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Growth Implications of Structure and Size of Public Sectors

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Abstract

The relationship between government size and growth has received an enormous attention in the economics literature, and the recent financial crisis has forced this topic back on the agenda. A highly controversial debate in this respect is whether large governments are harmful for growth. Endogenous growth theory provides us with the view that tax structure and the composition of public expenditure may be important for growth, perhaps even more than total tax or expenditure levels. Government size and structure are, however, also reflected in the level and structure of market regulations, which may substitute or complement fiscal intervention.

The study provides an overview of the growth-friendliness of fiscal and regulatory structures in a cross-section of EU15- and EU12-members and highly developed OECD countries. Peripheral European (transition) countries are also included, whenever respective data are available. Our analysis is based on several measures capturing the expenditure and the tax side of the budgets, as well as regulatory policies. It is shown that the size and the structure of fiscal and regulatory regimes and, hence, the expected long run-growth impact of government activities, still differ markedly across countries.

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1   Introduction

The relationship between government size and growth has received an enormous attention in the economics literature. One of the main questions in this respect is, 'are large governments harmful for growth?'

While Neoclassical Theory sees only an insignificant role for fiscal policy to impact on the long-run rate of economic growth, Endogenous Growth Theory provides us with the view that fiscal policy can generate permanent effects on the steady state growth rate of output, and not just temporary effects, i.e. on the transitional dynamics towards a higher output level. A number of theoretical models predict that tax structure and the composition of public expenditure may be important for growth, probably even more than total tax or spending levels (e.g. *Lucas*, 1988; *Barro*, 1990; *Barro – Sala-i-Martin*, 1992). Moreover, a non-negligible literature discusses the potential growth effects of international openness or the regulatory regimes on factor and goods markets, which could be seen as a further dimension of public sector size and structure.

Together with the availability of more and better data, both in the cross section and over time, empirical research on the determinants of economic growth increased remarkably over the last 20 years. Although there is still a substantial model uncertainty leading to a lack of robustness of empirical growth analyses (e.g. *Nijkamp – Poot,* 2004; *Ciccone – Jarocinski*, 2010), it is now widely acknowledged that properly designed fiscal and regulatory policies can play an important role in supporting economic growth (e.g. *Tanzi – Zee*, 1997; *Kneller – Bleaney – Gemmell*, 1999; *Bleaney – Gemmell – Kneller*, 2001; *Fölster – Henrekson*, 2001; *Zagler – Durnecker*, 2003; *Angelopoulos – Economides – Kammas*, 2007; *Ghosh – Gregoriou*, 2008; *Romero-Ávila – Strauch*, 2008; *Gemmell – Kneller – Sanz*, 2011). A survey of both older and recent studies, as well as an interpretation of results is available in *Bergh – Henrekson* (2011).

In this respect it should be emphasized that many empirical analyses focus on developed countries (OECD or EU15), with some notable exceptions (*Campos – Coricelli*, 2002; *Fidrmuc*, 2003; *Bose – Haque – Osborn*, 2007; *Pushak – Tiongson – Varoudakis*, 2007; *Baldacci et al.*, 2008; *Bayraktar – Moreno-Dodson*, 2010) which concentrate on transition economies and developing countries, respectively. The suitable design of growth-enhancing policies will nevertheless differ substantially across different countries. Accounting for the stage of economic development, the political and institutional environment and (probably) historical legacies of a country, a one-size-fits-all-fiscal and/or regulatory policy in order to promote

growth is almost certainly not appropriate. Moreover, the recent Financial Crisis and the Great Recession might lead to a somehow revised view on the role of the state in supporting growth and long-run economic development (*Griffith-Jones – Ocampo – Stiglitz*, 2010; *Blanchard – Dell'Arricca – Mauro*, 2010).

Against this background the purpose of the present paper is to provide a very brief overview of the literature on the growth impact of fiscal (i.e., tax and expenditure) as well as regulatory policies. The main part of the article addresses the question, to what extent European and OECD-countries (or country groups) suit to concepts of growth-friendly fiscal and regulatory policies. We will consider in this respect that less developed countries (e.g. European Union Accession States and Eastern Neighborhood States) due to their different institutional background and economic legacies might follow a different growth path as compared to already wealthy and developed countries.

