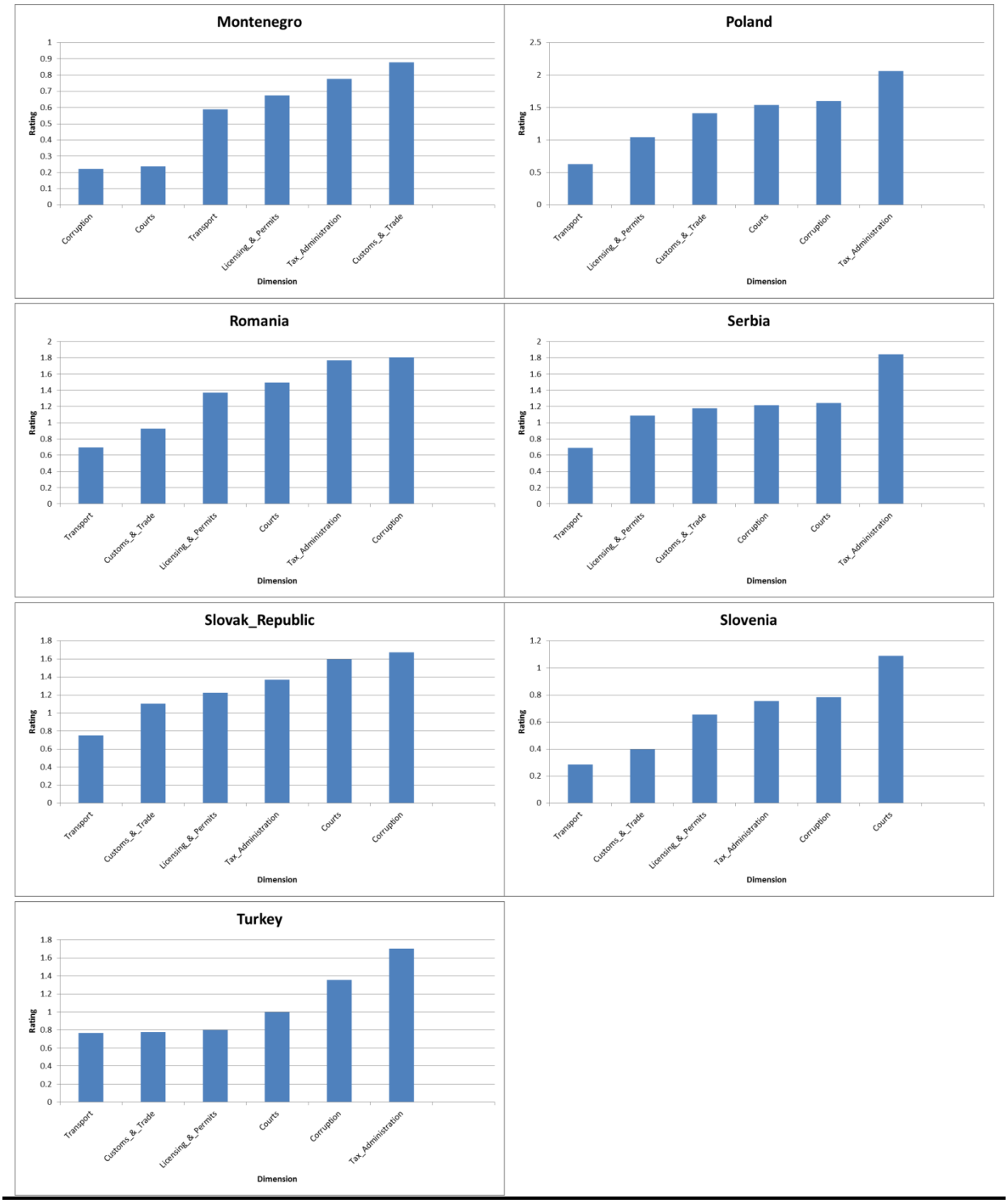
Note: To improve readability, results for 2007 are omitted. '.' indicate missing data for respective dimensions of public administration. In case of 2009, HU and FYROM are excluded from the ranking due to the very low number of observations.
Source: ZEW calculations

Figure 3.32 – Within-country analysis for 2002 part I (baseline specification)



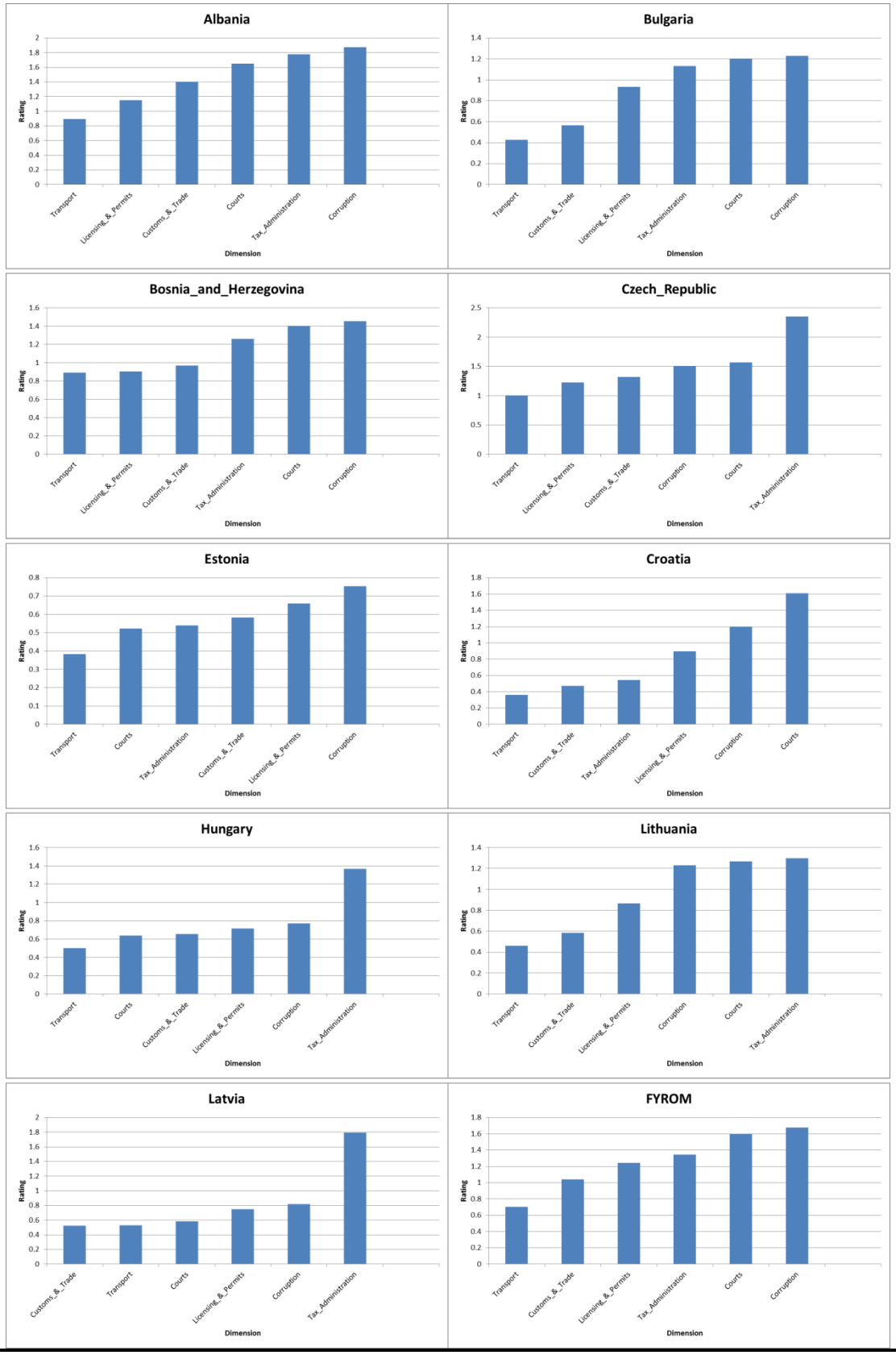
Source: ZEW calculations

Figure 3.33 – Within-country analysis for 2002 part II (baseline specification)



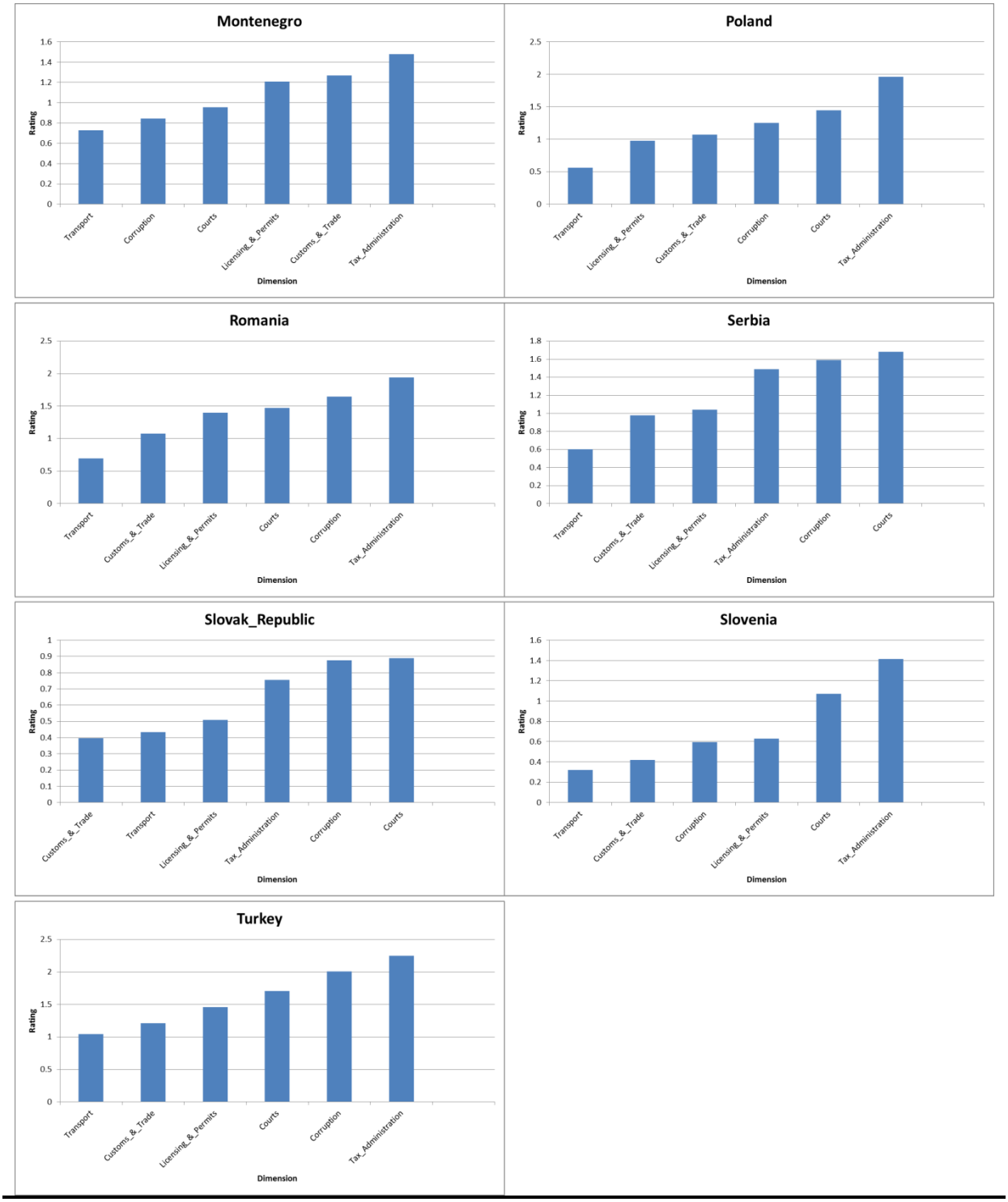
Source: ZEW calculations

Figure 3.34 – Within-country analysis for 2005 part I (baseline specification)



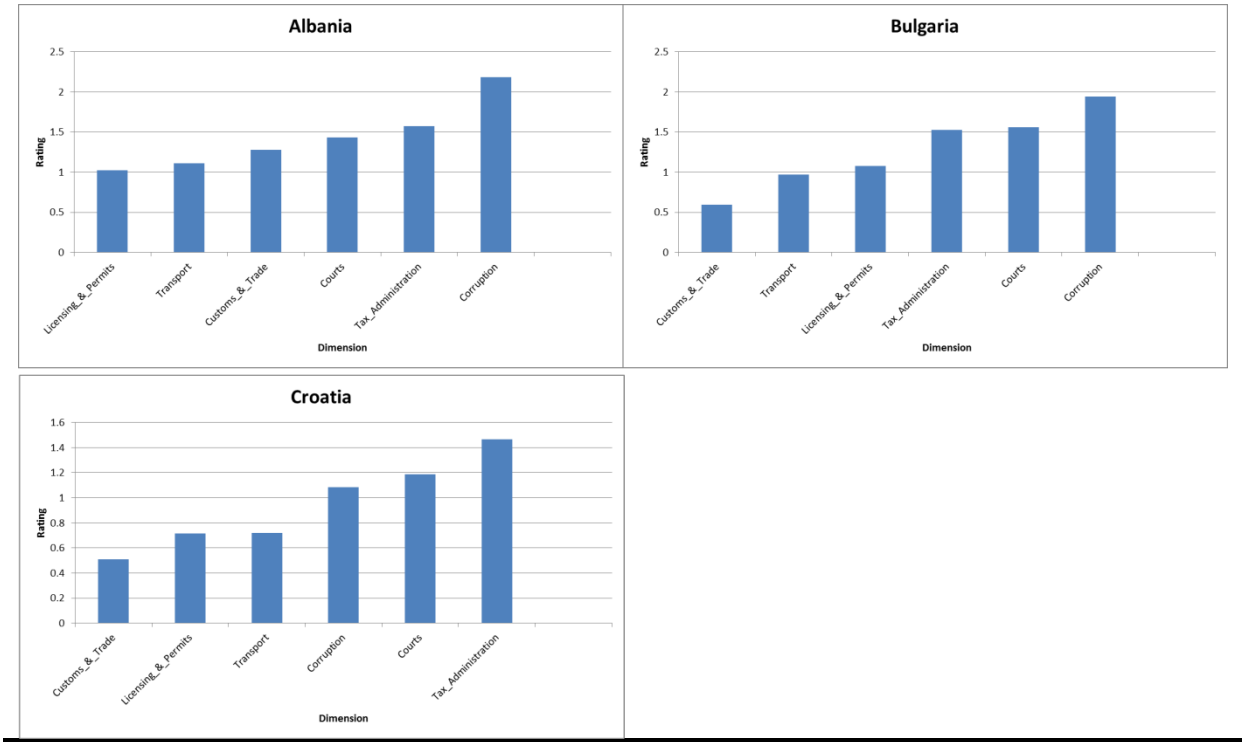
Source: ZEW calculations

Figure 3.35 – Within-country analysis for 2005 part II (baseline specification)



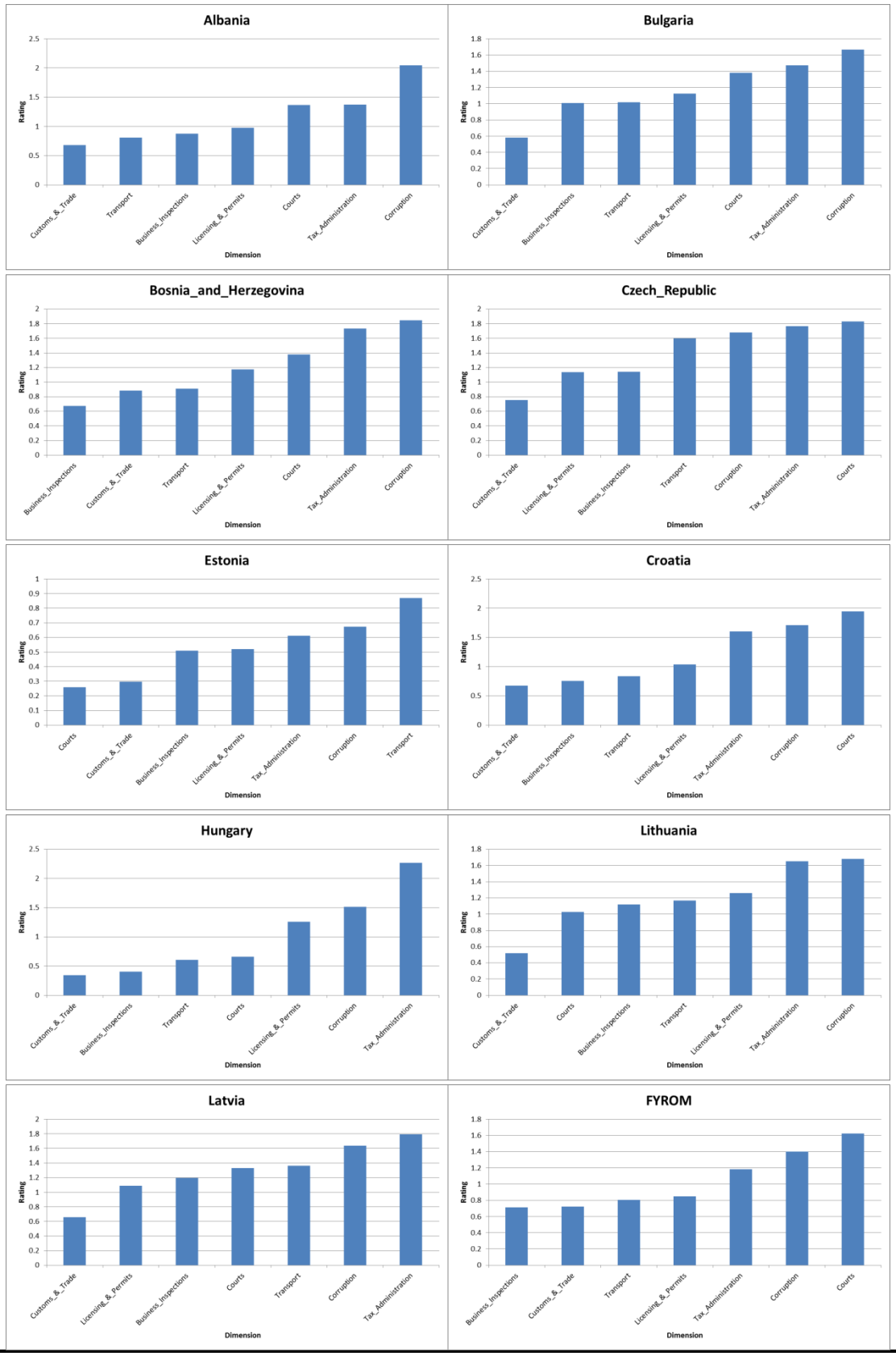
Source: ZEW calculations

Figure 3.36 – Within-country analysis for 2007 (baseline specification)



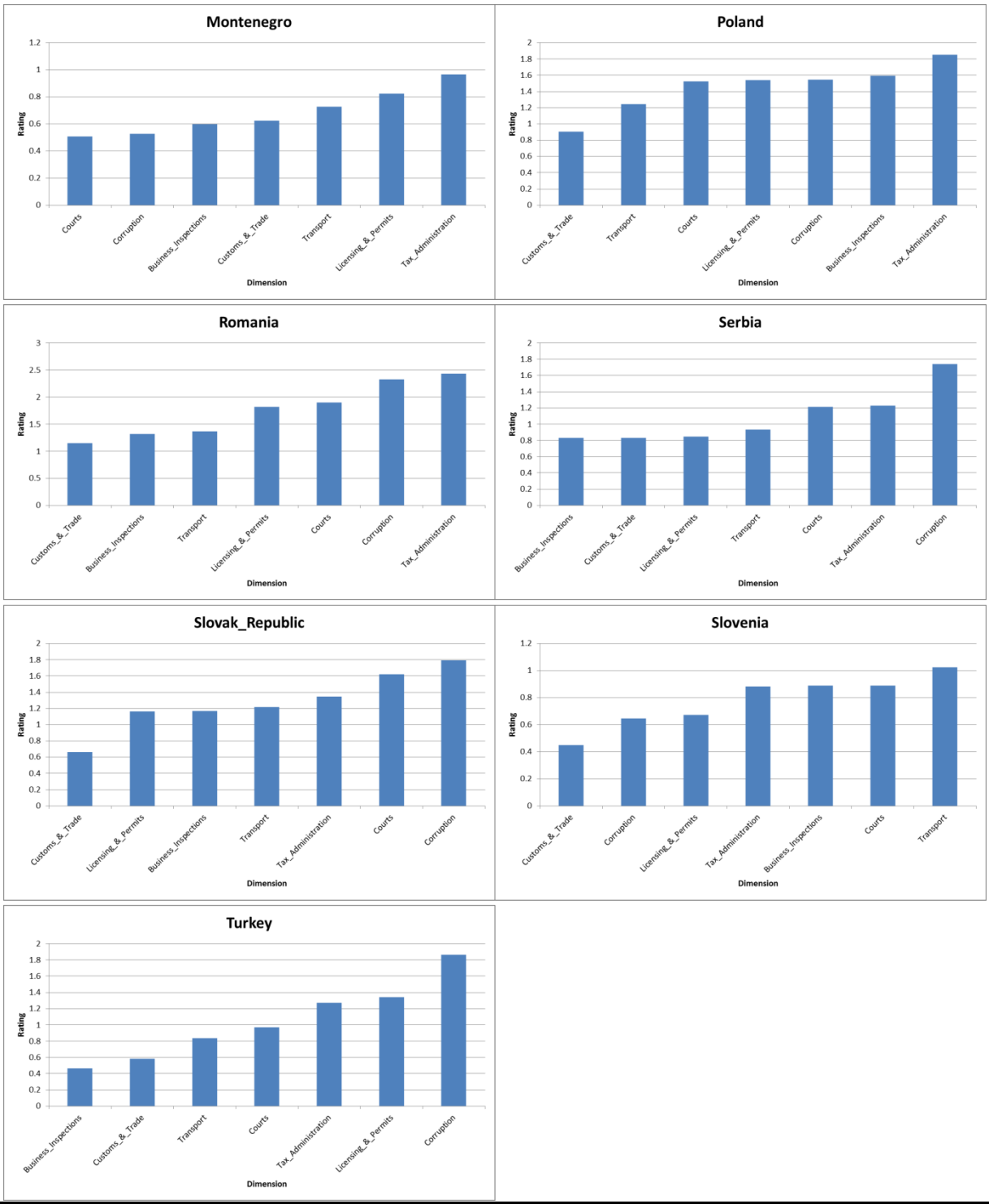
Source: ZEW calculations

Figure 3.37 – Within-country analysis for 2008 part I (baseline specification)