We proceed as follows. Section 2 is devoted to government expenditure structures. Following a brief discussion of the categorization of public spending categories into 'productive' and 'unproductive' types, we analyze the development of several spending categories. In a next step we investigate the growth-friendliness of expenditure structures. Section 3 presents the tax structures and their evolution over time in a sample of European countries, using adequate macroeconomic and microeconomic indicators. We evaluate the growth friendliness of tax structures and their evolution based on the 'tax and growth'-hierarchy derived by the OECD. In section 4 we turn to the regulation issues. The growth impact of regulatory regimes is less well documented and even more controversially debated than the fiscal size and structure of government. Nevertheless, several empirical investigations support the view that stricter regulation of goods and factor markets is detrimental to economic development. Recent theoretical and empirical research emphasizes the notion of complementarities between institutions and policies in order to enhance growth. Section 5 therefore aims to provide an overall assessment of economic policy regimes and their growth-friendliness in a comparative way. Of special interest in this respect is whether there are systematic deficiencies of certain countries (country groups) in providing a combination of growth-friendly economic policies. We will also consider the possibility that some countries provide more (less) regulation (or more/less taxes and expenditure) as a compensation for a lack of (more) reforms in another policy area. Section 6 concludes.

2 Government Expenditure

2.1 Productive vs. unproductive public spending: Theoretical background

The connection between government spending and growth is probably one of the most controversially debated topics in economics. In theory the relationship is ambiguous. On the one hand, ever since the days of Adam Smith government expenditure is deemed an indispensable prerequisite for economic development. The protection and enforcement of private property rights and contracts appear to be the most important factors for economic prosperity and growth. A well-functioning legal system (including expenditure for the courts) and enforcing public order and safety (including the police and the armed forces) are a precondition for economic specialization and the operation of markets (e.g. *Hayek*, 1960; *Buchanan*, 1975; *North*, 1990).

In addition to these essential functions of government, a number of further public goods are considered as potentially growth-enhancing. The operation of a high-quality physical infrastructure as well as basic educational services clearly fall under this category, given that governments will produce or provide these goods more efficiently than markets. At least according to Welfare Economics, market-failures from public goods, information asymmetries, (network) externalities, and natural monopolies, can be corrected by different categories of public spending (and also by taxation or regulation measures, all subject to cost-benefit-considerations), thus potentially leading to a more efficient allocation of scarce resources through additional government health expenditure, spending on environmental issues, etc.

Beyond such core allocative functions the Musgravian tradition of Public Finance (*Musgrave*, 1959) advocates a distributional role as well as a stabilization function of government spending. Although not evidently linked with the goal of enhancing economic growth, government spending on these two functions nevertheless has an impact on growth performance, which may be either positive or negative. Higher government spending and a larger public sector may be better able to stabilize the economy if it is hit by macroeconomic shocks (e.g. *Fatás – Mihov*, 2001), which might also be conducive to longer-run growth (e.g. *Ramey – Ramey*, 1995; *Martin – Rogers*, 2000). Higher social transfer spending may not only improve the distribution of income and wealth, and thus satisfy political equity considerations, but may also improve the functioning of labor markets and – under certain circumstances – reduce social conflict in society and thereby enhance growth (e.g. *Perotti*, 1996).

On the other hand, the debate about the appropriate role and size of the state has also shown that in general an ever increasing government sector, as measured by total spending, will slow down or inhibit growth for a number of (partially interconnected) reasons:

- Disproportionally increasing distortionary effects of higher levels of taxation to fund increasing expenditures are detrimental for growth, probably also depending on the tax structure. This will be discussed in more detail in section 3.

- Long-run growth effects of most (if not all) public spending categories are subject to diminishing marginal returns, i.e. at higher expenditure levels the marginal productivity of additional public spending is expected to decline. Also, the stage of development of a country will matter. Highly developed countries probably require a different expenditure composition as compared to less developed or transition economies.

- Several types of expenditures yet create disincentives for the recipients (households as well as enterprises), leading to a crowding out of productive private spending and a reduction of economic efforts of beneficiaries, which, in turn, impedes growth.

- Inside the public bureaucracy resources are often wasted and/or used inefficiently, due to lack of appropriate incentives. Public sector governance will play a crucial role in this respect, as inefficient provision of public services is more likely if institutions are weak. This effect will exacerbate if expenditure levels are high.

Summing up, the theoretical link between government expenditure and economic growth is rather complex. At least, the relationship between public spending and growth appears to be of a non-linear type, depending on factors like type of expenditure under consideration, initial spending level, internal efficiency of public provision, and the level and structure of taxation. *Figure 2.1* illustrates the theoretical line of reasoning.

Figure 2.1: Theoretical relationships between government expenditure and long-run growth
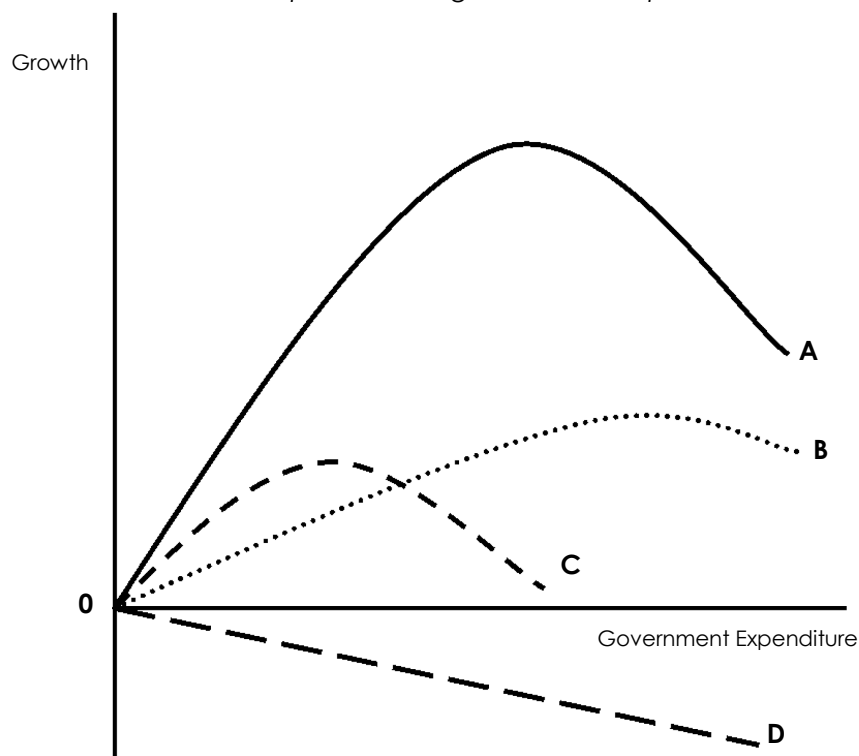
Source: WIFO, based on *European Commission* (2002).

Even highly productive spending types (illustrated by the solid line A) that are particularly conducive to economic growth will have a hump-shaped relation to economic growth. The relationship as indicated by curve A however is based on the most efficient way of production, as well as the least distorting way of tax financing. If the task is performed poorly by the government bureaucracy, or if spending is funded in an inefficient way, this is reflected by a relationship depicted by the dashed line C, for example. Less productive spending categories have a weaker relation to growth (at any given level of taxation), as is illustrated by the dotted line B.[1] In any case there is a theoretical optimum in which a certain level of public expenditure maximizes economic growth, given the disincentive effects of taxation and the level of bureaucratic efficiency.

An extreme case is a spending type that almost exclusively serves government officials and creates no additional value for society. This is stylized by the continuously downward sloping broken line D.[2] This also means that we have to take into account as an implicit assumption, that governments tend to concentrate spending first on the provision of the most productive goods and services, so that larger governments increasingly turn to spend more on goods and services that are less conducive to growth. Empirically, these nonlinear effects between spending levels and economic growth are not easy to test because governments do not necessarily prioritize core productive functions of government responsibility over other forms of intervention. Ultimately, as a clear-cut theoretical relation cannot be derived, it is a matter of empirical testing whether and which types of government spending should be classified as 'productive' or 'unproductive'.

Keeping in mind the numerous problems and pitfalls of econometric growth analyses (e.g., *Durlauf – Johnson – Temple*, 2005), some reasonably robust empirical results will serve us as a guideline for an international comparison of the growth-friendliness of government expenditure levels and structures. We will elaborate on this in the following sub-sections.

2.2 Size and structure of government spending

2.2.1 *Aggregate expenditure*

The most commonly used measure for government size is its expenditure share over GDP. As noted above, there is some evidence that high aggregate spending levels can be an impediment for growth. At least, even if empirical results are sometimes not robust, no recent study finds a positive relationship between long-run growth and high total public expenditure levels.

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[1] If government inefficiency and/or tax distortions increase line B would be shifted downwards accordingly.

[2] One may think about large infrastructure projects which frequently create perverse incentives that encourage promoters to underestimate costs and overestimate benefits in the business cases for their projects in order to gain approval and funding. See *Flyvbjerg* (2009).

To get a first impression on the level of government spending, we employ a sample of 36 OECD- and EU27-countries[3], and display 5-year-averaged values over the years 2004-2008 in *Figure 2.2.*[4] A 5-year-period is chosen in order to smooth out effects of the business cycle on spending levels. 2009 is not included as during that year most countries' spending-over-GDP ratios are biased upwards, due to a rapid GDP decline plus fiscal stimulus programs as a response to the recent Financial Crisis and the Great Recession.[5] The average 5-year spending level in the sample was 42.1% of GDP, with a minimum of 27.9% (Korea) and a maximum of 52.9% (France). Primary spending levels amounted on average to 39.9% of GDP, with a maximum of 50.9% (Sweden) and a minimum 26.7% in Korea. Interest payments reached on average 2.2%, but Greece and Italy already faced an interest burden of 4.8% of GDP over 2004-2008. In any case, interest payments are considered as least productive spending type, as they are exclusively related to past political decisions, and reduce the margin for strategic future-oriented spending of governments currently in office.[6]