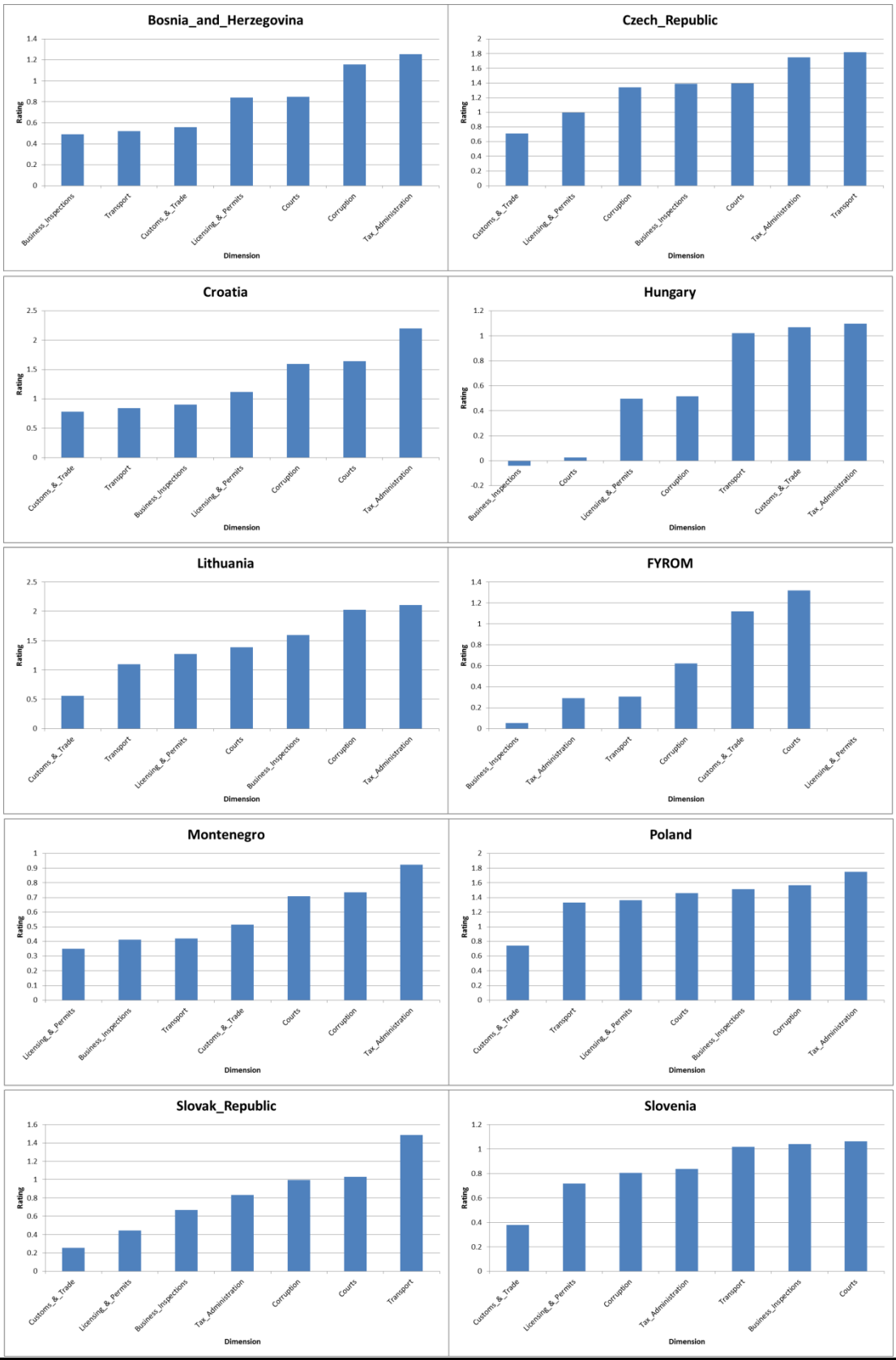
Source: ZEW calculations

Figure 3.38 – Within-country analysis for 2008 part II (baseline specification)



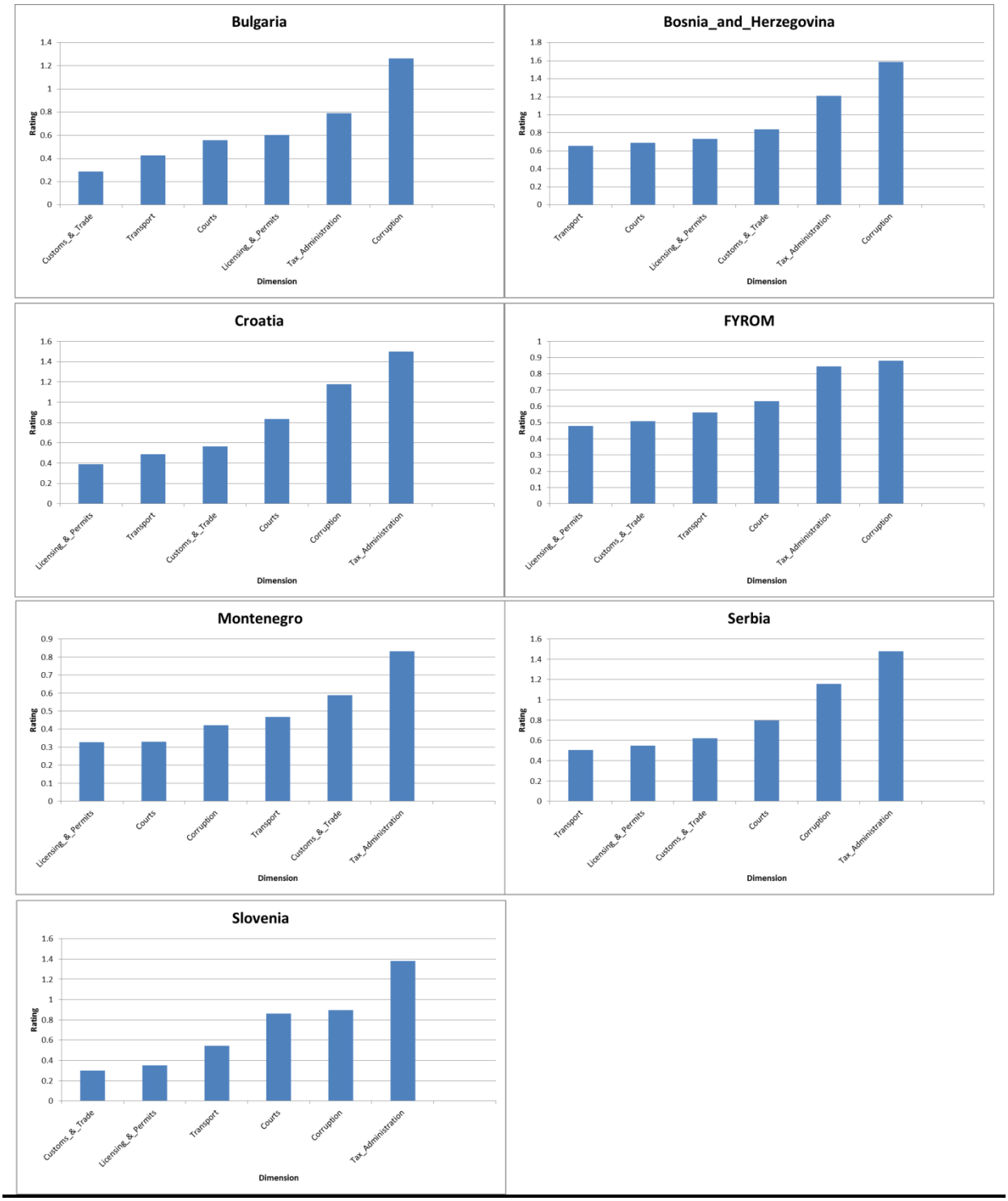
Source: ZEW calculations

Figure 3.39 – Within-country analysis for 2009 (baseline specification)



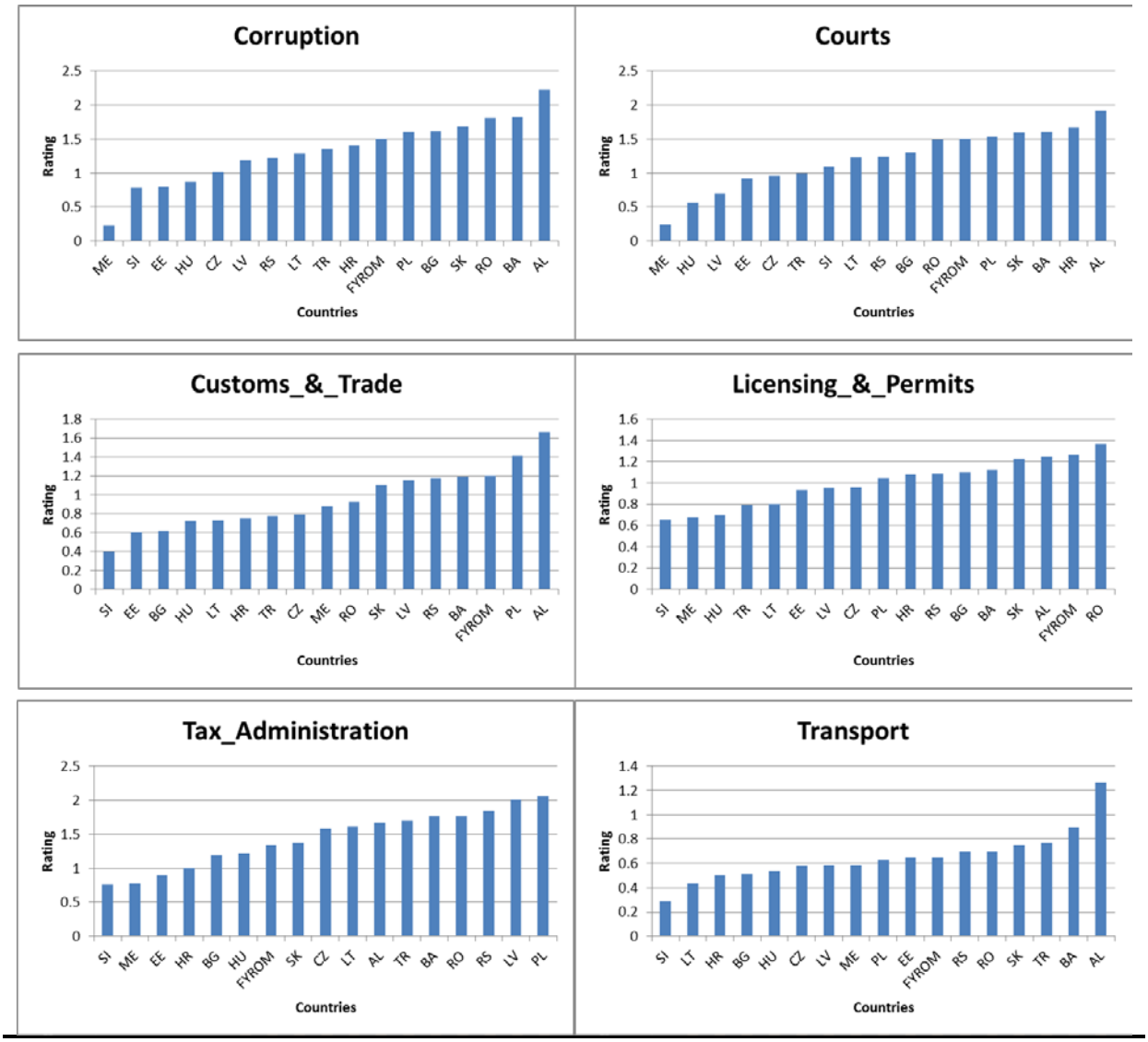
Source: ZEW calculations

Figure 3.40 – Within-country analysis for 2013 (baseline specification)



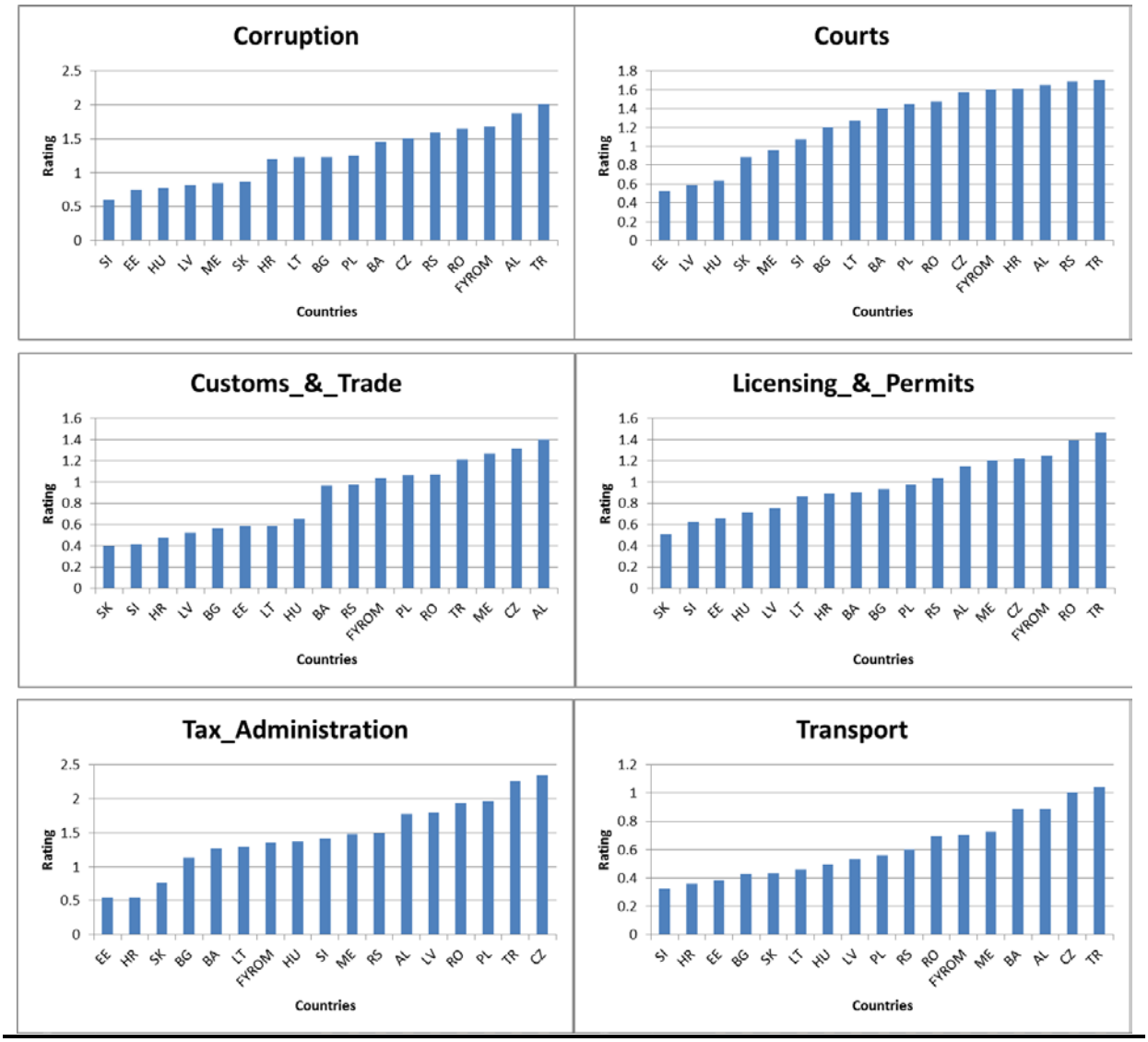
Source: ZEW calculations

Figure 3.41 – Between-country analysis for 2002 (baseline specification)



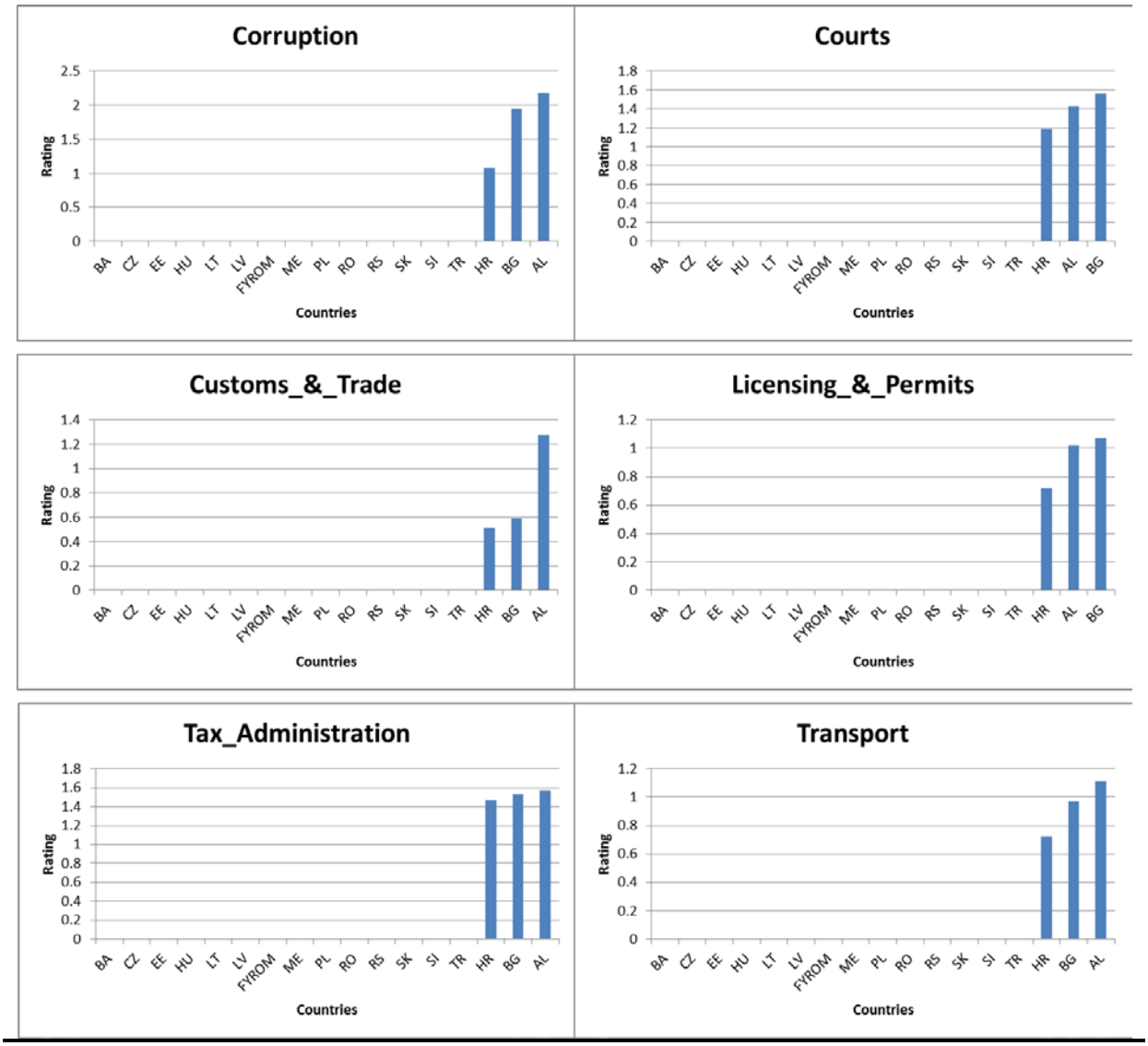
Source: ZEW calculations

Figure 3.42 – Between-country analysis for 2005 (baseline specification)



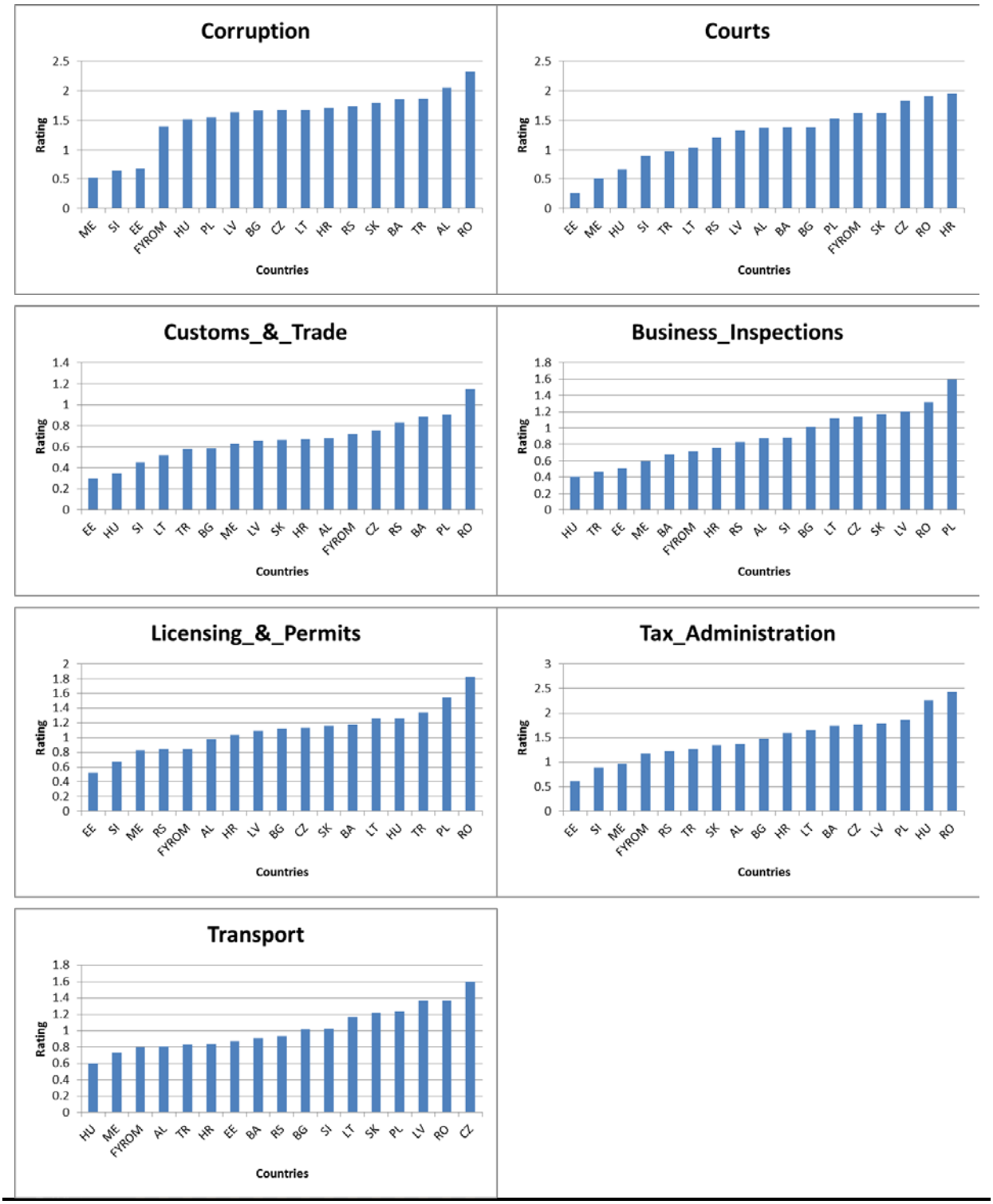
Source: ZEW calculations

Figure 3.43 – Between-country analysis for 2007 (baseline specification)



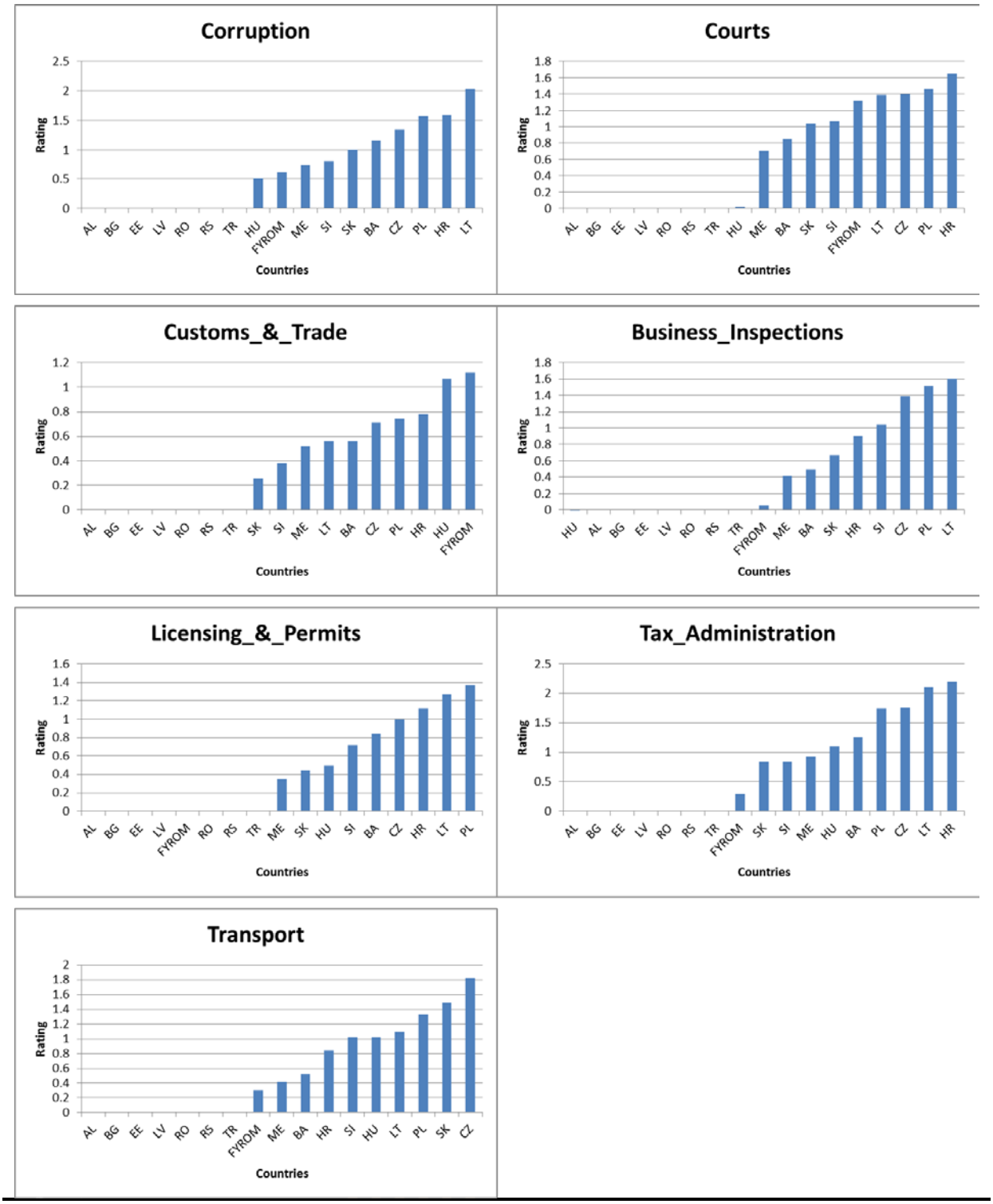
Source: ZEW calculations

Figure 3.44 – Between-country analysis for 2008 (baseline specification)