Figure 2.2: Aggregate government expenditure shares
Averages 2004-2008, in % of GDP
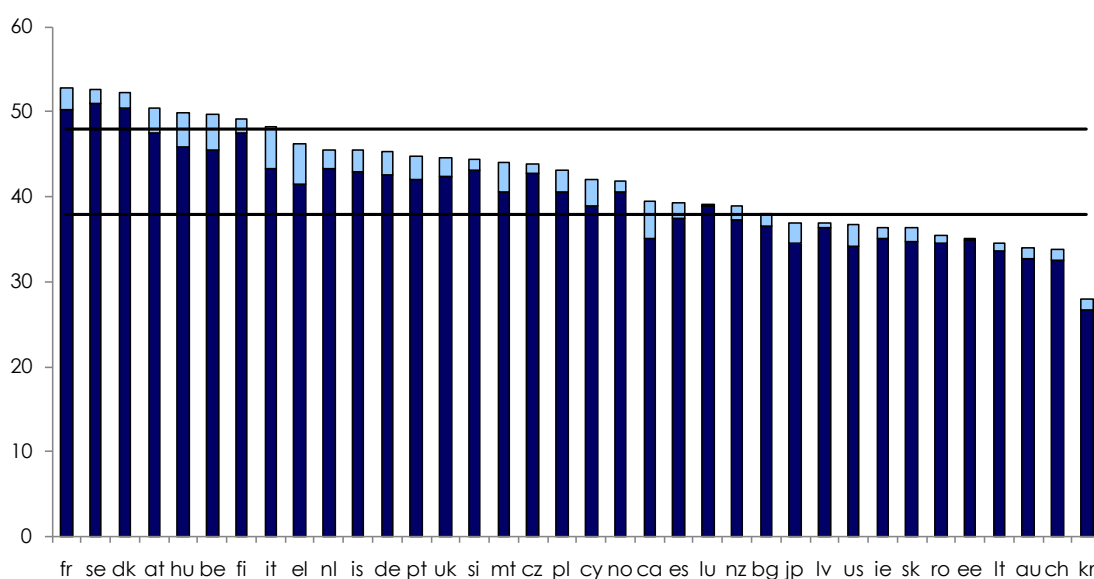
Source: EUROSTAT, OECD, WIFO calculations.

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[3] The sample includes all 27 EU-members plus all OECD-members that are not members of the EU27, except for Mexico, Israel, Chile and Turkey, both due to a lack of data and structural dissimilarities.

[4] If not noted otherwise, we always refer to general government figures. Of course, the degree of decentralization of a country's fiscal responsibilities may also have an effect on the growth effects of government spending. These issues are, however, not dealt with in this paper. See, e.g., *Schaltegger – Torgler* (2006).

[5] Except for Malta and Iceland all countries in the sample increased primary spending over GDP between 2008 and 2009. In Iceland, primary spending already in 2007 exploded from 39.7% to 54.2% of GDP (2008). A simple regression shows that spending increases were somewhat larger in countries with an initially smaller spending level in 2008.

[6] The correlation between primary spending and interest spending is only weakly positive (+0.27 in the sample over the years 2001-2010).

Somewhat arbitrarily, we can divide the sample of 36 countries into three sub-samples according to average aggregate spending levels over 2004-2008. The group of big spenders consists of countries with a mean expenditure-to-GDP-ratio above 48%.[7] The small government group is made up of countries with average spending levels below 38% of GDP, approximately the mean spending level minus one standard deviation.[8] The medium-spending group consists of countries with a mean expenditure share between 38% and 48% over 2004-2008.[9]

Figure 2.3 illustrates the development of total spending over GDP from 1995-2009 in three country groups of 'old' EU15, EU12 (new member states since 2004), and 9 remaining OECD-members which are not EU-members.[10] In order to mitigate the influence of outliers, we report median values in the respective country groups. Expenditures are much higher in EU-15 as compared to the two other groups and jumped back above 50% of GDP in 2009. The difference to EU12 and remaining OECD-members is substantial and amounts to over 8 (over 10) percentage points in some years.