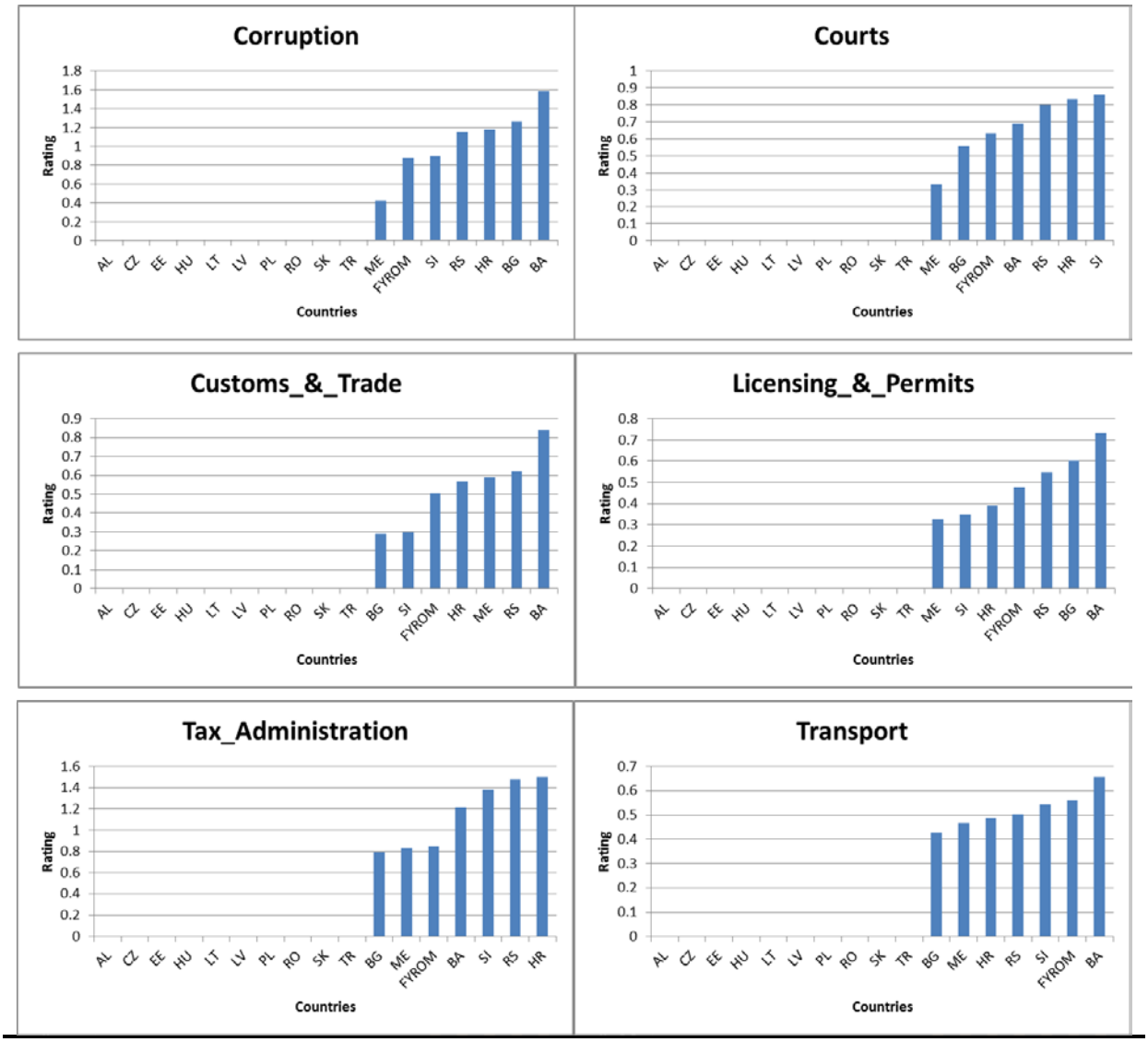
Source: ZEW calculations

Figure 3.45 – Between-country analysis for 2009 (baseline specification)



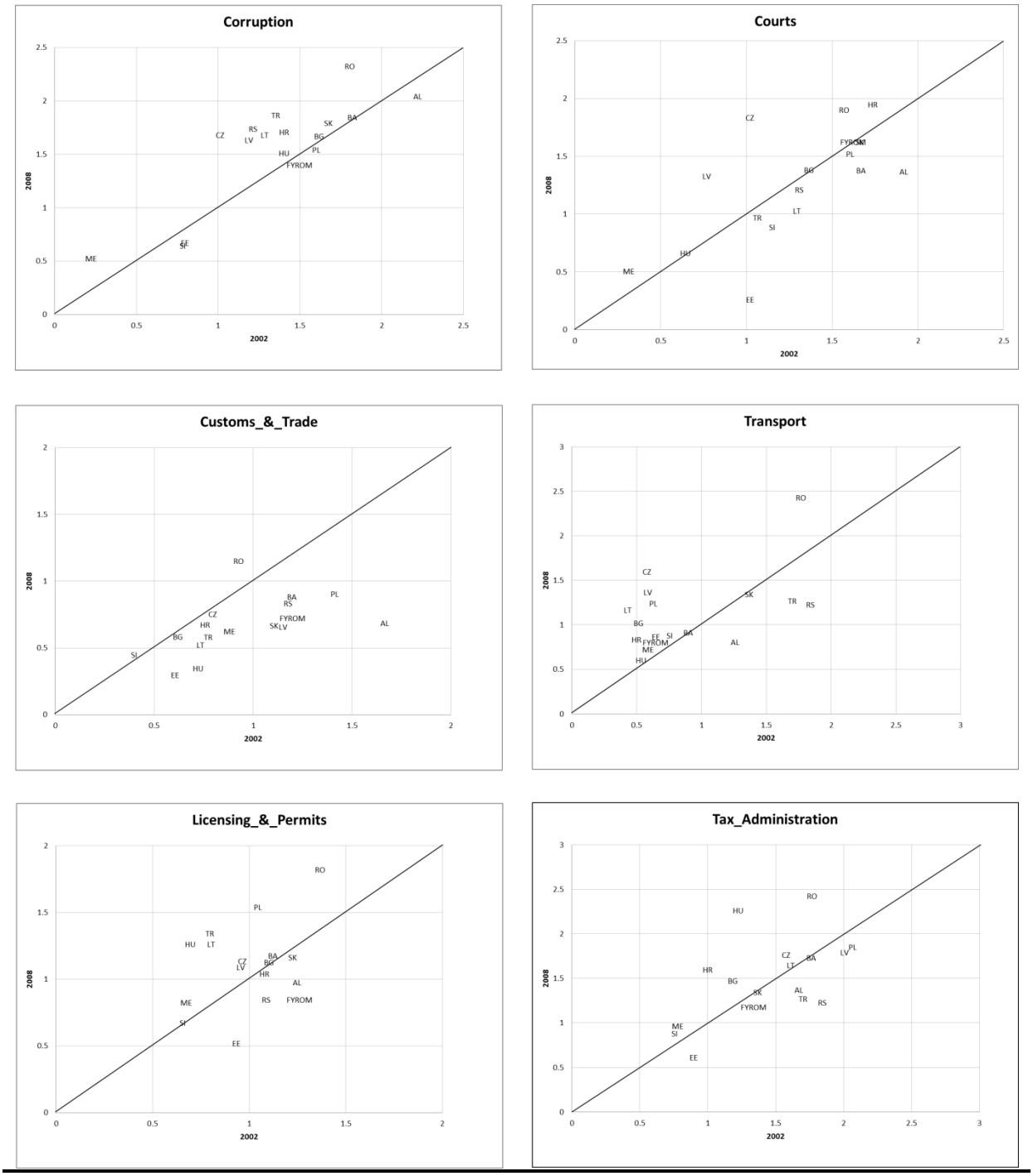
Source: ZEW calculations

Figure 3.46 – Between-country analysis for 2013 (baseline specification)



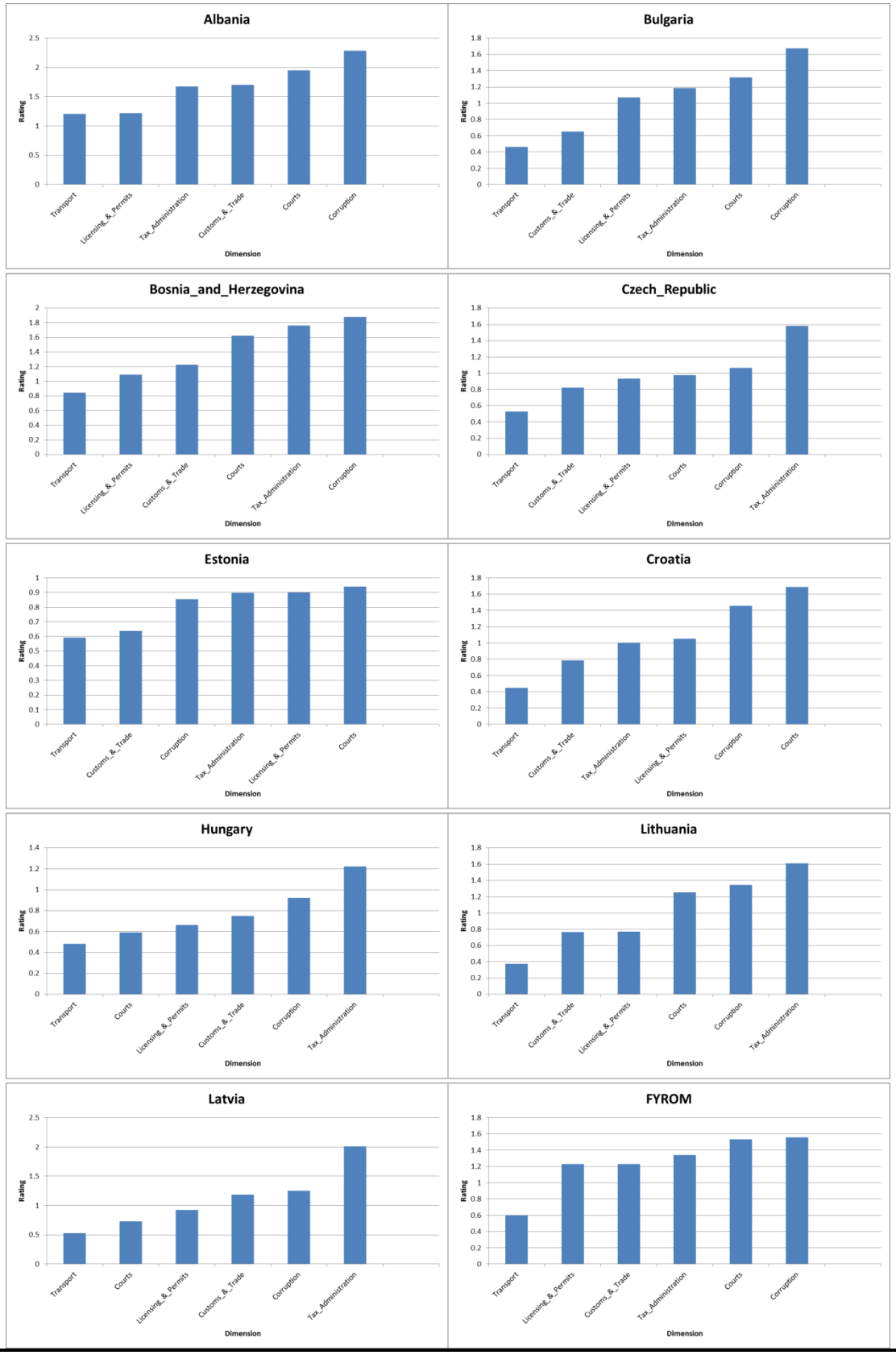
Source: ZEW calculations

Figure 3.47 – Between-country analysis using scatter plots (baseline specification)



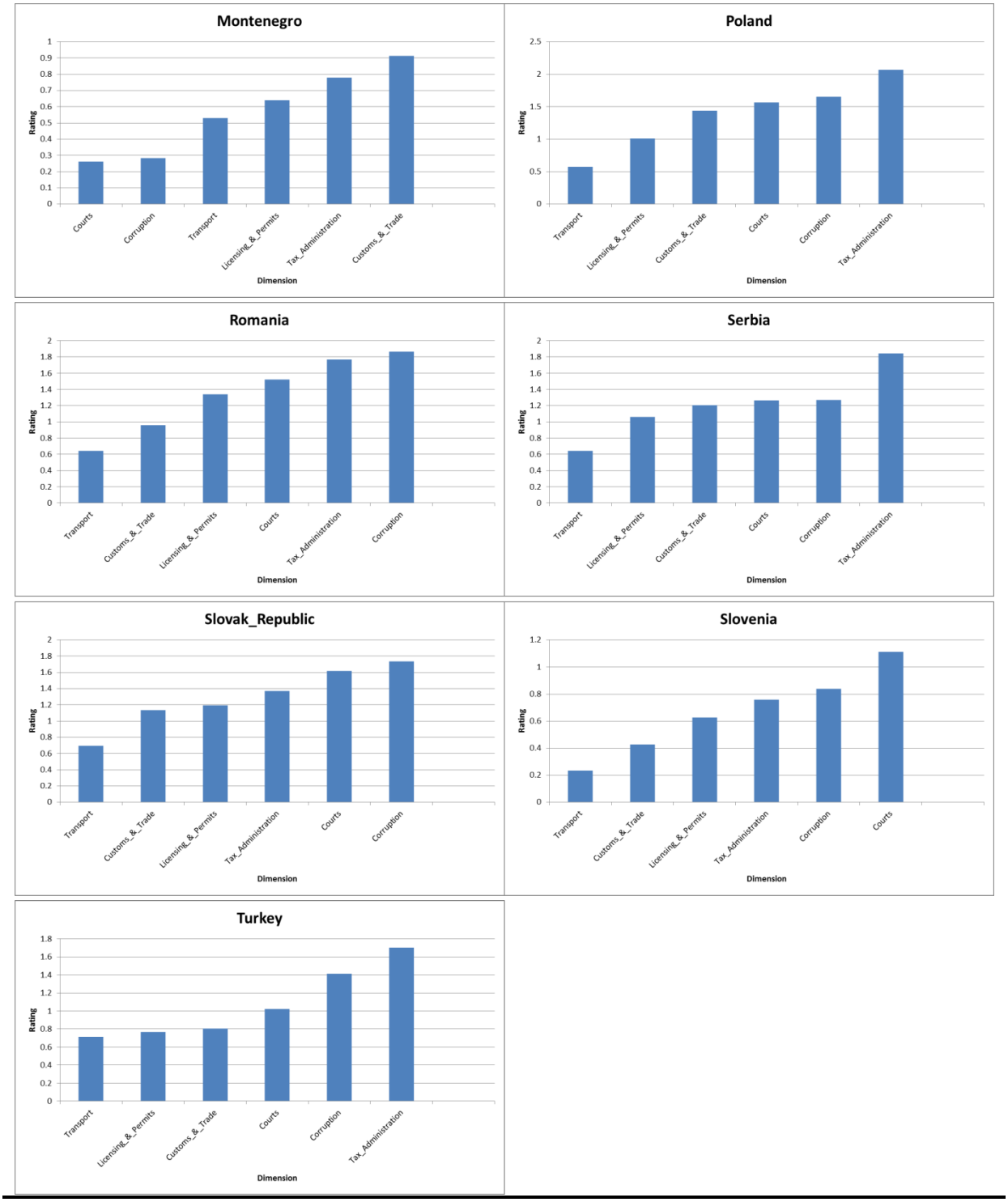
Note: Scores for 2002 and 2008 are compared, as this maximises the country coverage for this particular analysis
Source: ZEW calculations

Figure 3.48 – Within-country analysis for 2002 part I (robustness check including firm age)



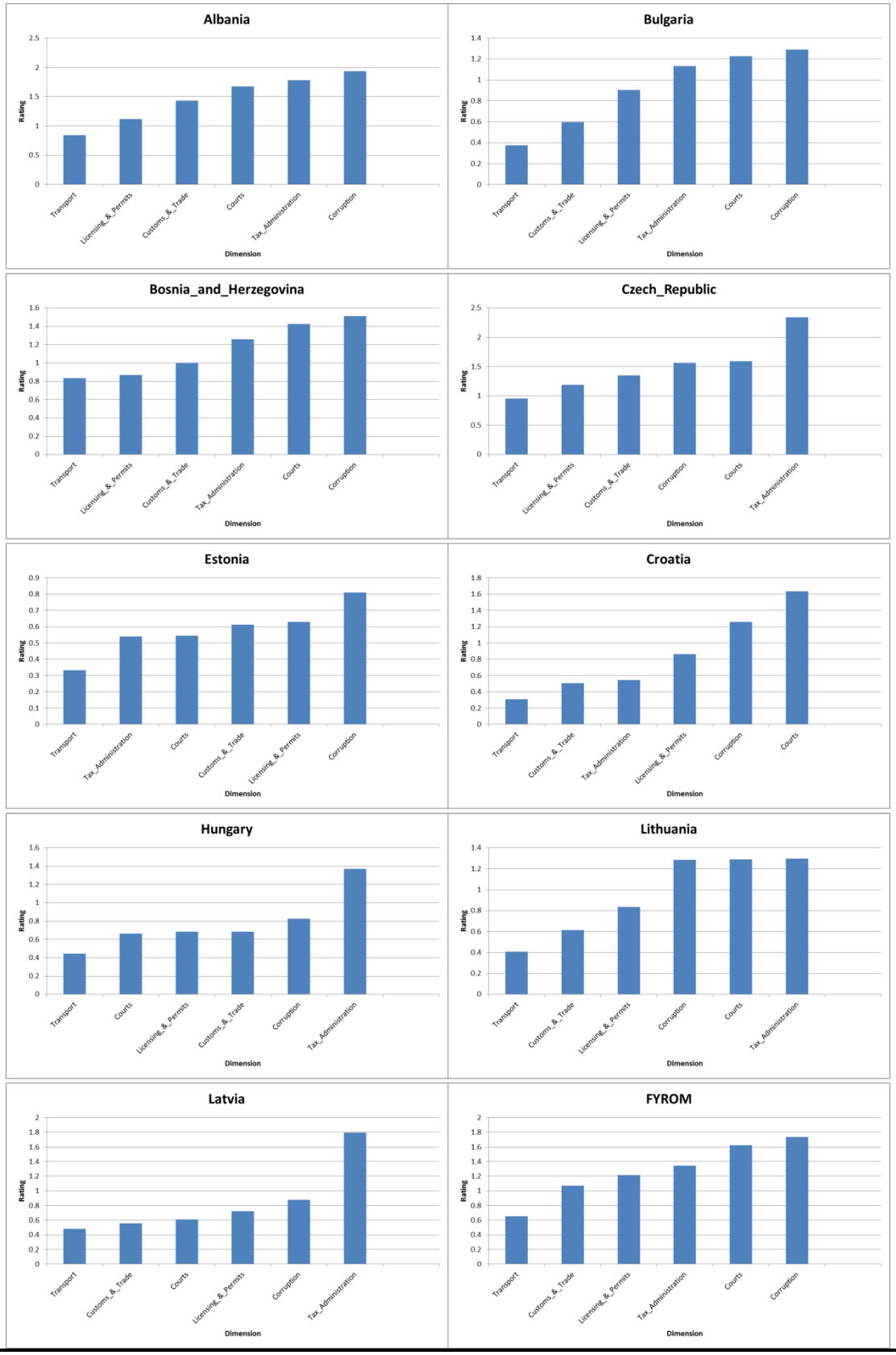
Source: ZEW calculations

Figure 3.49 – Within-country analysis for 2002 part II (robustness check including firm age)



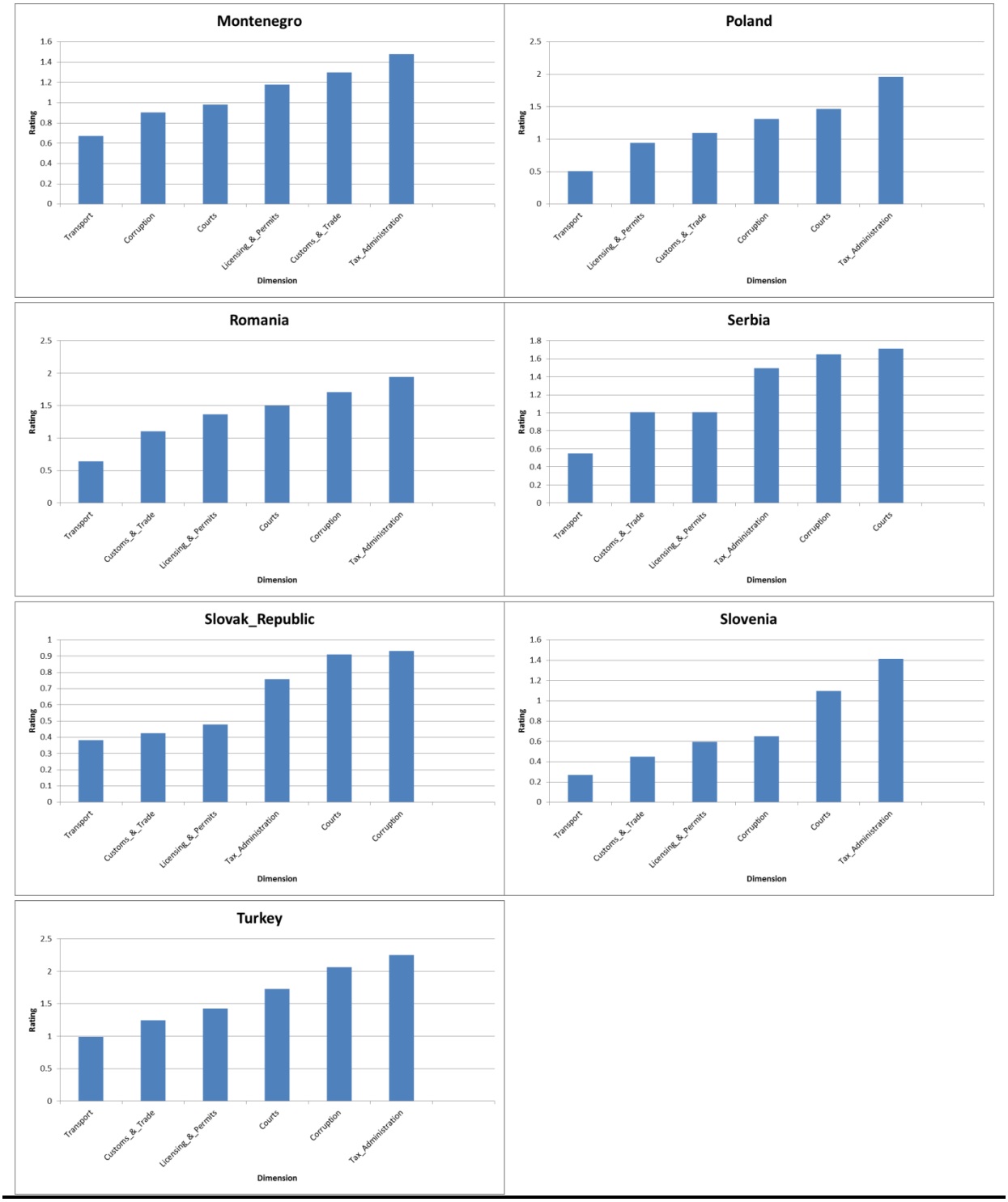
Source: ZEW calculations

Figure 3.50 – Within-country analysis for 2005 part I (robustness check including firm age)



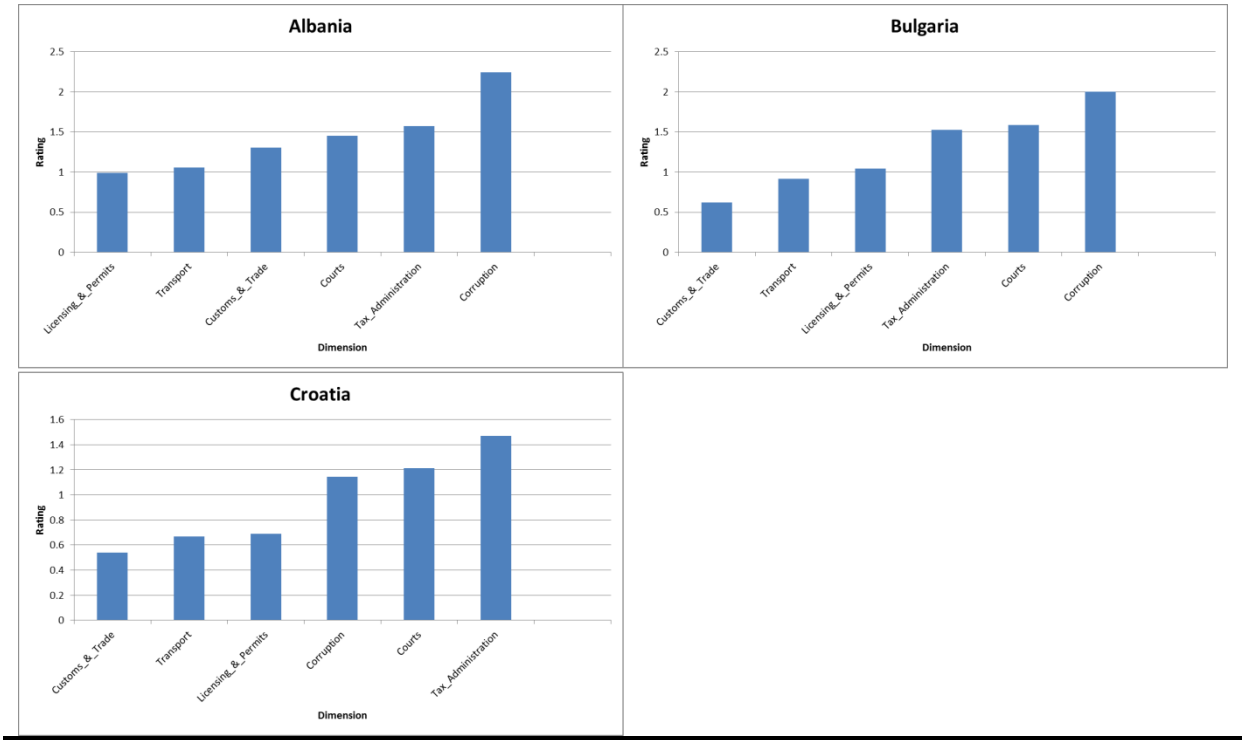
Source: ZEW calculations

Figure 3.51 – Within-country analysis for 2005 part II (robustness check including firm age)



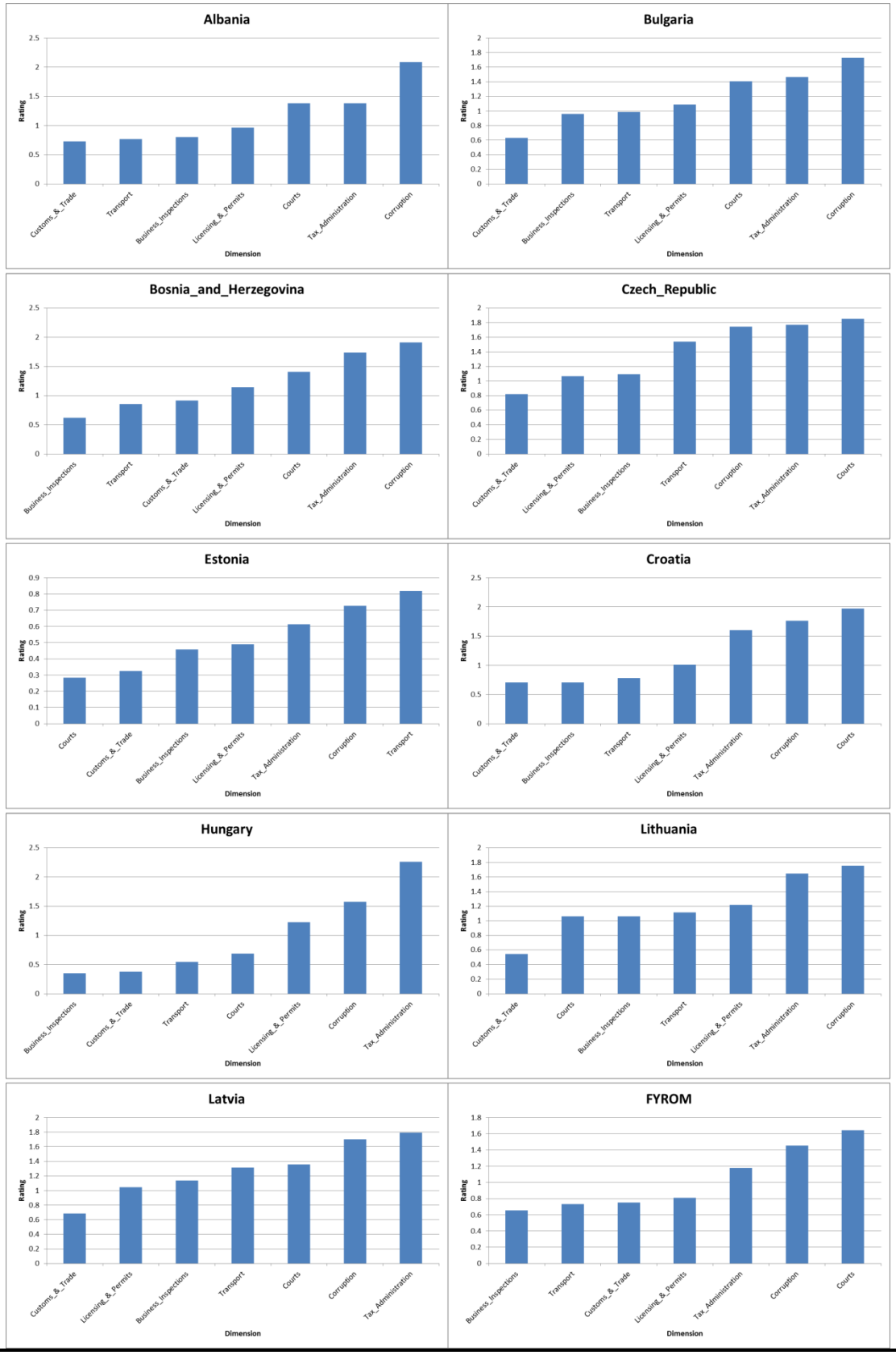
Source: ZEW calculations

Figure 3.52 – Within-country analysis for 2007 (robustness check including firm age)



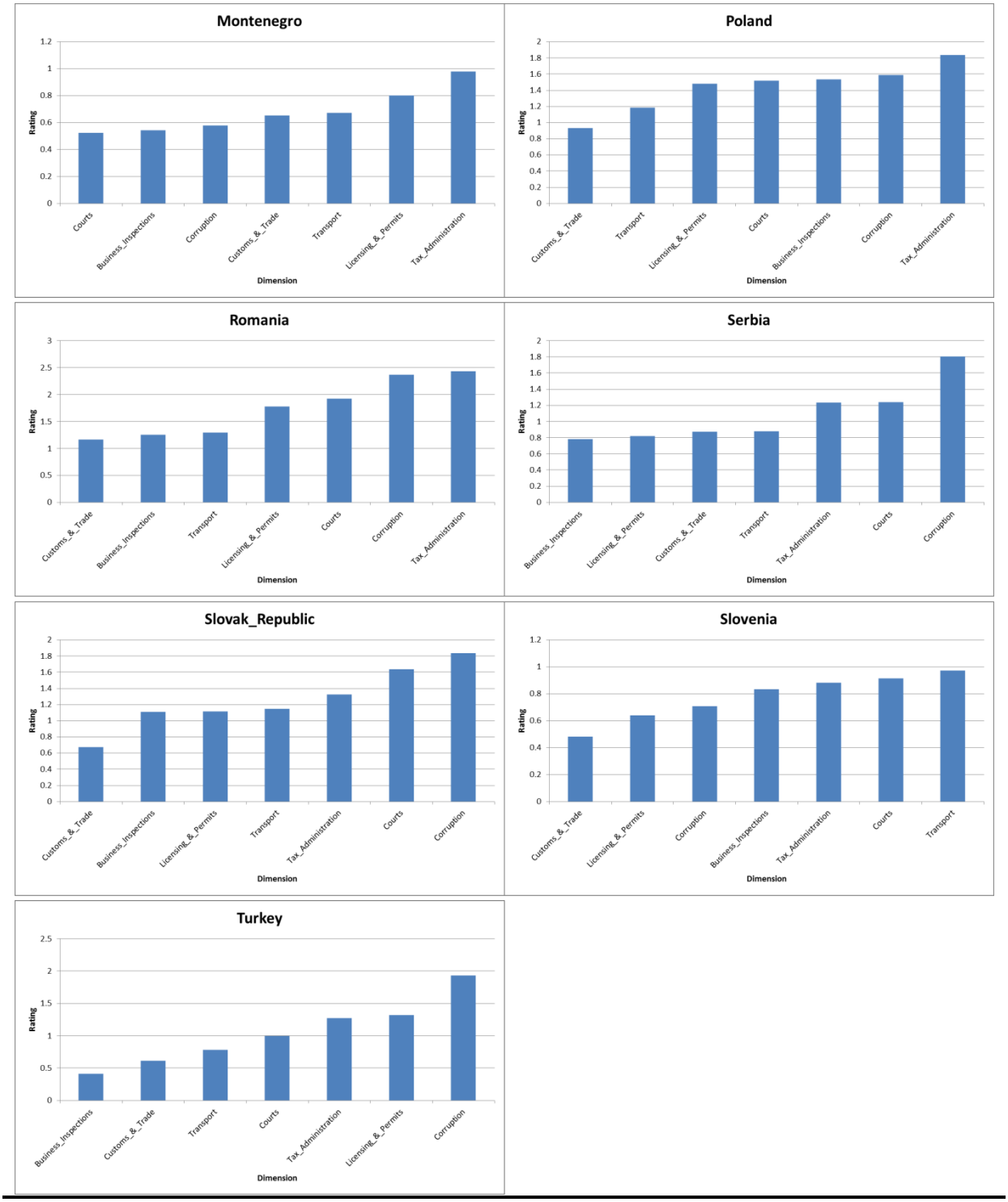
Source: ZEW calculations

Figure 3.53 – Within-country analysis for 2008 part I (robustness check including firm age)



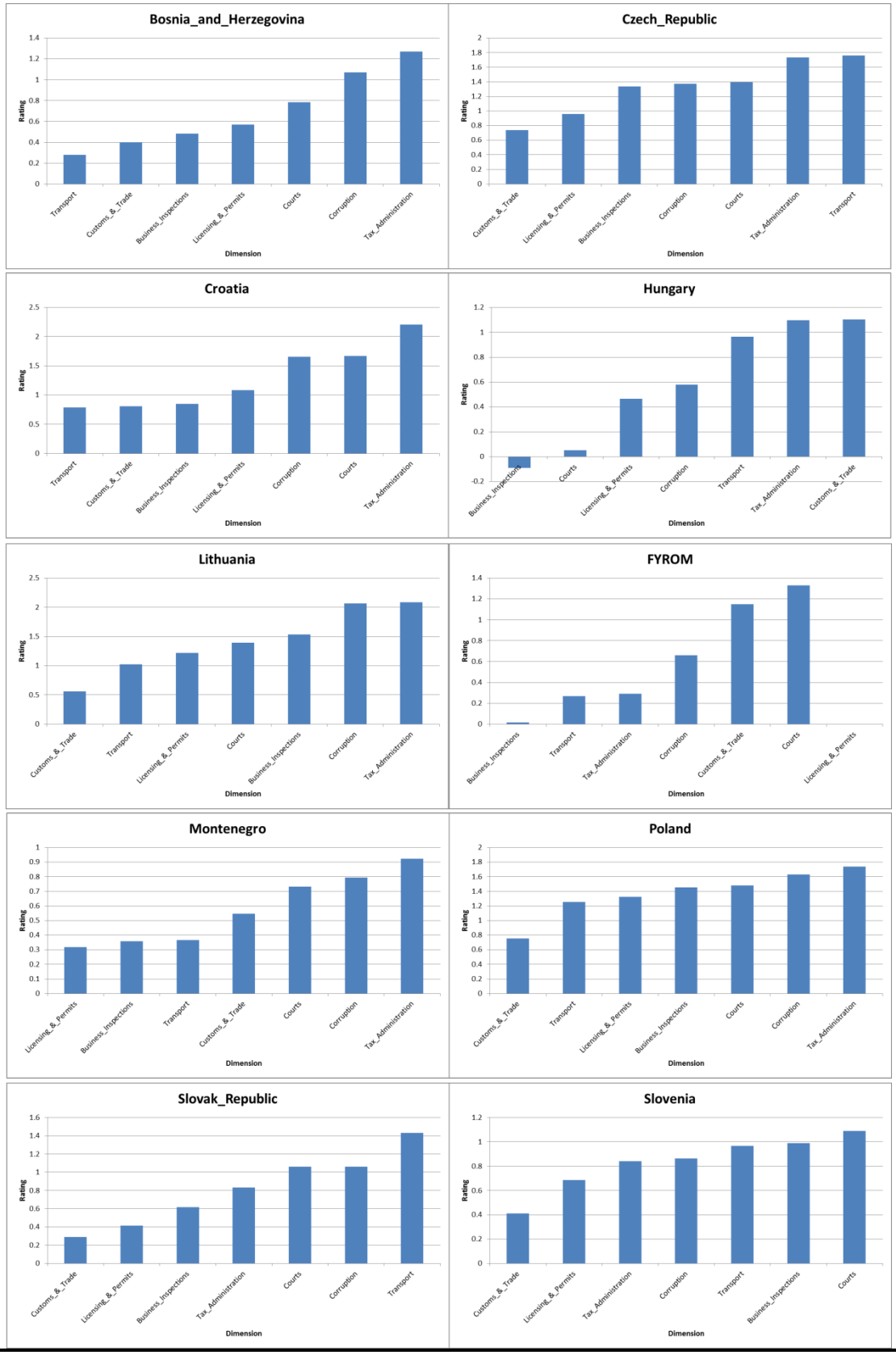
Source: ZEW calculations

Figure 3.54 – Within-country analysis for 2008 part II (robustness check including firm age)



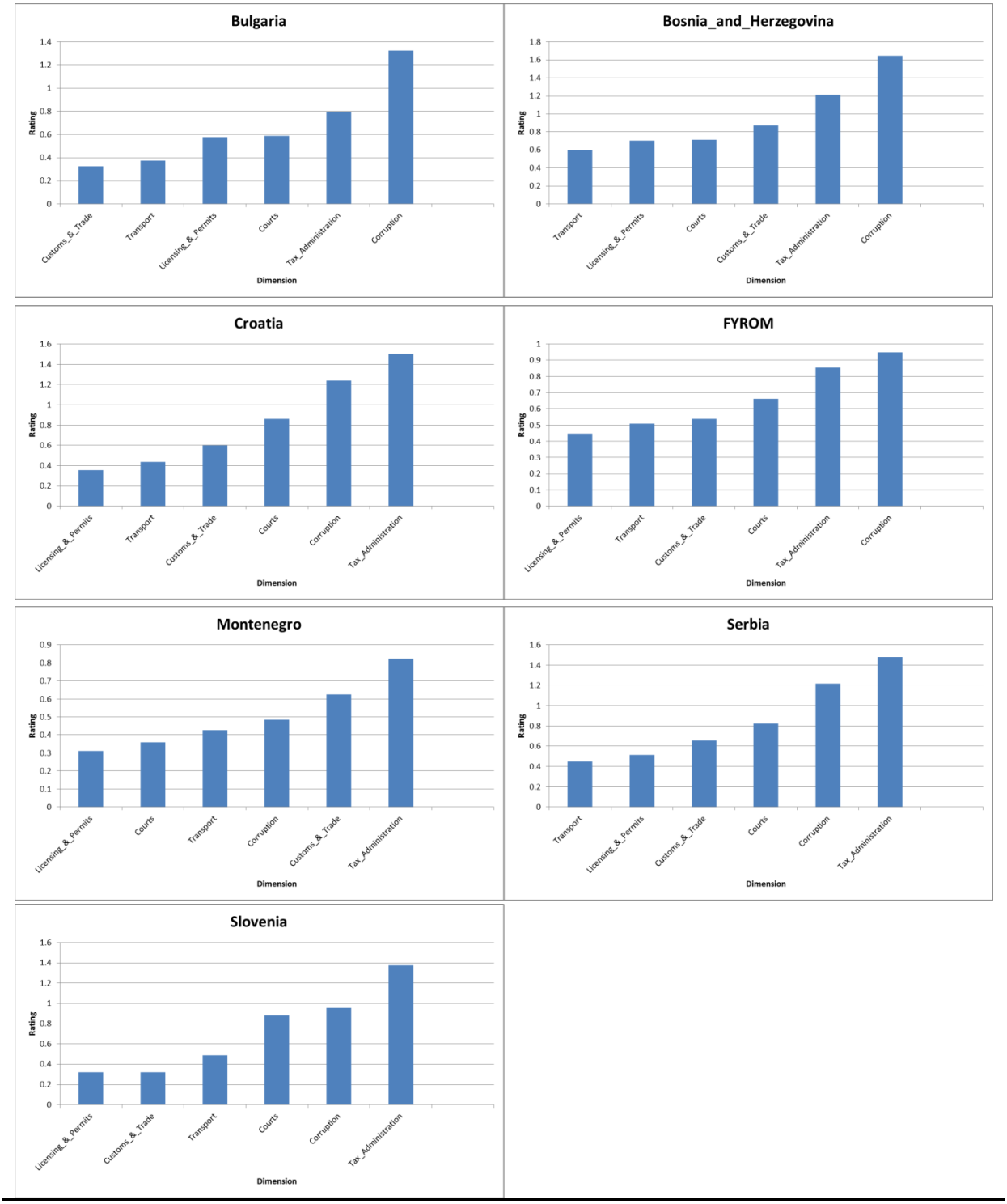
Source: ZEW calculations

Figure 3.55 – Within-country analysis for 2009 (robustness check including firm age)



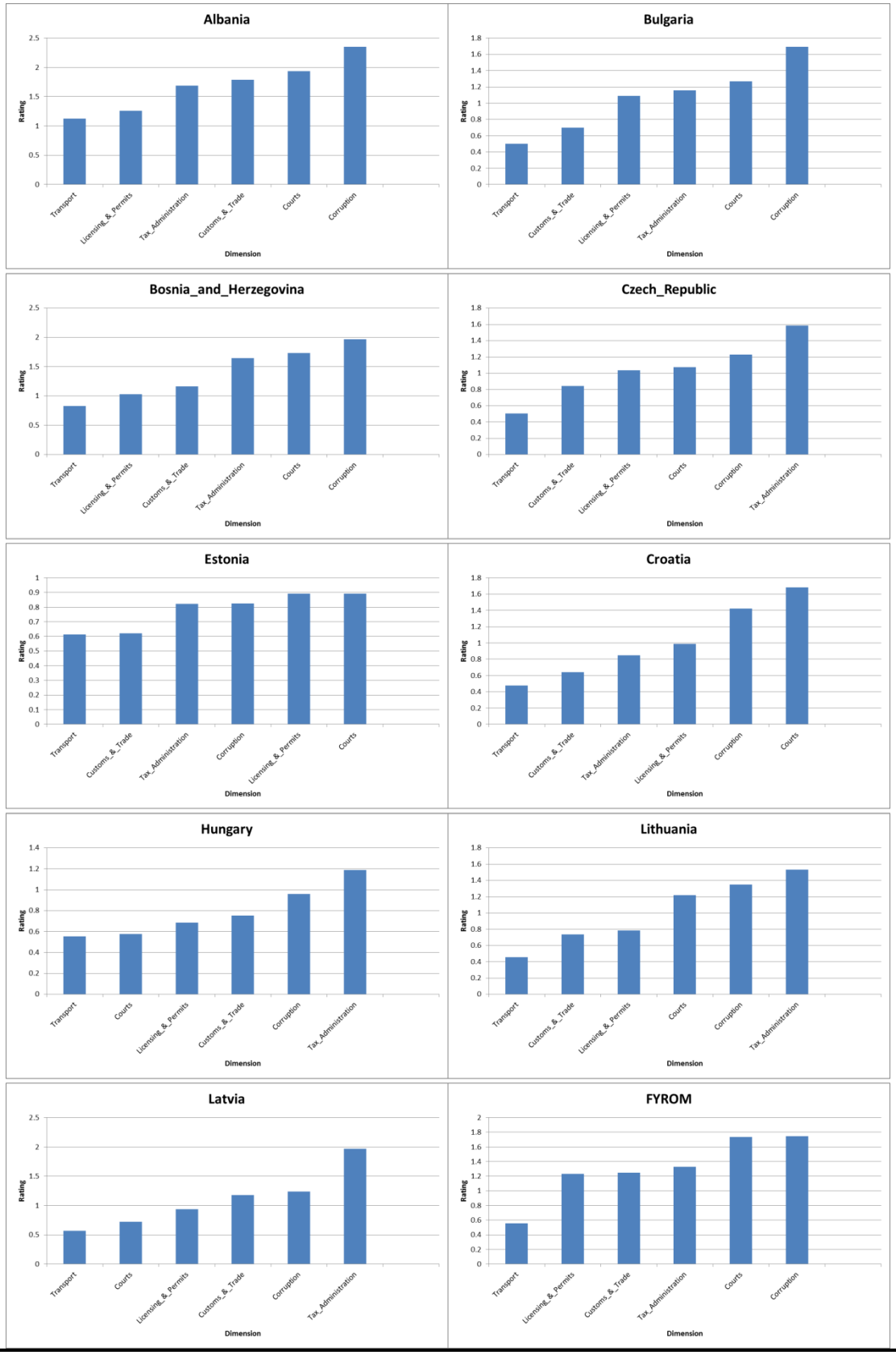
Source: ZEW calculations

Figure 3.56 – Within-country analysis for 2013 (robustness check including firm age)