Figure 2.3: Median government expenditure shares of EU15, EU12 and further OECD-countries 1995-2009, in % of GDP
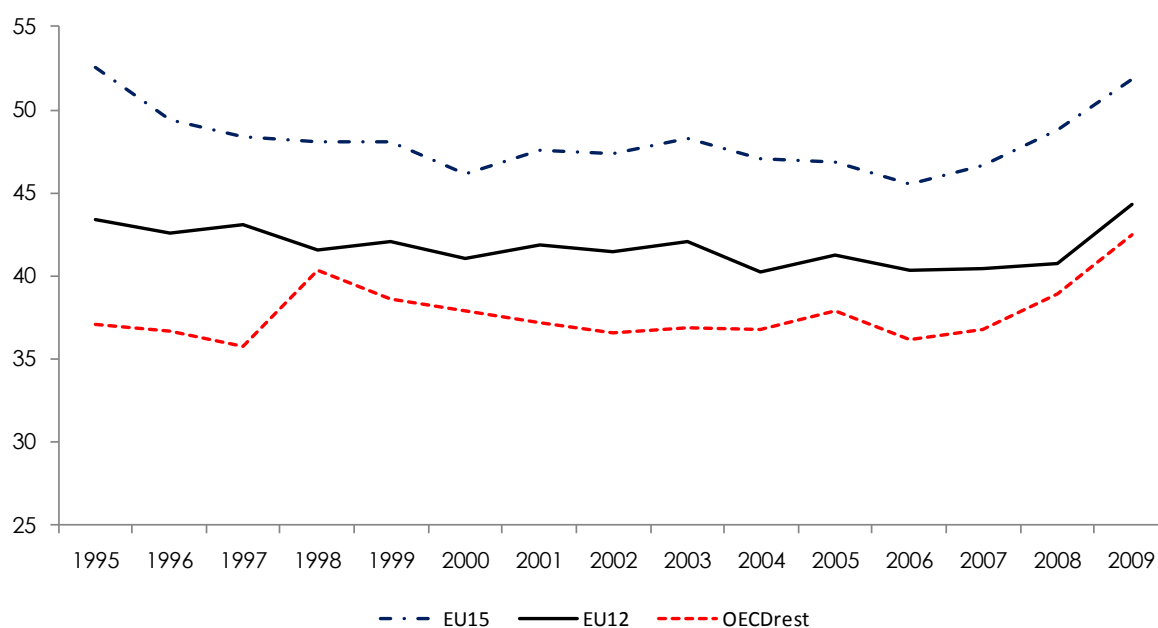
Source: EUROSTAT, OECD, WIFO calculations.

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[7] This group is composed of France, Sweden, Denmark, Austria, Hungary, Belgium, Finland and Italy.

[8] Korea, Switzerland, Australia, Lithuania, Estonia, Romania, Slovakia, Ireland, the USA, Latvia, Japan and Bulgaria all belong to the small-spender group.

[9] Greece, the Netherlands, Iceland, Germany, Portugal, the United Kingdom, Slovenia, Malta, Czech Republic, Poland, Cyprus, Norway, Canada, Spain, Luxembourg and New Zealand (listed from higher to lower shares).

[10] Australia, New Zealand, Japan, Korea, Iceland, Norway, Switzerland, USA, and Canada.

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In all groups we observe a similar pattern: At the end of the 1990s, overall expenditure quotas were slightly reduced and increased again substantially already in 2007.

In the European periphery we also observe a substantial heterogeneity of government spending (see f*igure 2.4*)

Figure 2.4: Aggregate government expenditure shares in the European periphery
Averages 2004-2008, in % of GDP
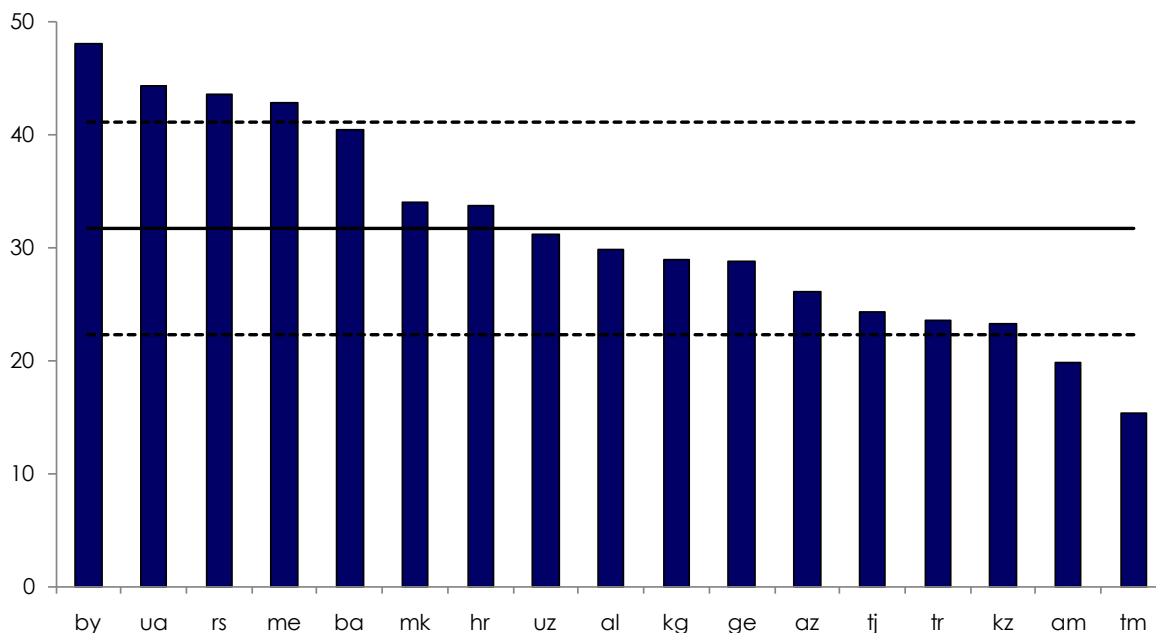
Source: EBRD (data for Armenia: central government only).