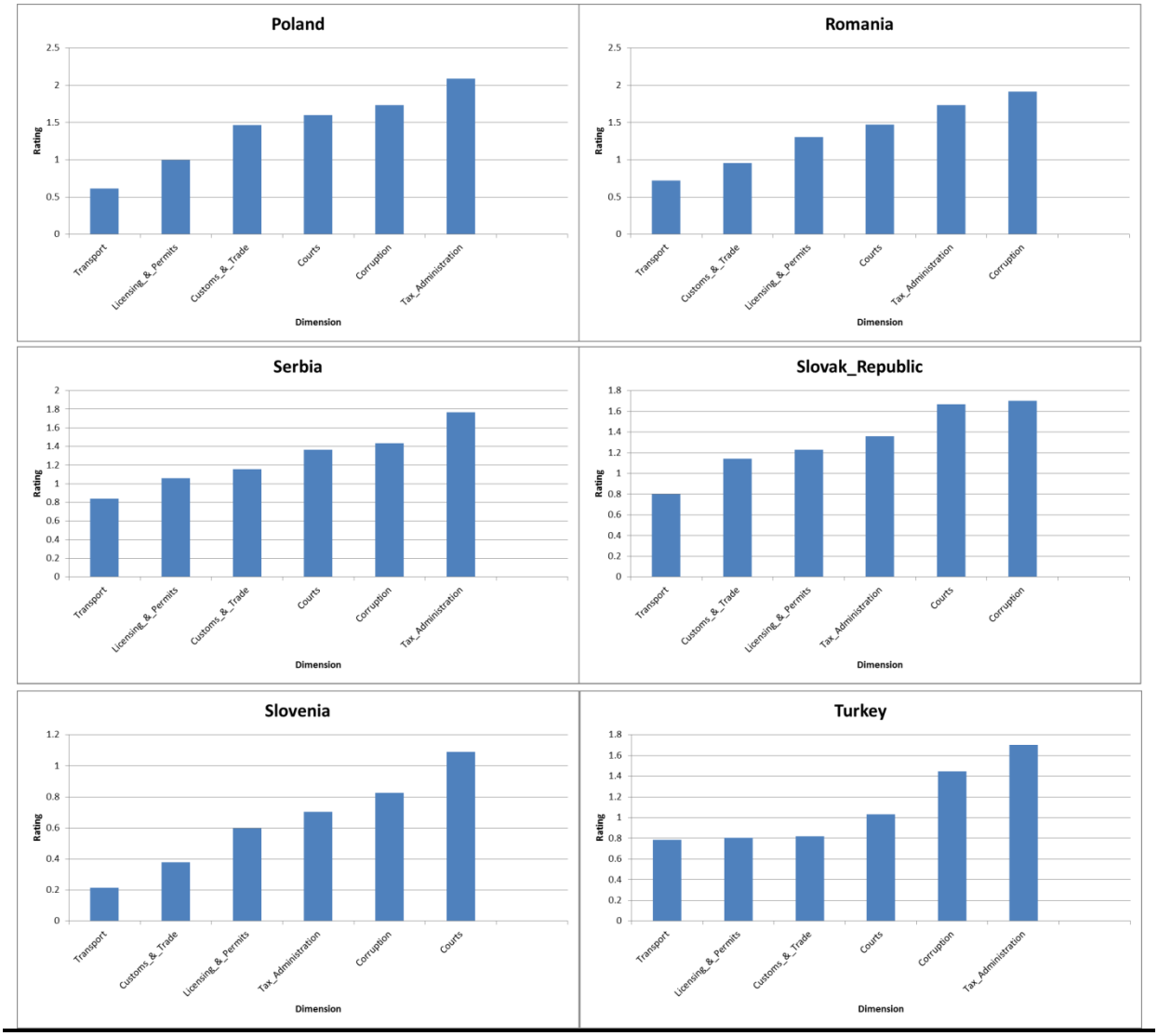
Source: ZEW calculations

Figure 3.57 – Within-country analysis for 2002 part I (robustness check including firm productivity)



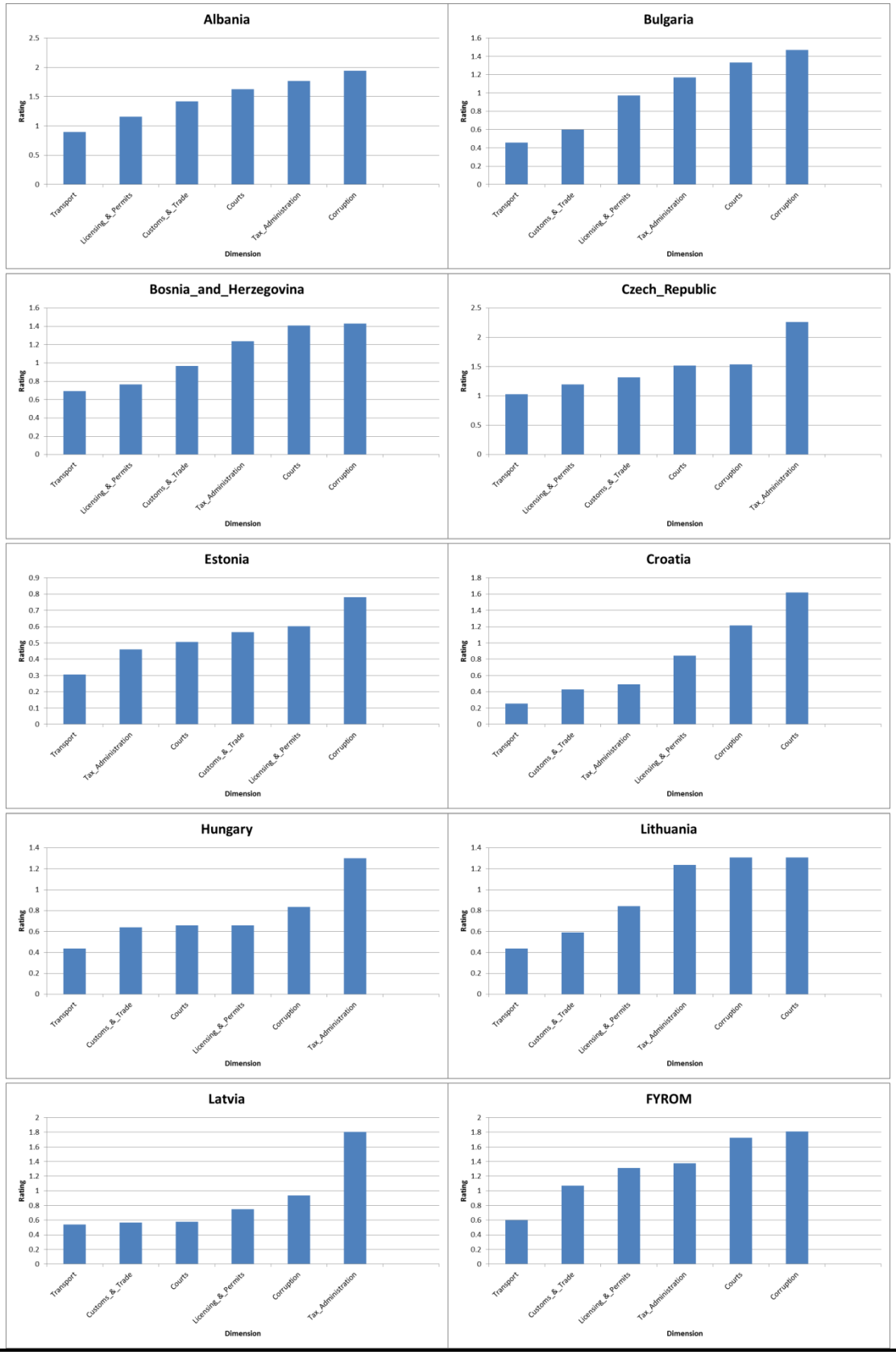
Source: ZEW calculations

Figure 3.58 – Within-country analysis for 2002 part II (robustness check including firm productivity)



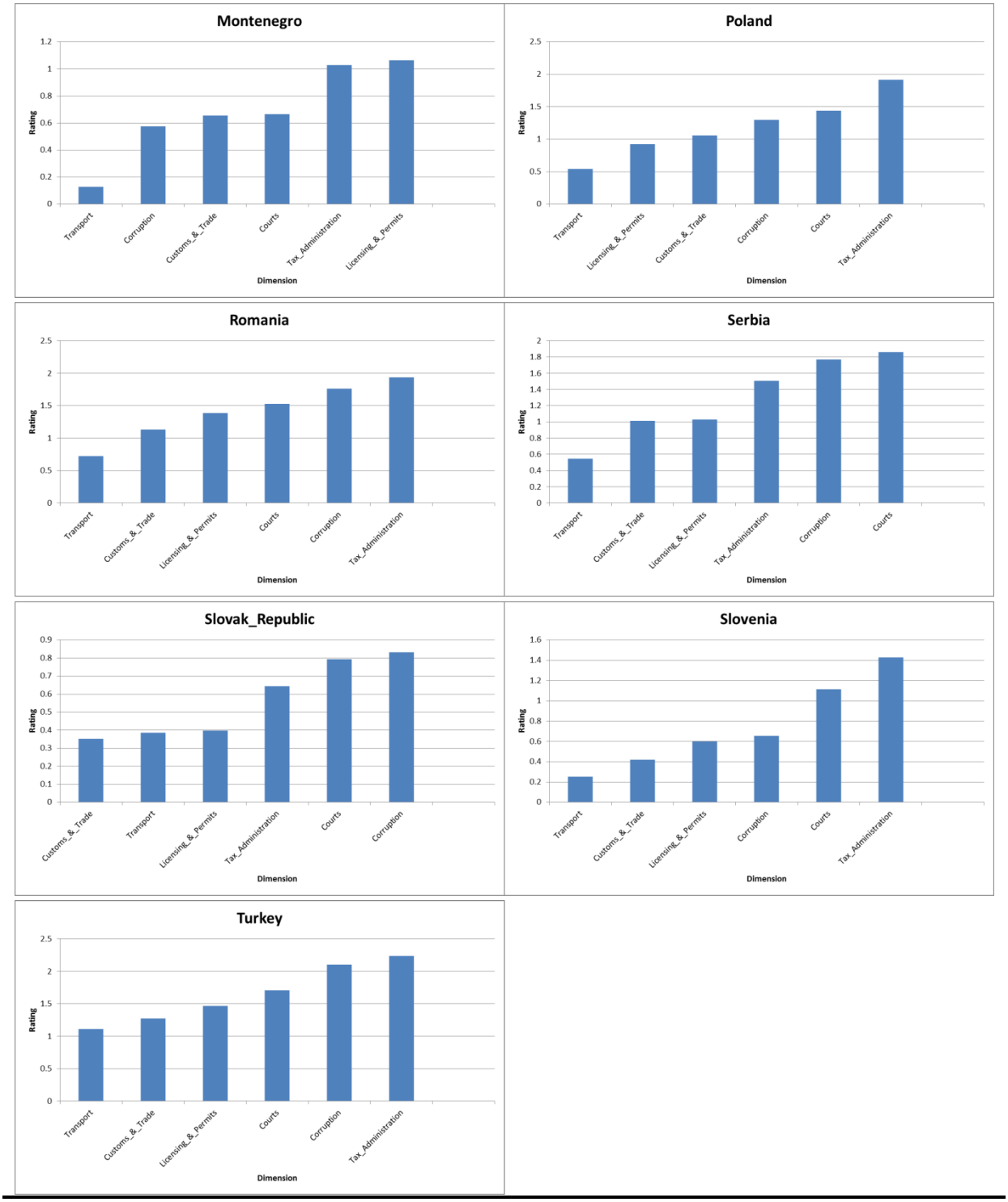
Source: ZEW calculations

Figure 3.59 – Within-country analysis for 2005 part I (robustness check including firm productivity)



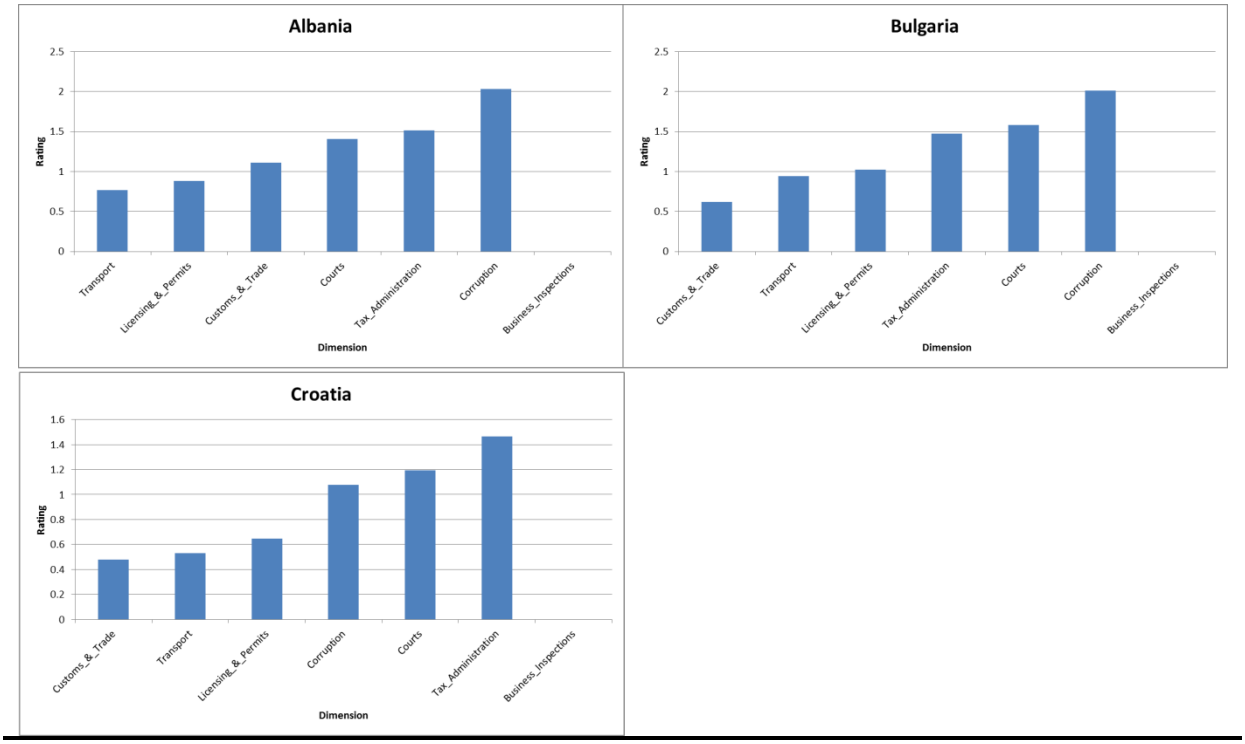
Source: ZEW calculations

Figure 3.60 – Within-country analysis for 2005 part II (robustness check including firm productivity)



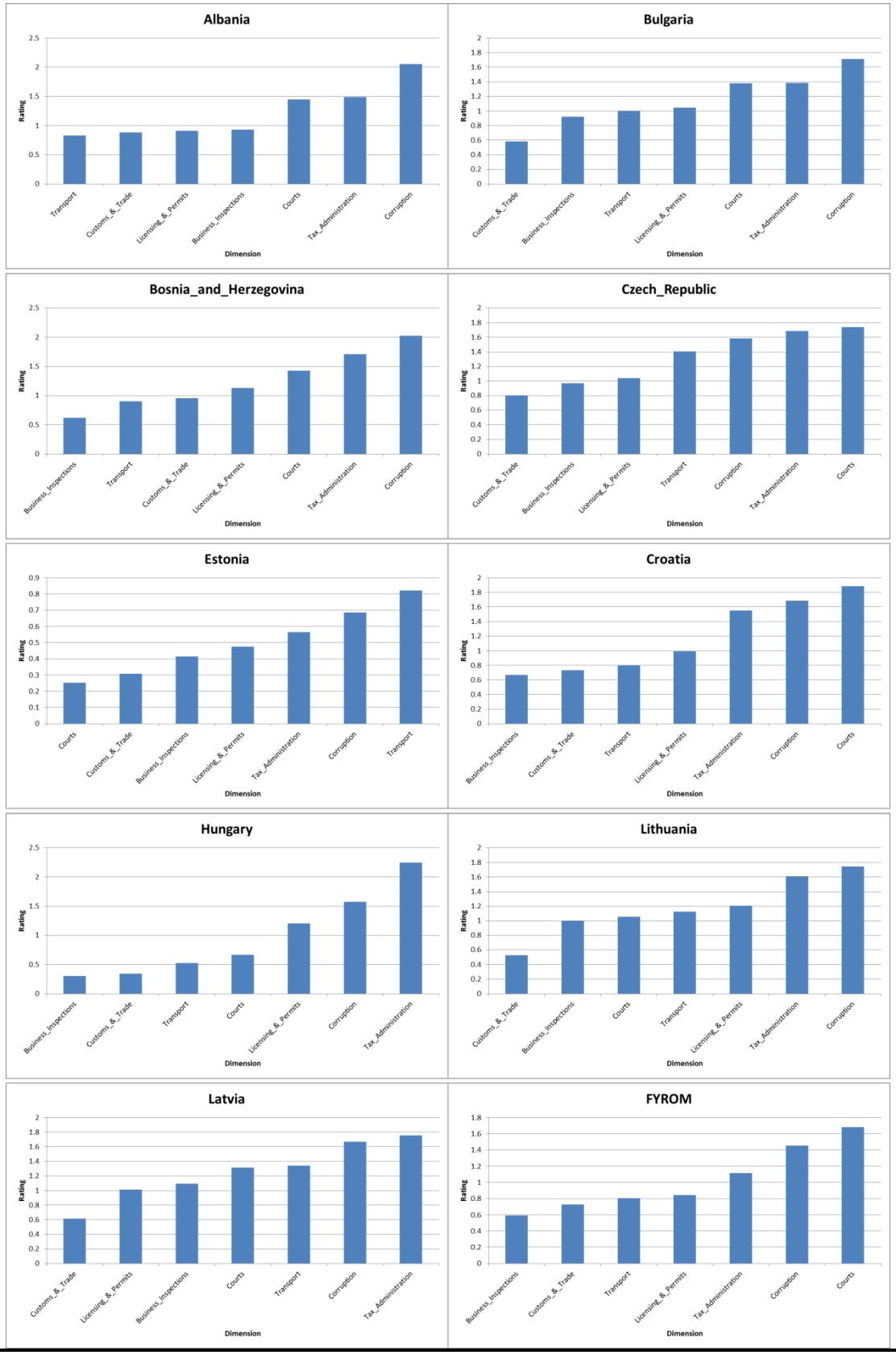
Source: ZEW calculations

Figure 3.61 – Within-country analysis for 2007 (robustness check including firm productivity)



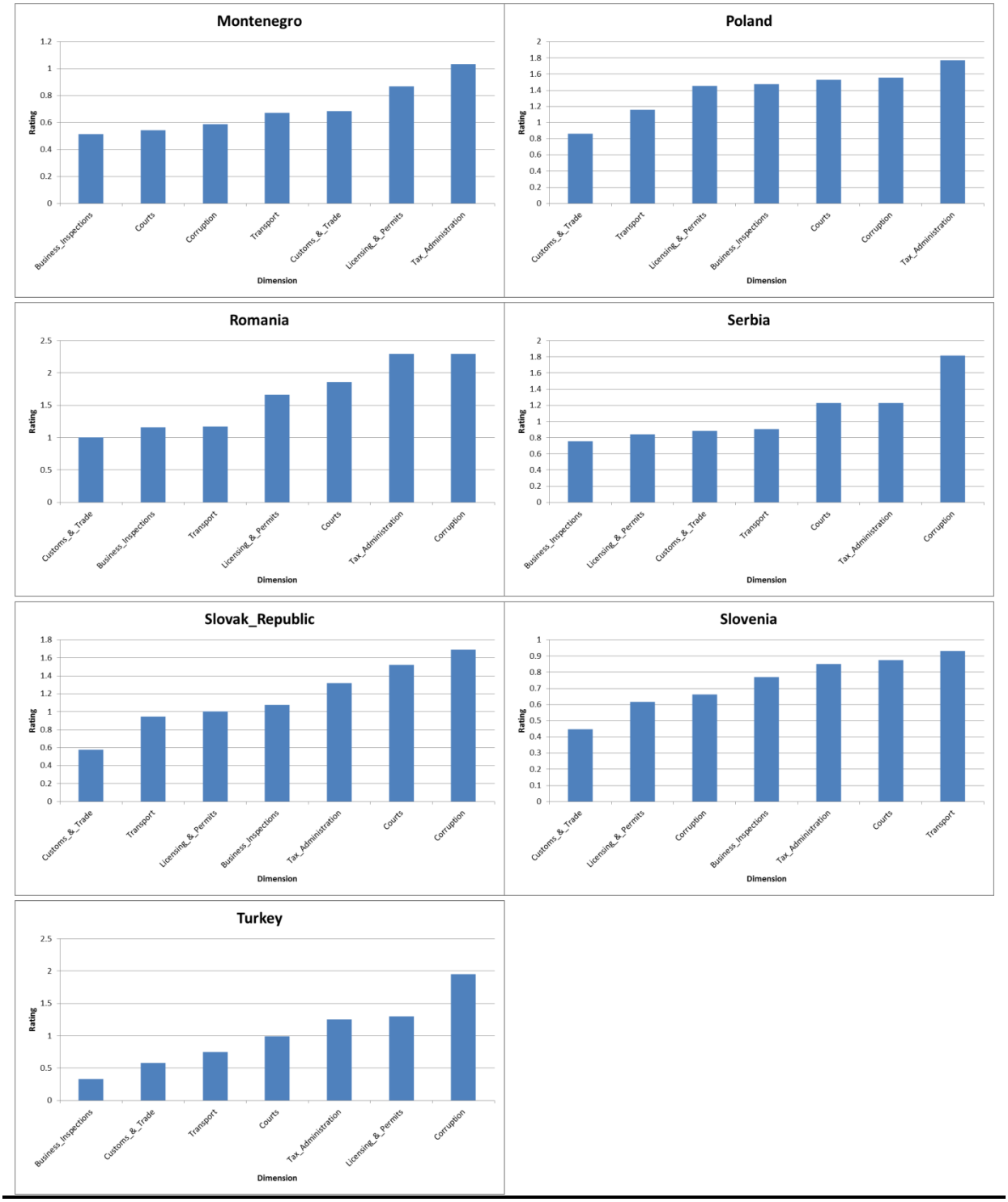
Source: ZEW calculations

Figure 3.62 – Within-country analysis for 2008 part I (robustness check including firm productivity)



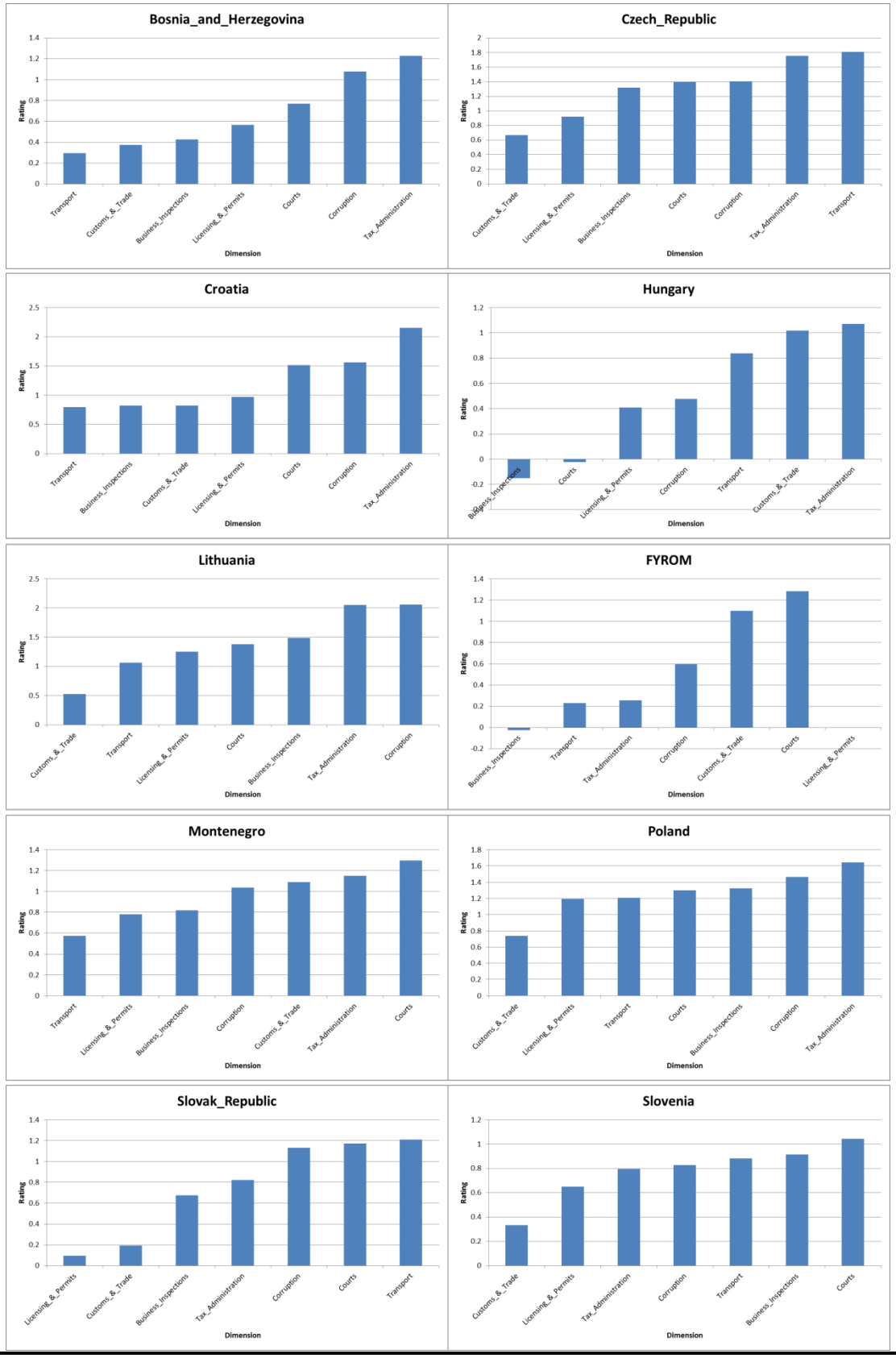
Source: ZEW calculations

Figure 3.63 – Within-country analysis for 2008 part II (robustness check including firm productivity)



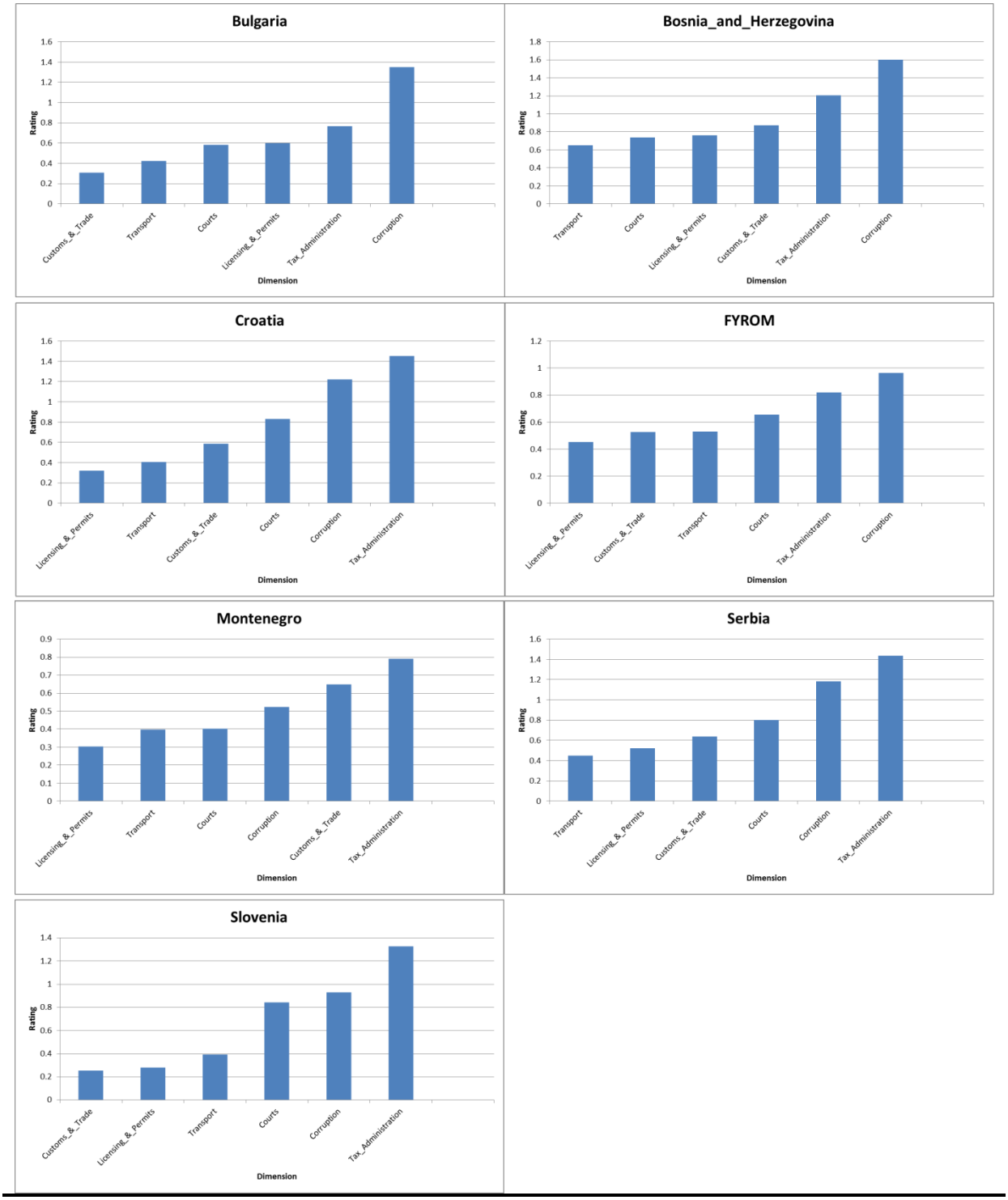
Source: ZEW calculations

Figure 3.64 – Within-country analysis for 2009 (robustness check including firm productivity)



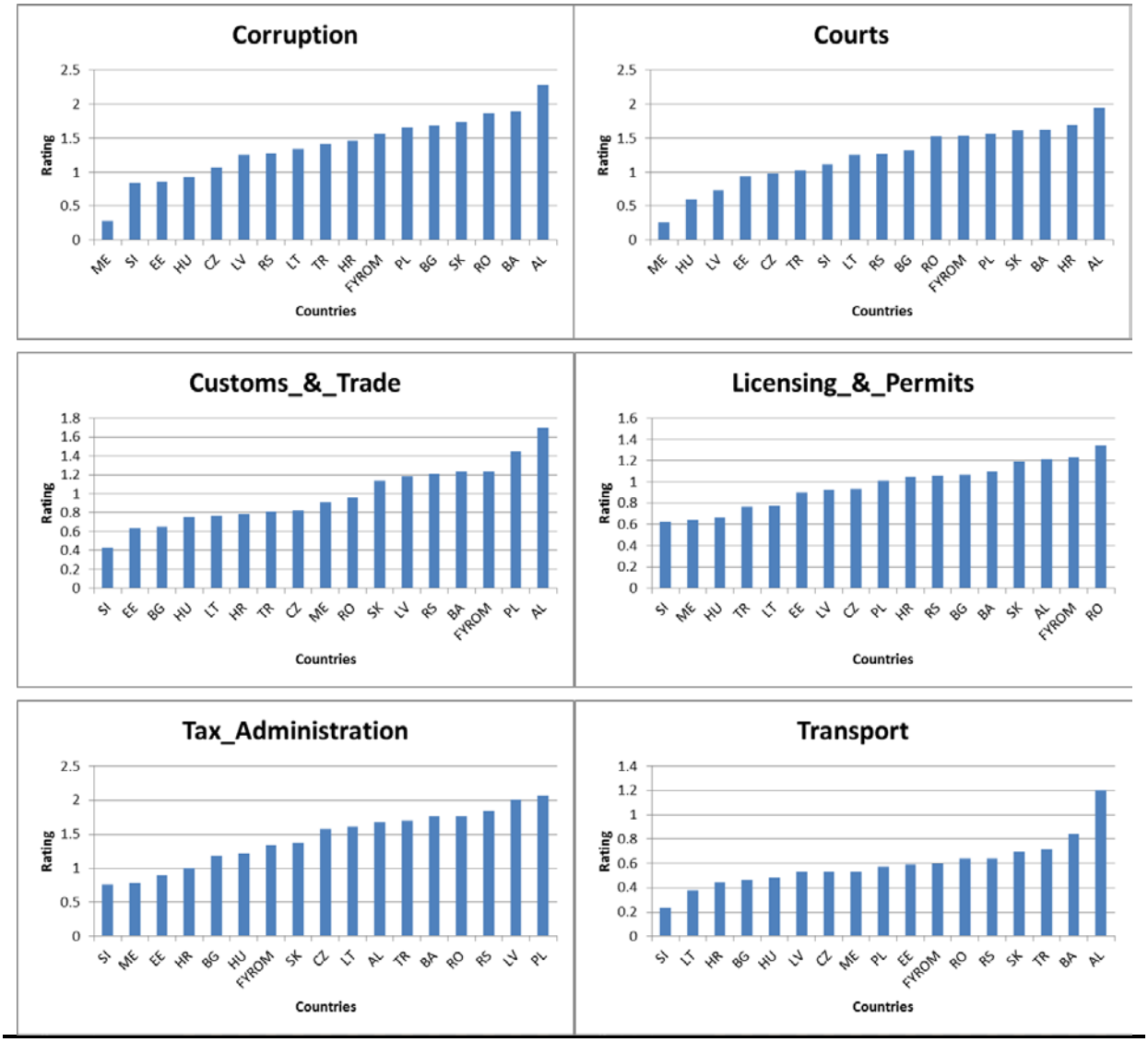
Source: ZEW calculations

Figure 3.65 – Within-country analysis for 2013 (robustness check including firm productivity)



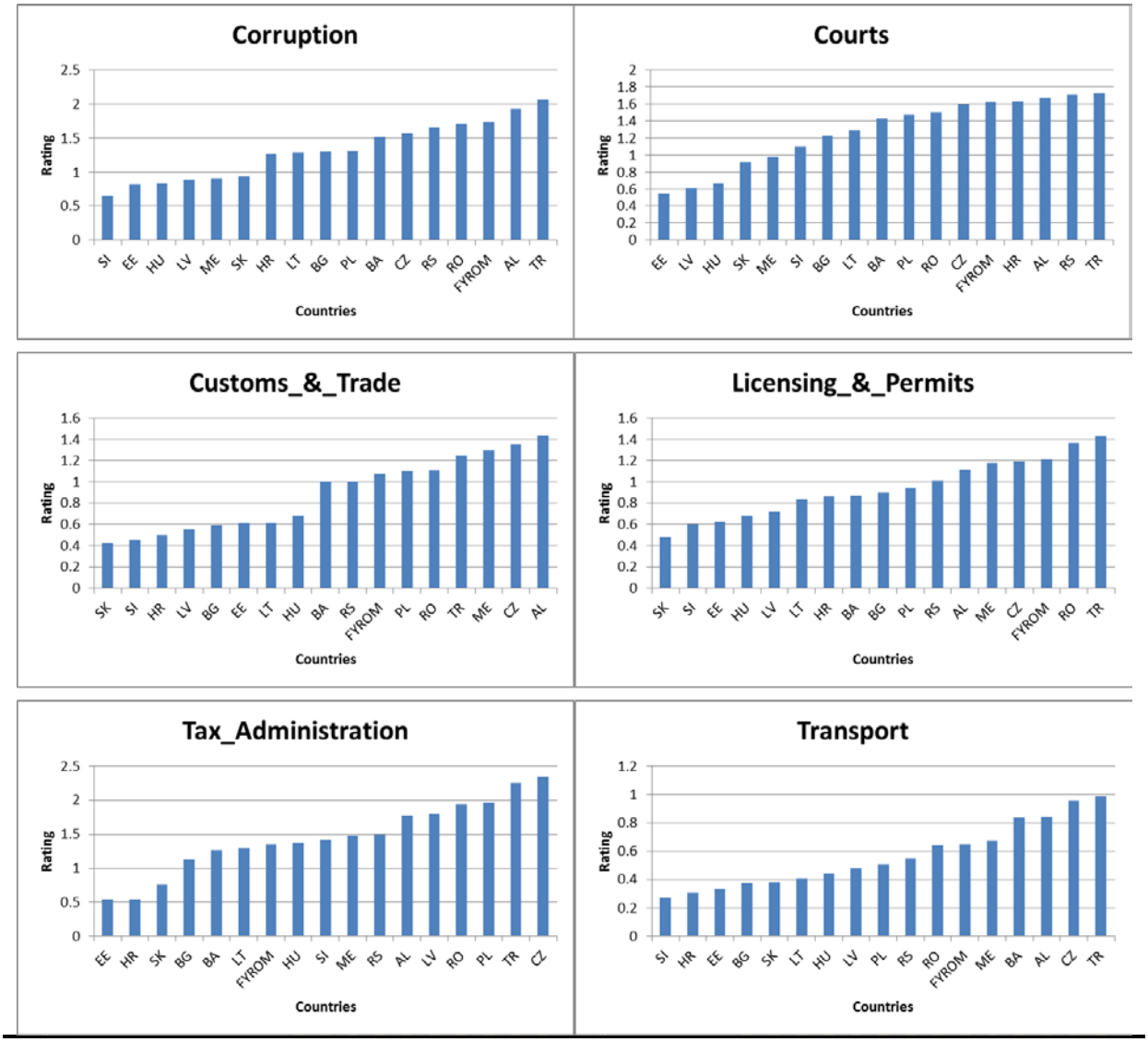
Source: ZEW calculations

Figure 3.66 – Between-country analysis for 2002 (robustness check including firm age)



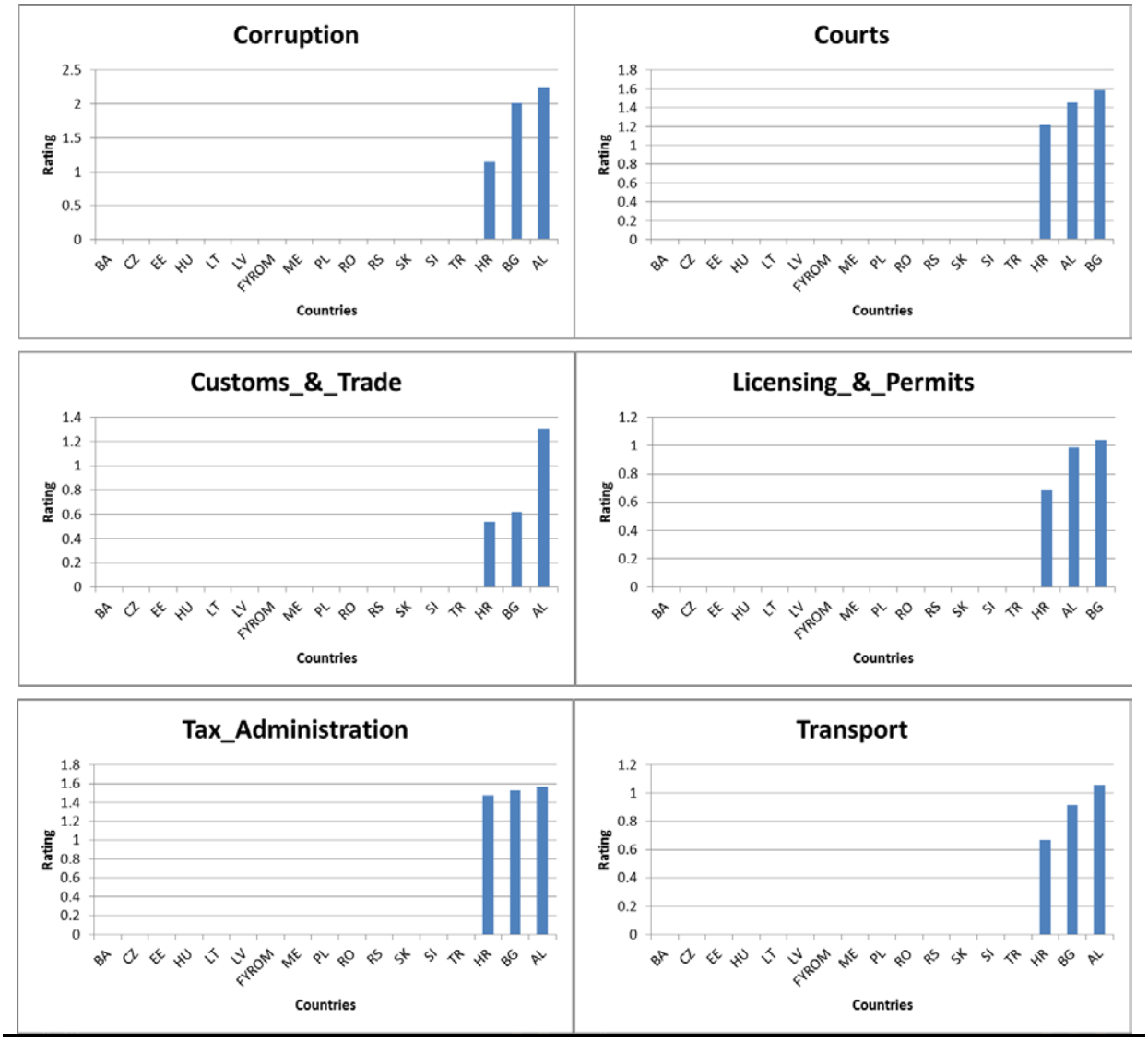
Source: ZEW calculations

Figure 3.67 – Between-country analysis for 2005 (robustness check including firm age)



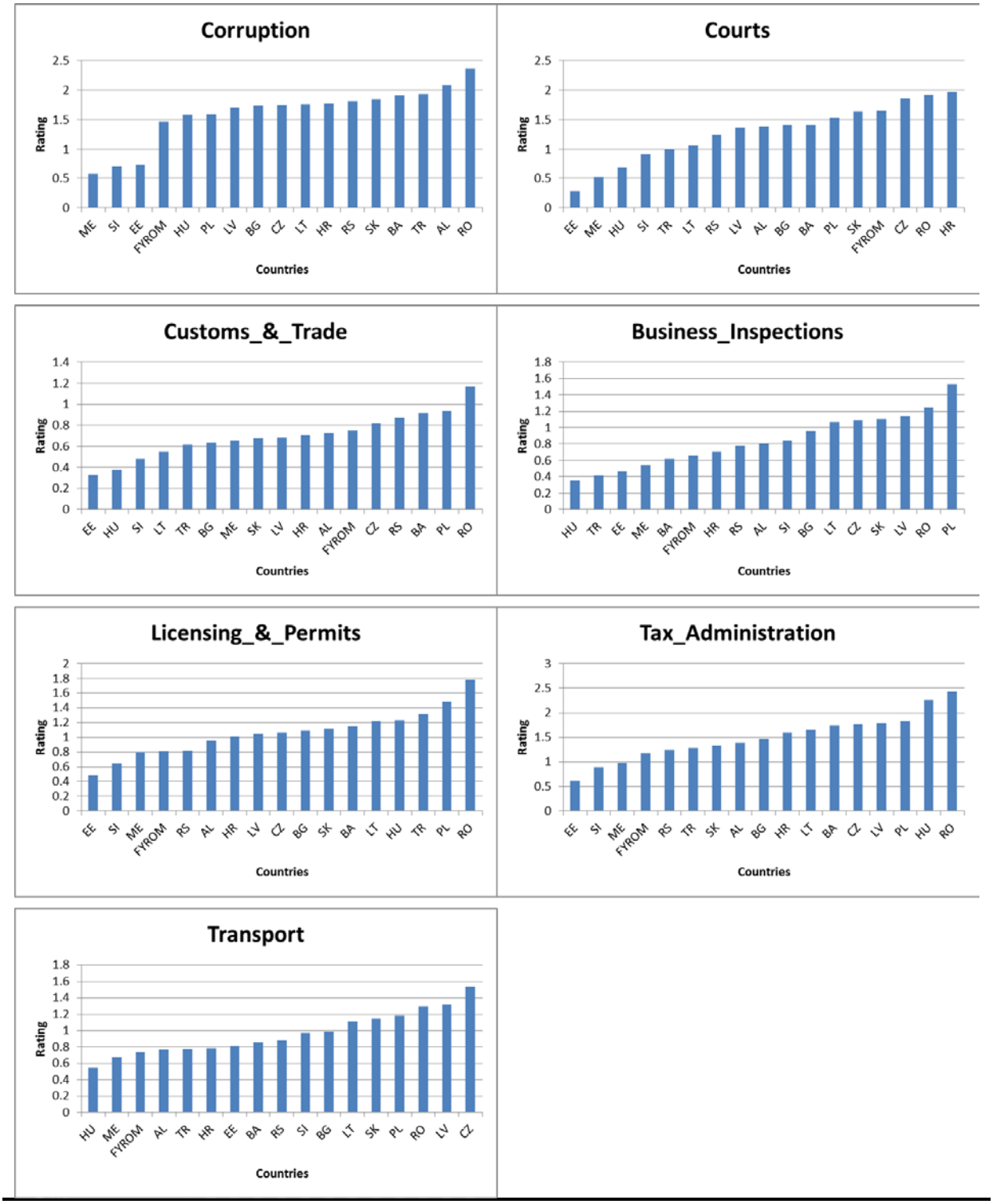
Source: ZEW calculations

Figure 3.68 – Between-country analysis for 2007 (robustness check including firm age)



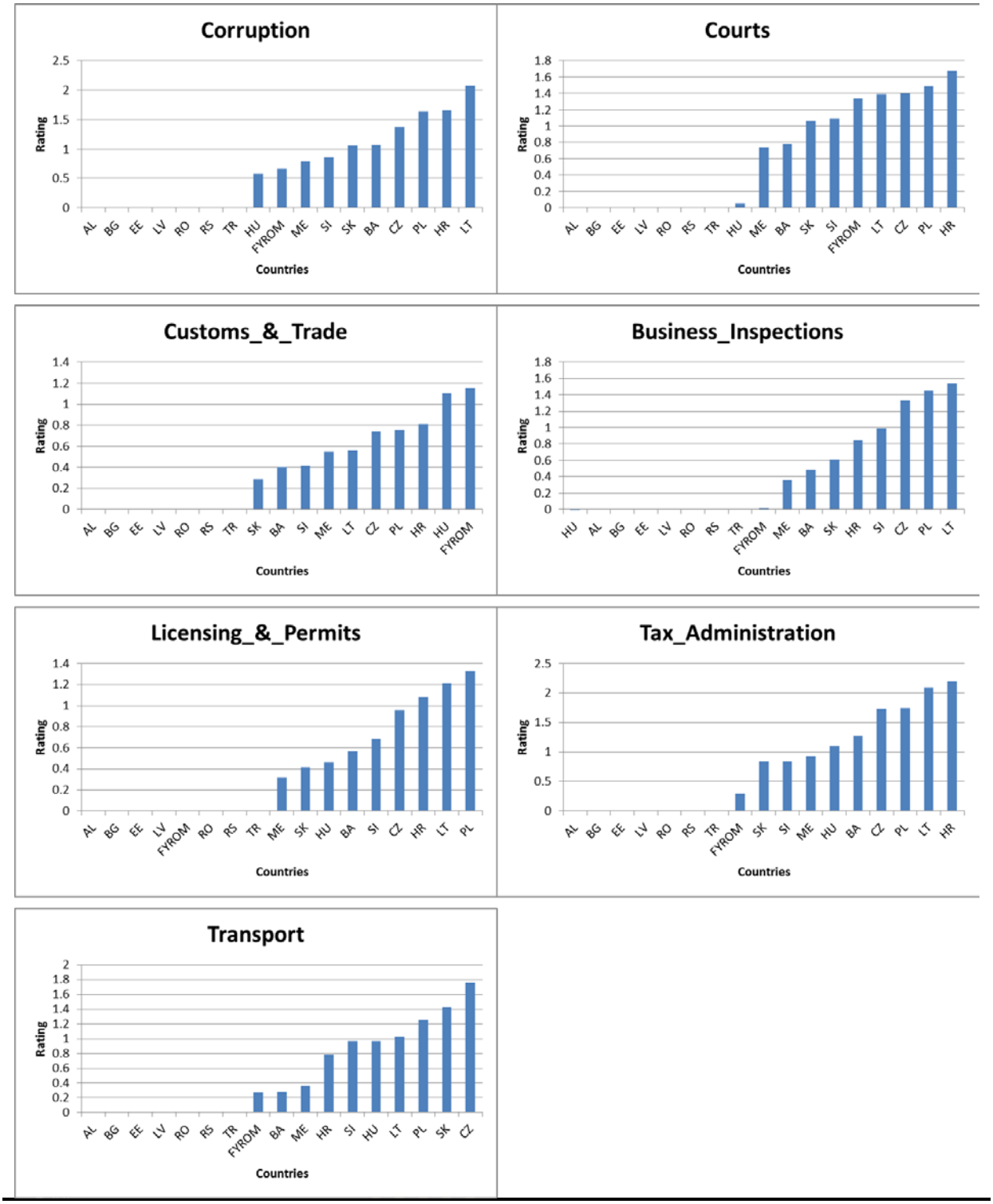
Source: ZEW calculations

Figure 3.69 – Between-country analysis for 2008 (robustness check including firm age)