We proceed by taking a look at the two largest spending components in an 'economic classification', i.e. government consumption (2.2.2) and transfers (2.2.3). In section 2.2.4 we turn to a functional view, taking into account recent empirical evidence on productive government spending.

2.2.2 Government consumption and modes of service provision

A further (sub-) dimension of public sector size and structure is measured by the resources used up in the production and provision of government services. In our 36 countries sample, government consumption makes up (on average) 46.1% of total spending over the years 2004-2008. Public consumptions spending is often argued to be negatively associated with growth performance (e.g. *Barro, 1991; Easterly – Rebelo, 1993; Romero-Ávila – Strauch, 2008; Afonso – Alegre, 2008). Dowrick* (1996) reports that in a sample of 116 countries growth rates are increasing with government consumption expenditures up to a level of around 12% of GDP, while above that level its impact turns to become negative.

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Figure 2.5: Government consumption expenditure shares
Averages 2004-2008, in % of GDP
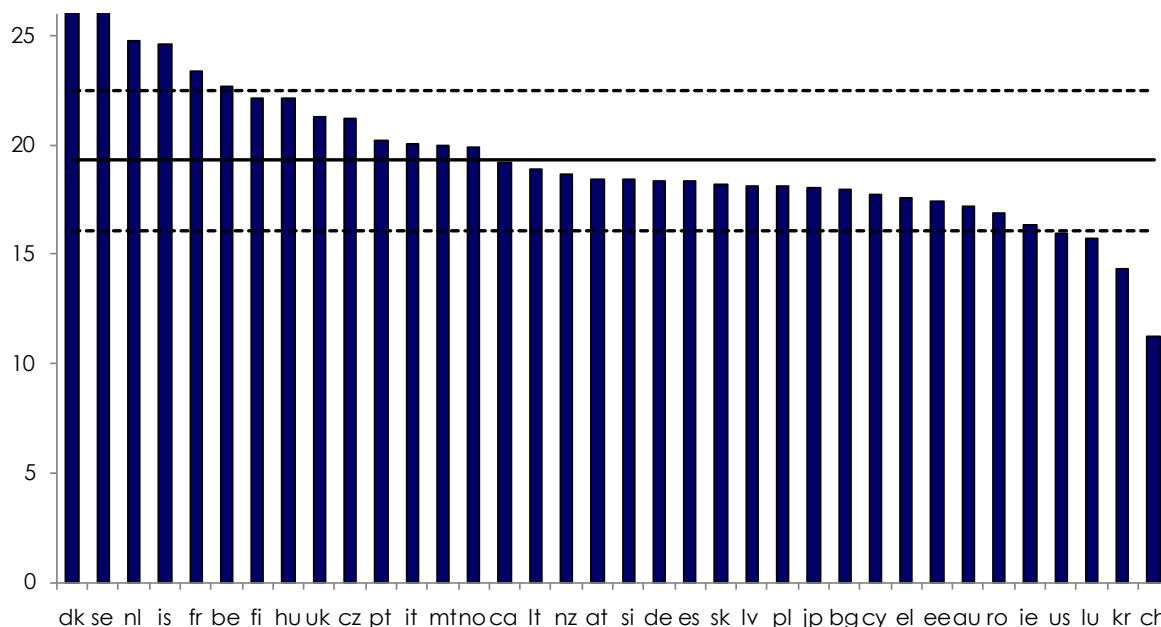
Source: EUROSTAT, OECD, WIFO calculations.

Figure 2.5 shows that 12% of GDP is a much smaller share than what OECD- and EU27 countries realized on average. The 36 countries observed government consumption of 19.3% of GDP on average (dashed line). The upper and lower lines mark the boundaries of the sample mean plus/minus one standard deviation of 3.2 points. In particular, Denmark, Sweden, the Netherlands, Iceland and France show high government consumption levels of over 23% of GDP. Switzerland's 11.3% are less than half of these countries' levels. Government consumption shares on GDP remained almost constant over the past 10-15 years in the country sample. Comparing the 5-year-averages over the period 1994-1998 to GDP shares over 2004-2008, significant reductions can only be observed in Estonia (-5.2 percentage points) and Lithuania (-4.6 percentage points). In the United Kingdom, government consumption even increased by 2.4 percentage points.

An often negative connotation of government consumption is rooted in the assumption that resources are wasted by the public bureaucracy (*Niskanen*, 1971; *Moe* 1990). At least partly as a reaction to the critique on the quality of internally produced services, in the 1990s governments in some countries began to outsource the production of a number of services to autonomous agencies and even private enterprises (*OECD*, 2005). A re-organization from own production by contracting out the provision of public services will improve efficiency if

agencies and private firms are more competitive than traditional public administration. Hence, the structure of government consumption may have changed over the years.[11]

A number of countries, most notably Austria, Canada, Germany, Sweden and Slovakia have reduced significantly their expenditure for the compensation of public employees – which accounts regularly for the largest part of government consumption – in relation to GDP since the mid-1990. Comparing the 2004-08 averages with the 1994-98 (or 1995-99) averages, the share of government employee's compensation over GDP fell by only 0.2 percentage points in the total sample. Cyprus, Switzerland, Malta, Denmark and Greece observe a share of salaries for public sector employees in total government consumption high above the sample mean of 55.7%; Japan, the Czech Republic, the Netherlands, Germany and Slovakia have shares below 40% (see f*igure* 2.6).

Figure 2.6: Compensation of employees as a share of government consumption expenditure Averages 2004-2008
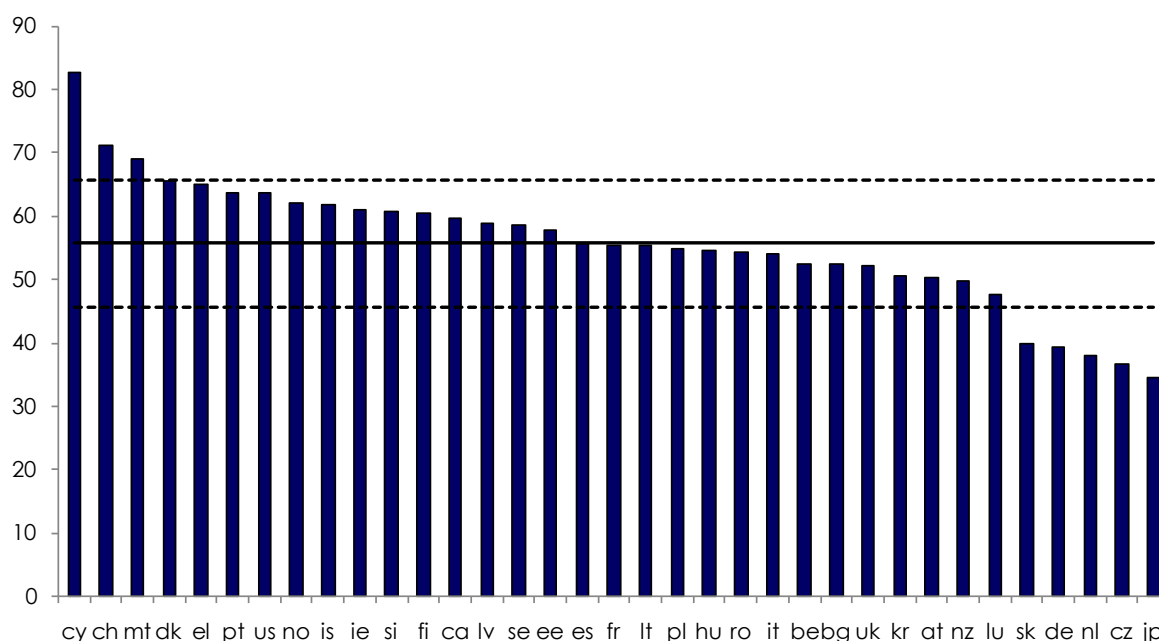
Source: EUROSTAT, OECD, WIFO calculations.

Yet, we cannot conclude *per se* that government consumption in terms of GDP shares is lower if service provision is contracted out to external producers. Switzerland and Cyprus with the highest share of public salaries have low government consumption expenditure levels; Denmark, on the contrary, with a similarly high share of internal production expenses observes highest consumption expenditure. On the other hand, the Netherlands rely a lot on the

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[11] In terms of SNA transaction aggregates such a re-organization leads to an increase of intermediate consumption and social transfers-in-kind. See *Pilichowski – Turkisch* (2008).

purchase of goods and services from external producers, but they also have a relatively high total government consumption level. To be sure, principal-agent and transaction cost theory would not support a simplistic view that contracting-out public services leads to cost savings and reduced expenditure levels, as control problems could be much more severe if production of services is carried out by private producers or self-governing agencies as compared to a hierarchical administrative structure (*Tirole*, 1994).