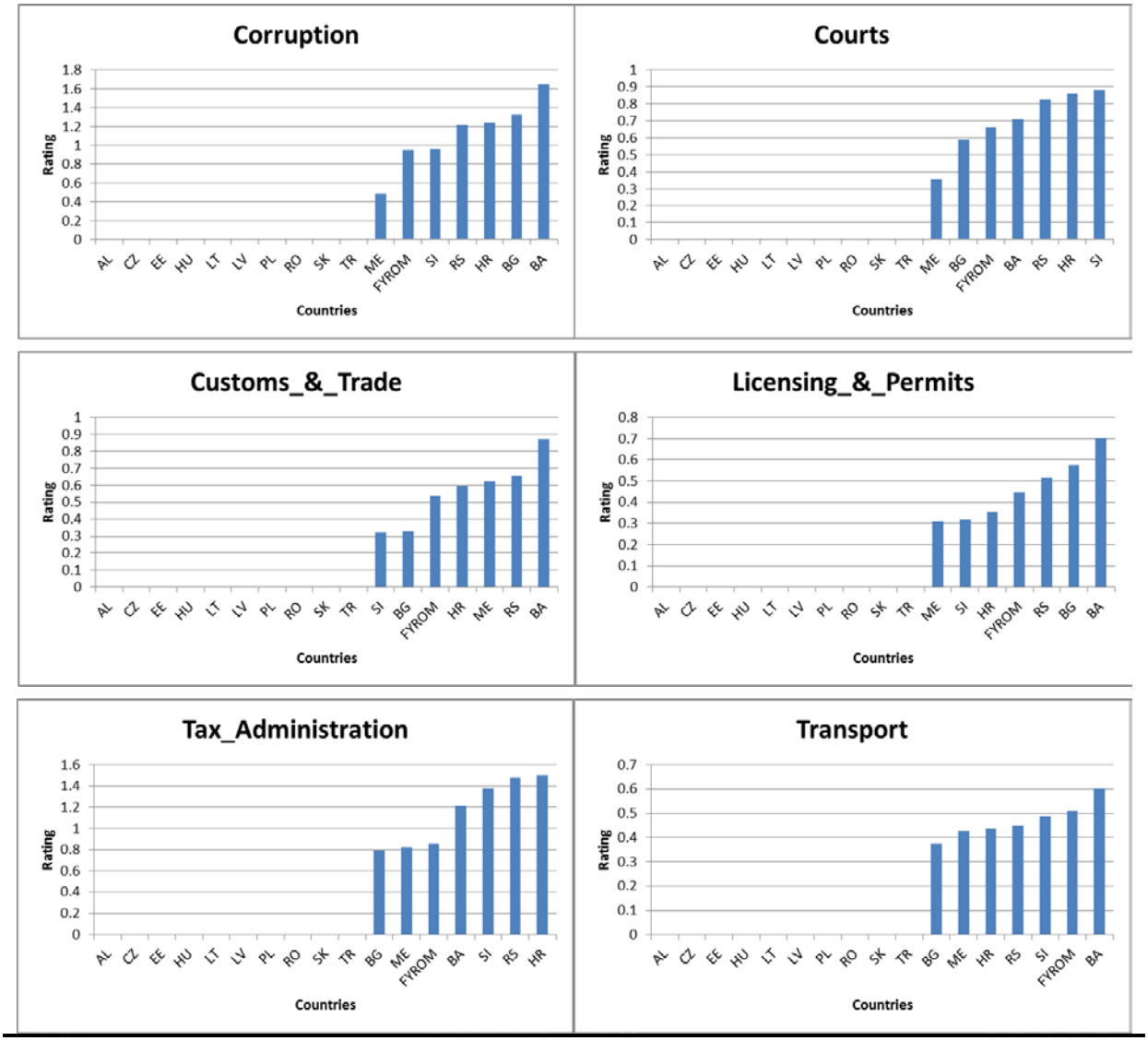
Source: ZEW calculations

Figure 3.70 – Between-country analysis for 2009 (robustness check including firm age)



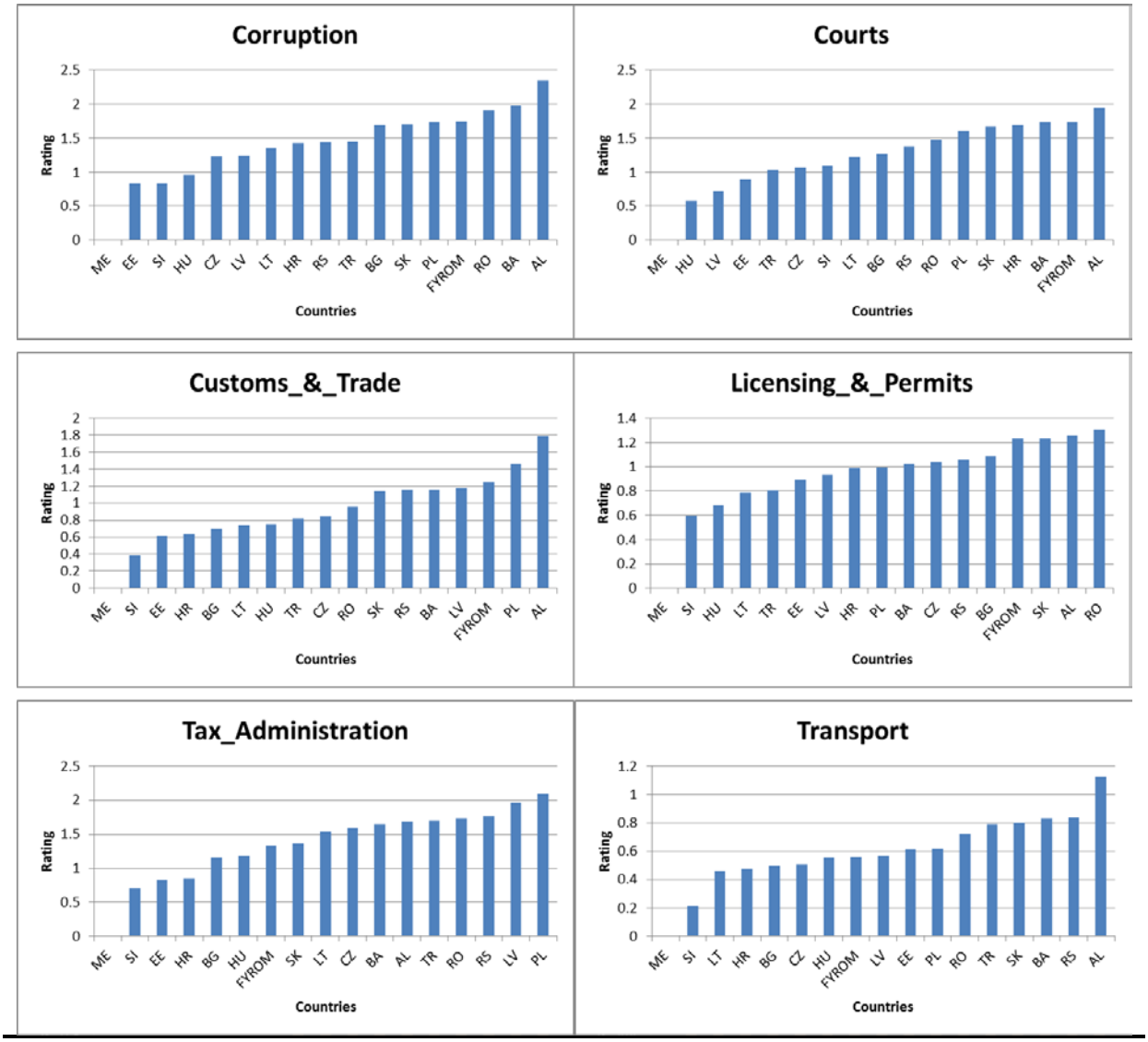
Source: ZEW calculations

Figure 3.71 – Between-country analysis for 2013 (robustness check including firm age)



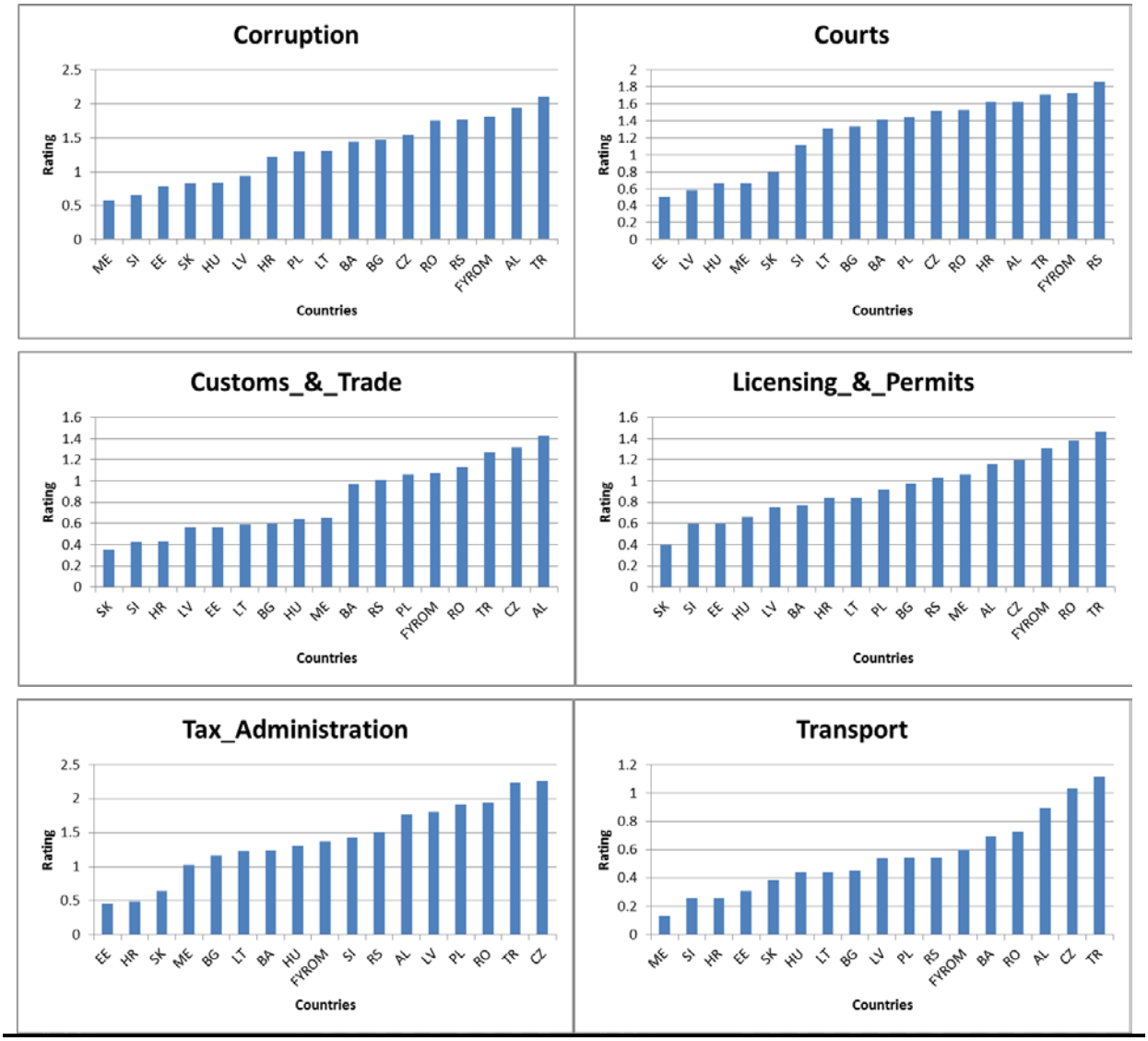
Source: ZEW calculations

Figure 3.72 – Between-country analysis for 2002 (robustness check including firm productivity)



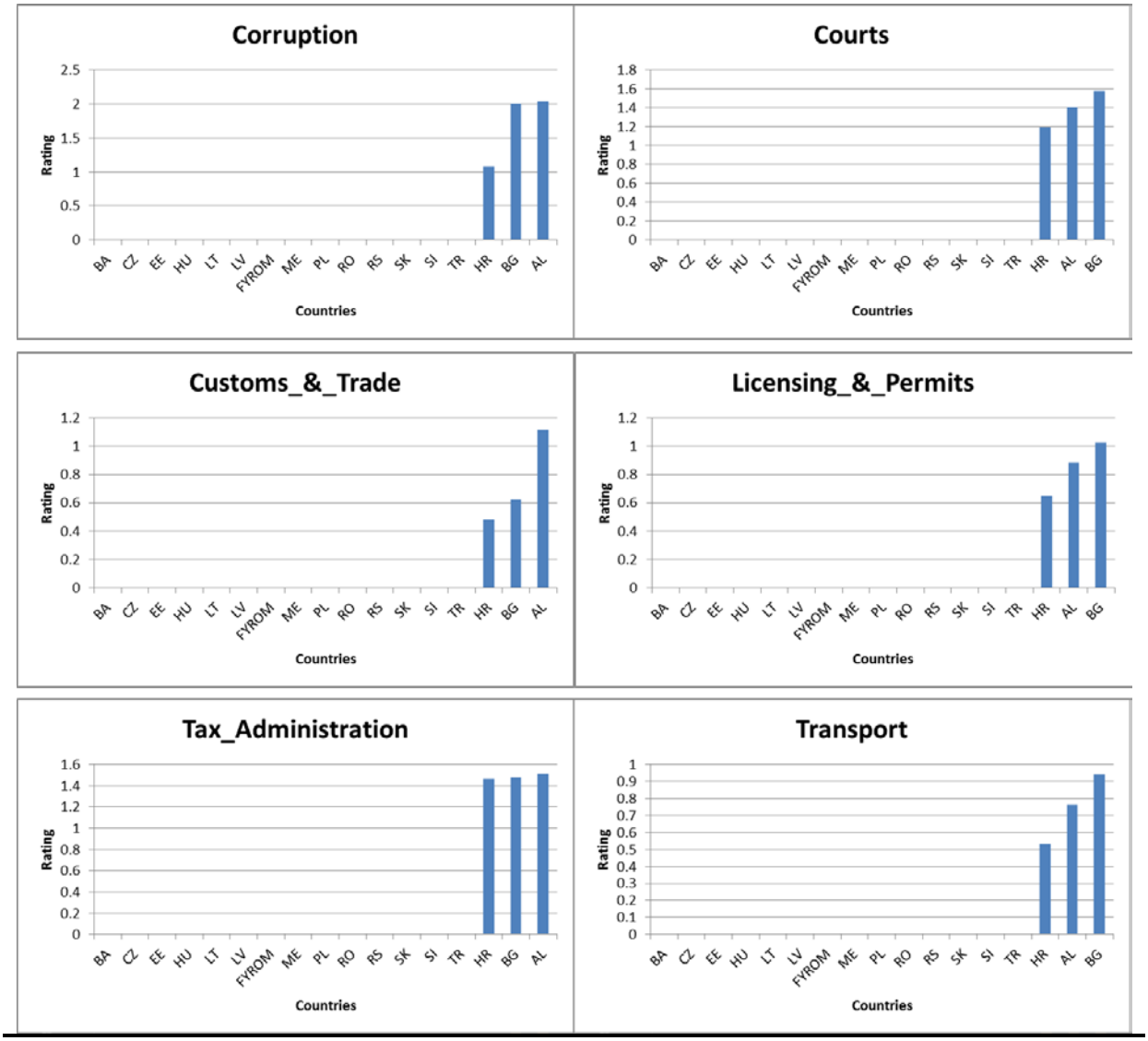
Source: ZEW calculations

Figure 3.73 – Between-country analysis for 2005 (robustness check including firm productivity)



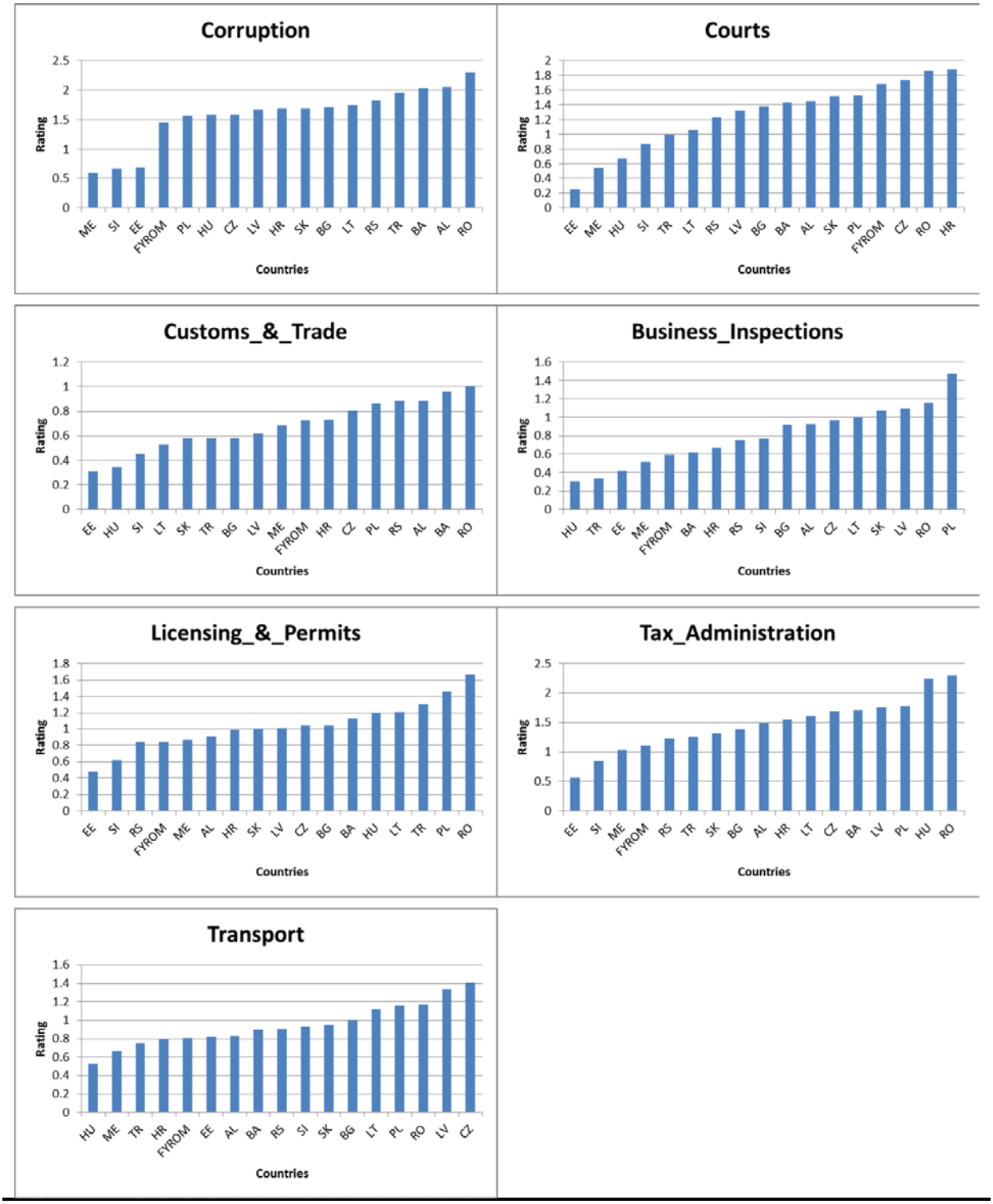
Source: ZEW calculations

Figure 3.74 – Between-country analysis for 2007 (robustness check including firm productivity)



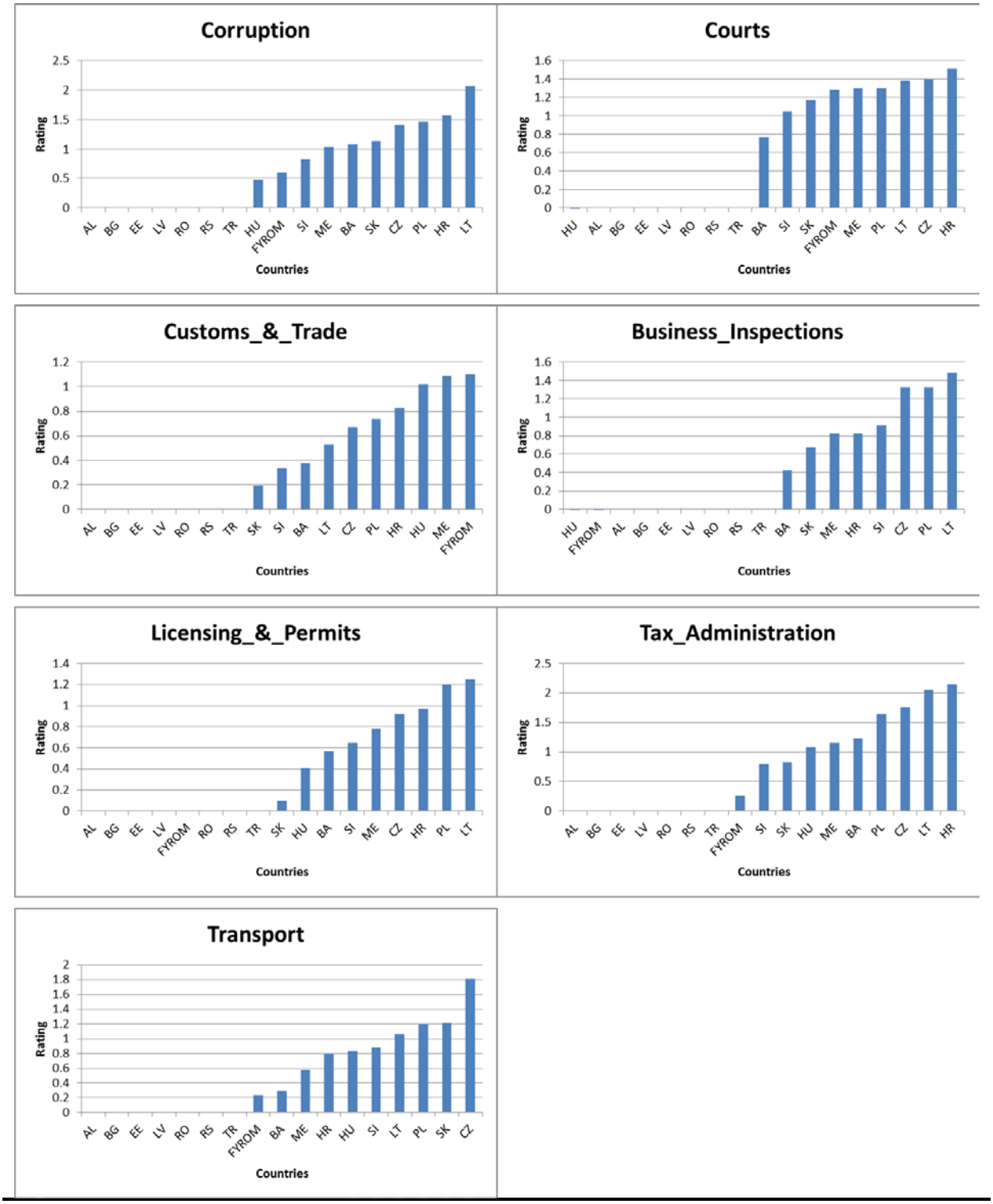
Source: ZEW calculations

Figure 3.75 – Between-country analysis for 2008 (robustness check including firm productivity)



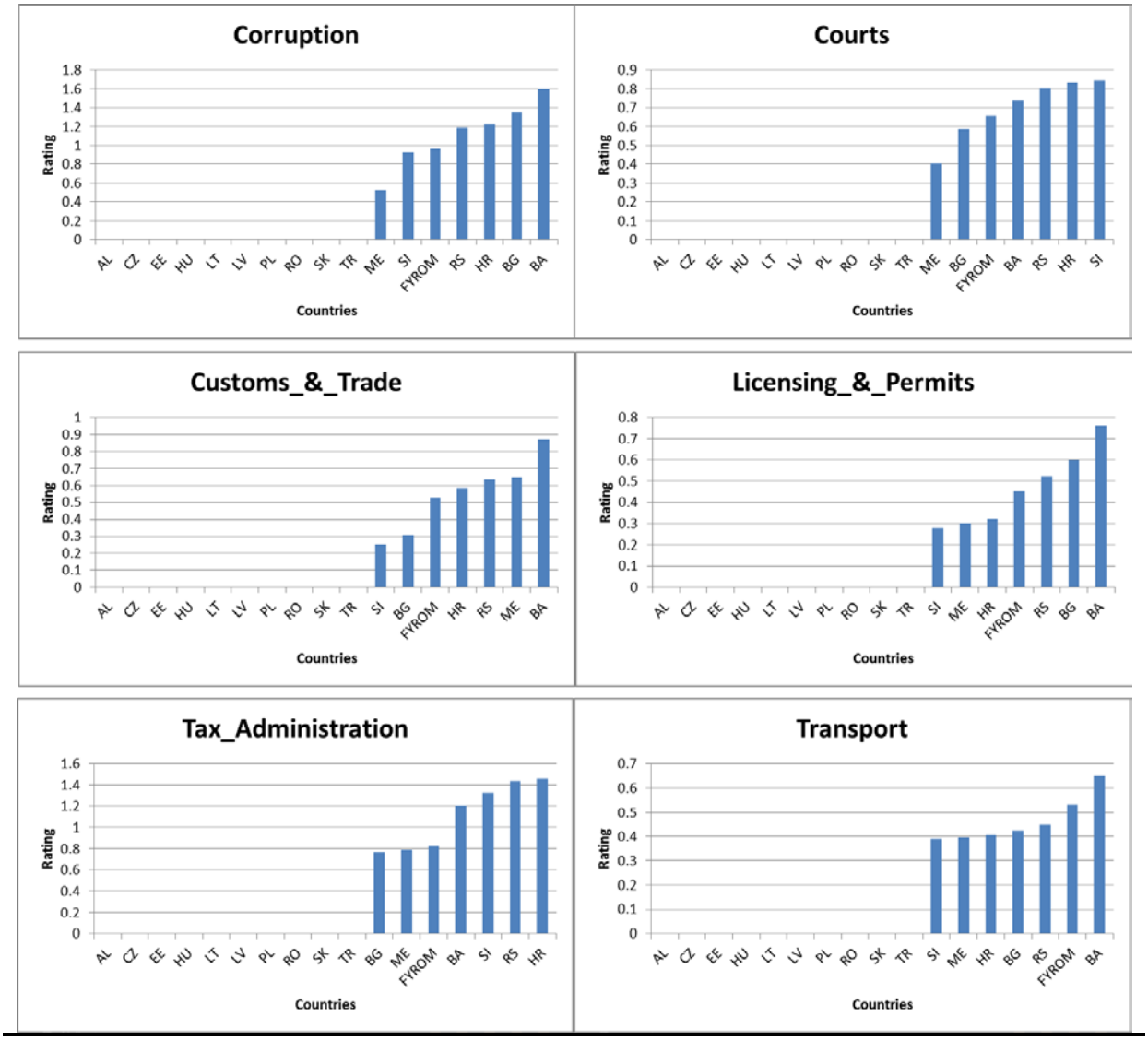
Source: ZEW calculations

Figure 3.76 – Between-country analysis for 2009 (robustness check including firm productivity)



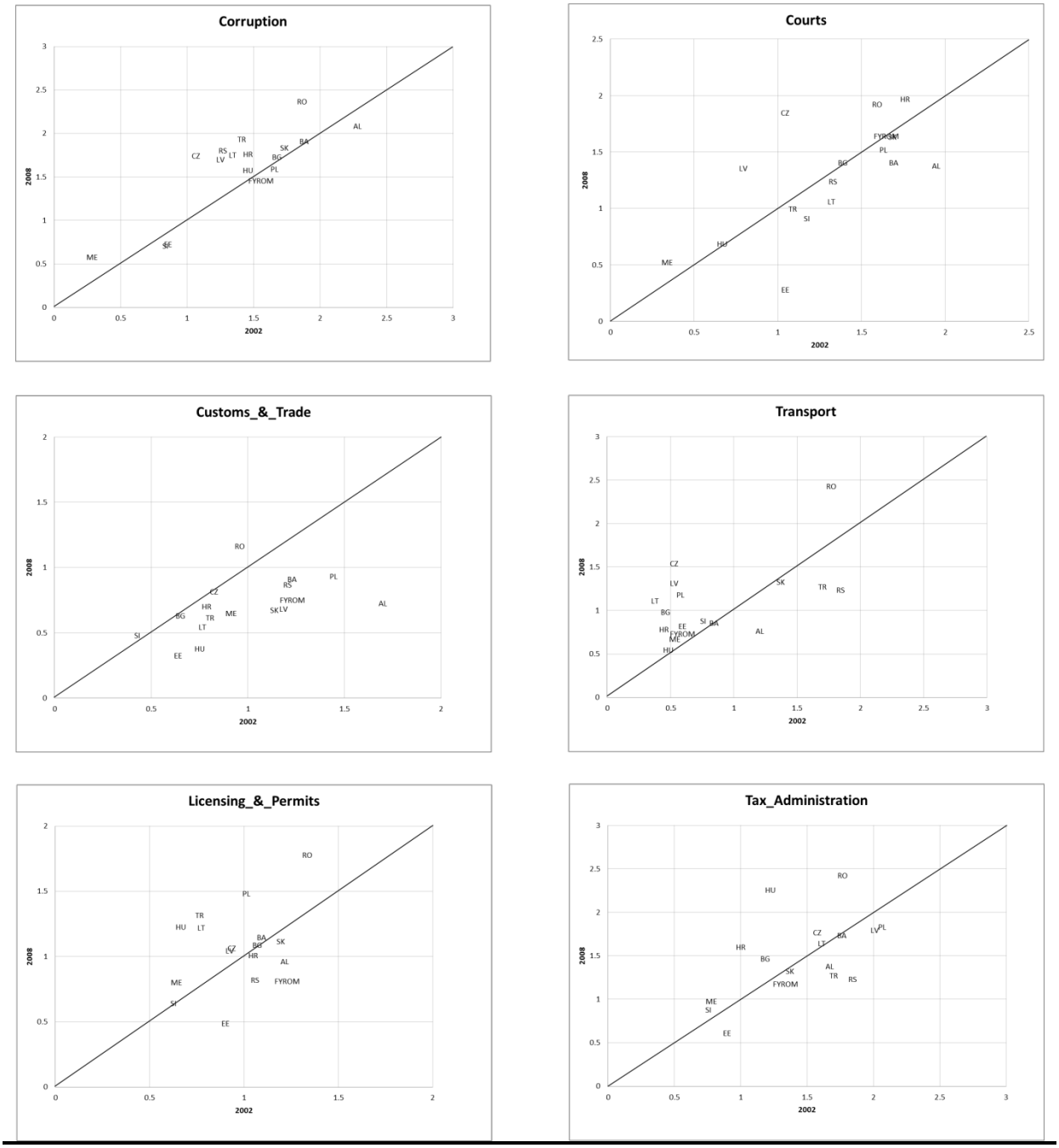
Source: ZEW calculations

Figure 3.77 – Between-country analysis for 2013 (robustness check including firm productivity)



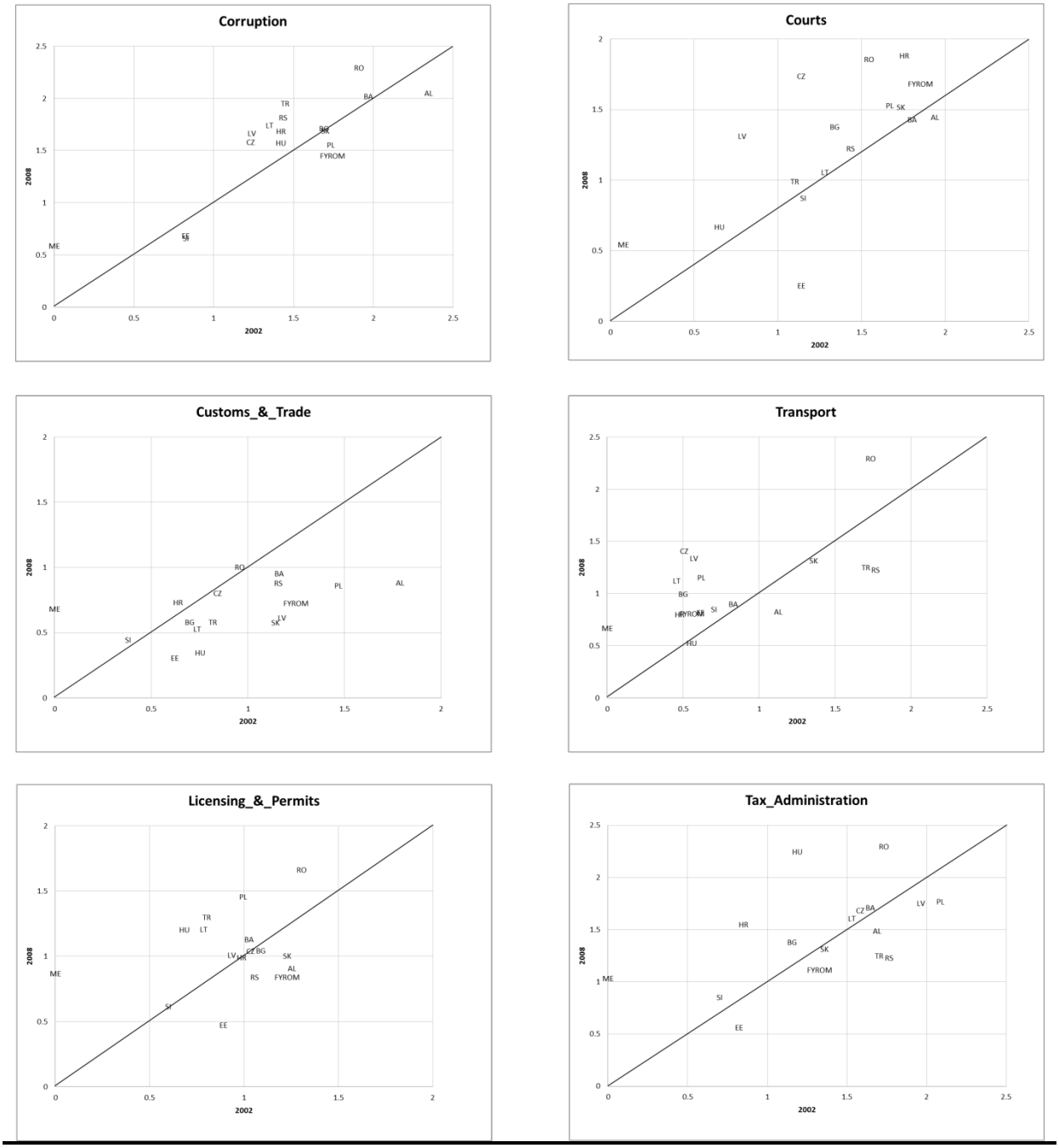
Source: ZEW calculations

Figure 3.78 – Between-country analysis using scatter plots (robustness check including firm age)



Note: Scores for 2002 and 2008 are compared, as this maximises the country coverage for this particular analysis
Source: ZEW calculations

Figure 3.79 – Between-country analysis using scatter plots (robustness check including firm productivity)



Note: Scores for 2002 and 2008 are compared, as this maximises the country coverage for this particular analysis
Source: ZEW calculations

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Chapter 4.
CONCLUSIONS AND POLICY IMPLICATIONS

1 INTRODUCTION

This chapter will summarise Chapters 1 to 3 and draw policy conclusions as understanding the role of public administration for firm growth is certainly crucial from a policy perspective. On the one hand, as firms frequently interact with public administration in a variety of different ways, and as such interactions are costly in several ways, it seems plausible that the quality of public administration matters. On the other hand, in the context of tight public finances, improving the quality of public administration, in particular through raising its efficiency, does not only help to at least slightly ease fiscal pressure: as many other instruments impose additional fiscal burdens, increasing the efficiency of public administration may be a key lever to improve the business climate that policy makers currently have access to. In addition, efficiency gains in public administration may be easier to achieve from a political economy perspective than say implementing policy reforms that may involve – at least over the short run – adverse welfare losses. This is the case as no trade-offs with other policy objectives are associated with improving the efficiency of public administration. Promoting firm growth through improving the business climate is also relevant in the context of a number of EU flagship initiatives such as the Europe 2020 which aims at boosting sustainable growth and raising employment among other objectives. Here, improving the quality of public administration to foster firm growth is likely to be a key ingredient to reach these objectives.

This report provides four sets of 'lessons' that are relevant for policy making:

- **(1)** It sheds light on the right choice of methodology in practice to analyse the interactions between firm growth and public administration
- **(2)** It highlights data constraints in the econometric analysis which could be alleviated by the European Commission
- **(3)** It provides evidence on specific effects on the quality of PA on firm growth
- **(4)** It has some wider policy implications

This chapter discusses each of these sets of lessons below.

2 CHOICE OF METHODOLOGY

Assessing the role of public administration for firm growth requires both, a solid understanding of the magnitude and nature of the effects of public administration on firm growth, and of the exact measures to be taken including the priorities. However, from a research perspective, it is not obvious how unambiguous and robust evidence needed for such an assessment can be obtained. On the one hand, econometrically, the reason is that it is difficult to establish causality, i.e., to provide evidence on the causal effects of the quality of public administration rather than to provide evidence on simple correlations without any policy implications. On the other hand, measuring the quality of public administration is challenging. This implies that there is no single and ideal approach that solves all difficulties simultaneously.

This report has therefore taken three different approaches to nevertheless make significant progress in this respect. The particular approach taken depends on the question that is asked. If the policy interest is on the impact of the efficiency of public administration on firm and industry growth, regression-based evidence using the empirical specifications of Chapter 1 is most suitable.

If the policy interest is on what dimension of public administration the government should improve in a particular country, information on business perceptions may be used. Along the same lines, if the policy interest is the relative performance of a country in a particular dimension of public administration, then business perceptions may likewise be used. However, the analysis of Chapter 3 implies that business perceptions must be used in a careful way and corrected for various biases to make them useful for policy. Once such a procedure is applied, business perceptions may be used to arrive at within-country and cross-country rankings of obstacles for firm growth including those that relate to public administration.

By contrast, Chapter 2 has argued that an input-output table-based analysis may not be suitable for the guiding questions of this report. One reason is that only fee-based public services are considered as 'intermediate deliveries of the public sector', and the amount of fees charged may be fairly small for services delivered by public administration. This implies that observed differences in shares of public administration as an input to production across countries mainly reflect variations in whether public services are fee- or tax-financed. As a

result, input-based measures of public services are likely to seriously underestimate their role for industrial production.

3 DATA CONSTRAINTS

Ideally, any policy measure to promote firm growth should be based on a rigorous empirical analysis examining the effects of such a measure. The quality of any such empirical analysis relies on the quality of the underlying data used. This report has revealed several key data constraints, in particular shortages in the availability of comparable EU-wide data at the industry and firm level.

First, available industry data has various shortcomings, and their time and country coverage is problematic. With respect to the share of high growth firms by industry, key countries including for instance Germany are missing, and availability of data for recent years is limited (for instance, no data are available for the time after 2010). Further problems arise as outliers (e.g., Cyprus) are difficult to explain which potentially points to issues related to data quality.

Second, there is no freely accessible firm-level survey with panel dimension available for all or at least the majority of EU Member States and which is similar to the Enterprise Surveys (the latter are only available for selected years and countries). Such data should be the basis of any analysis of firm growth and similar issues in the EU. Related to this, business perception data are fragmented across different types of data and not available for all EU Member States.

Alleviating these data constraints must be a central policy priority, in particular as the cost of collection and dissemination of such data appears to be moderate; for instance, carrying out a firm-level survey covering several hundred firms in an Eastern European country using face-to-face interviews may cost less than EUR 20,000. Given that provision of data for EU member states constitutes an important European public good in addition to being potentially an important input for policy analysis in reports like this one, the European Commission would ideally make significant efforts to make such data available in the near future, possibly in cooperation with the World Bank. In this context, initiatives such as financing the provision of EFIGE data are important and should therefore be broadened and continued.

4 EVIDENCE ON THE SPECIFIC EFFECTS OF THE QUALITY OF PUBLIC ADMINISTRATION ON FIRM GROWTH

This section summarises the specific findings with respect to the nexus of the quality of public administration and firm growth. Chapter 1 has analysed the relation between indicators of public administration and the observed share of high growth firms, the role of public administration innovations such as e-services in the process of firm growth, and the key factors of PA efficiency that affect the share of high growth firms. It focuses on 12 different indicators of public administration efficiency reflecting its multidimensional nature. The regression analysis covers two time periods because of a break in the industrial sector classification. The 2003-2007 period is based on NACE Rev. 1.1 data, and the 2008-2010 period is based on NACE Rev. 2 data.

The results show that PA efficiency has an impact on the rate of high growth firms and employment growth at the NACE 2-digit industry level. Greater PA efficiency induces greater rates of fast growing firms, in particular by increasing the firm turnover and the scale of net-entry. This holds especially for general indicators that measure the overall governance system, including the presence of an independent judiciary and freedom of corruption. Thus, the results confirm the view that public administration efficiency affects firm performance and industry-wide competitiveness, especially in more dynamic and growing industries. The results also suggest that relatively broad concepts of public administration efficiency that relate to the quality of public administration and governance are important in shaping the environment for high growth firms. Seen from this perspective public administration efficiency is tied to the quality of institutions and general (also political) governance at the country level.

Chapter 2 used a system of interlinked international input-output tables (WIOD) to measure the economic contribution of public administration. It showed that the share of the value of public administration services consumed as intermediate demand by other sectors in the total value of public administration services is low, though on a rising trend. Analysing the sectorial variation of the shares of public administration services in total intermediate inputs shows that they are somewhat lower for manufacturing industries than they are for service industries. They are also fairly low for construction services (since government fees for construction permits should mostly be accounted for in real estate services) but higher for the energy producing sector. However, differences in mean shares between manufacturing and service sectors seem to be driven by a higher cross-country variation for most service industries: In general the standard deviation with respect to those shares is

much higher for service industries than for manufacturing industries. Within services the highest variation is found for the public administration sector itself and the education sector.

In general, the business-perception based analysis in Chapter 3 produced results with plausible policy implications. It showed that in within country rankings of countries, tax administration, corruption and courts are considered most frequently as the most important constraints in virtually all countries thereby highlighting the importance of these dimensions of public administration in the firms' views. This result is robust across all years covered in the analysis and indicates that there may be room for further improvements in these areas. In addition, a striking pattern emerges with respect to the *least* impeding factors for firm growth. While prior to accession of the Eastern European Member States to the EU transport is considered as the least impeding factor for firm growth in virtually all countries in the sample, in the first survey wave after accession, this switches to customs and trade potentially reflecting the benefits for firms associated with the accession to the European Union. In Estonia, contrary to most other countries, transport is still seen as a central constraint relative to the other constraints which potentially reflects its location in the periphery of the European Union. In cross-country rankings of business perceptions about particular dimensions of public administration, Estonia often performs reasonably well, whereas Romania often performs poorly which corresponds to anecdotal evidence on the quality of public administration in both countries. Furthermore, the results reveal a strong correlation across different dimensions of public administration. Typically, the best or worst performing country with respect to one constraint also performs very good or poorly, respectively, across several other dimensions.

5 WIDER POLICY IMPLICATIONS

The report has highlighted two more general policy implications that should be considered in the context of discussions of the role of the quality of public administration for firm growth. First, any econometric analysis estimating the effects of public administration quality on firm growth needs to establish causal relationships. Chapter 1 has argued that 'naïve' regressions suffer from omitted variable bias thereby seriously undermining the 'value' of the results for policy making, or even resulting in misleading or plainly wrong policy implications. Chapter 1 has also applied an innovative methodology to address this problem which should serve as a benchmark in future exercises.

Second, business perceptions are often an underappreciated source of information that – through the World Bank Enterprise Surveys – are available for many Member States. In principle, business perceptions are powerful information for policy makers and have many advantages to identify general policy priorities to promote firm growth for instance. In the context of public administration, they could, at least in principle, also be used to better evaluate the costs of specific dimensions of public administration for firms. Of course, in many instances business perceptions are not used in practice as there are concerns about whether they contain valuable information given their subjectivity. However, Chapter 3 proposed and applied an innovative methodology to correct for potential biases inherent to business perceptions; this allows extracting the content of business perceptions which provides useful and reliable information for policy makers.

Chapter 5.
ANNEX

1 LIST OF ABBREVIATIONS

ANOVA	Analysis of variance
B2B	Business to business
B2C	Business to consumer
BEEPS	Business Environment and Enterprise Performance Survey
CEE	Central and Eastern Europe
CG	Government consumption
CP	Consumption of private households
CPA	Classification of products by activity
DFNS	Denmark, Finland, the Netherlands and Sweden
EFIGE	European firms in a global economy
EPSIS	European Public Sector Innovation Scoreboard
EU	European Union
FISIM	Financial Intermediation Services, Indirectly Measured
GDP	Gross domestic product
GE	Government effectiveness
HGF	High growth firm
ICT	Information and communication technology
IMF	International Monetary Fund
IO	Input-Output
IOT	Input-Output table
ISIC	International Standard Industrial Classification
IV	Instrumental Variable
NACE	Nomenclature statistique des activités économiques dans la Communauté européenne
NAS	National accounts statistics
OECD	Organisation for Economic Cooperation and Development
OLS	Ordinary least squares
PA	Public administration
PwC	PricewaterhouseCoopers
R&D	Research and development

RoW	Rest of the world
RQ	Regulatory quality
SME	Small and medium-sized enterprises
SUT	Supply and use table
UN	United Nations
VA	Value added
WGI	World Bank's Worldwide Governance Indicators
WIOD	World Input-Output database
WIOT	World Input-Output table
WTO	World Trade Organization

2 COUNTRY CODES

EU-Code	Country name
AL	Albania
AT	Austria
BA	Bosnia and Herzegovina
BE	Belgium
BG	Bulgaria
BR	Brazil
CA	Canada
CN	China
CY	Cyprus
CZ	Czech Republic
DE	Germany
DK	Denmark
EE	Estonia
EL	Greece
ES	Spain
FI	Finland
FR	France
FYROM	The former Yugoslav Republic of Macedonia
HR	Croatia
HU	Hungary
ID	Indonesia
IE	Ireland
IN	India
IS	Iceland
IT	Italy
JP	Japan
KR	Republic of Korea
LT	Lithuania
LU	Luxembourg
LV	Latvia
ME	Montenegro

MT	Malta
MX	Mexico
NL	Netherlands
PL	Poland
PT	Portugal
RO	Romania
RS	Serbia
RU	Russian Federation
SE	Sweden
SI	Slovenia
SK	Slovakia
TR	Turkey
TW	Taiwan
UK	United Kingdom
US	United States