Further critique of a line of reasoning that government consumption is always bad for growth stems from the fact that several productive government functions, say, legal protection or education services, are characterized by a high fraction of wages and salaries, which are classified as consumption spending. Hence, a distinction between unproductive government consumption and (productive) investment is seriously flawed. We will return to this question in the next sub-section.

2.2.3 *Productive vs. non-productive government spending*

Preliminaries

The core of endogenous growth models with public spending is that not (only) the total volume of government expenditure is relevant for growth but its composition and, thus, the allocation between expenditure types which are growth enhancing (productive), growth depressing or neutral (non-productive) with respect to economic growth. From the viewpoint of these theories it is in particular the components of government spending that enter directly or as intermediate public inputs the production function of private enterprises which are expected to have a positive impact on a country's growth performance (*Barro*, 1990; *Gemmell – Kneller – Sanz*, 2011).

Although the theoretical concept is quite clear it is, however, not so obvious which types of government spending should be counted as productive. Empirical research supports a substantial positive impact of some spending components on growth, but there is still no agreement on which categories. In their survey of the relevant literature *Bayraktar – Moreno-Dodson* (2010) guess that "[o]ne possible explanation for the mixed results in the literature is sample selection. What we expect is that public spending can improve growth performance of countries only if they are able to use these expenditures productively." This means that the productivity of several public spending types, i.e. their growth-promoting effects, depends critically on the institutional and economic environment of a country.

Another important point of the ongoing debate on productive and non-productive public expenditure is that one should take a more functional perspective. What matters is not the formal economic categorization of several spending types into consumption or investment spending per se, but for which function the money is used. Wages and salaries which are – by definition – a substantial part of government consumption can be employed for highly productive uses (e.g. educational issues) but also for unproductive purposes (e.g. salaries for outdated bureaucracies). We do not have the space to re-open the whole theoretical or

empirical discussion here, but our reading of the literature leads us to conclude that there is a broader consensus (or less controversy) on the categorization of some spending components, while for some other components the debate is still controversial and unresolved.

Table 2.1: Components of productive and non-productive government spending

Expenditure type (theoretical)	Expenditure type (SNA, COFOG)	Remarks on productive impact
Productive		
Core public services	General public administration	basic services for organization of democracy and public administration
	Public order and safety	includes spending on police, courts etc.
	Defense	growth effects disputed, dependent on external threats (?)
Infrastructure spending	Public investment in Economic Affairs	investment in transport and communication as well as other infrastructure services
	Housing and community services	predominantly spending for local infrastructures (e.g. water supply)
	Environmental protection	growth effects disputed
Merit goods/Externalities	Education	increases productivity of labor, but could also be provided privately in principle
	Health	increases productivity of labor, but could also be provided privately in principle
Non-productive		
Redistribution	Economic services	sectoral subsidies, often with sclerotic effects, although some forms of horizontal subsidies (R&D-spending) are productive
	Social protection	basic social protection may be productive if it improves labor market functions and reduces social tensions
Other	Recreation, culture, religion	possible indirect positive impact on growth via health channel
Interest payments	Interest payments	exclusively past-related spending

Source: WIFO compilation, based on *Gemmell – Kneller – Sanz* (2011). Supplemented by European Commission (2002), *Semmler, et al.* (2007); *Barrios – Schaechter* (2008), *Bayraktar – Moreno-Dodson* (2010).

In *Table 2.1* we report a categorization which is based on *Gemmell – Kneller – Sanz* (2011) with several adaptations and modifications based on European Commission (2002), *Barrios – Schaechter* (2008) and *Bayraktar – Moreno-Dodson* (2010). Note that in general the law of diminishing returns applies, i.e., 'too much' of a single spending item – taking into account a country's economic stage of development – is always bad for growth (see section 2.2.1). In addition, inefficiently provided services have a smaller or even negative growth impact. Moreover, it should be kept in mind that it is probably always possible to find (assume) a link between certain components of government spending and growth. The assignments shown in *table 2.1* are based on results of macroeconomic research on the impact of fiscal policies. Microeconomic evidence may lead to partly different conclusions.

Core public services

Expenditures for core public services consist of spending for general administration, public order and safety, and defense. These three spending components are to a great deal non-rival in consumption and constitute typical public goods. Their growth impact stems from the fact that a minimum of public administration services is required in all (democratic) systems, as well as institutions of enforcing law, order and public safety, probably also against external threats. What makes this spending category special is that there is almost no substantial private expenditure share for such purposes in most countries. This is a strong signal that it is in the predominant responsibility of governments to provide these services.

Figure 2.7: Government spending on core public services
Averages 2004-2008, in % of GDP
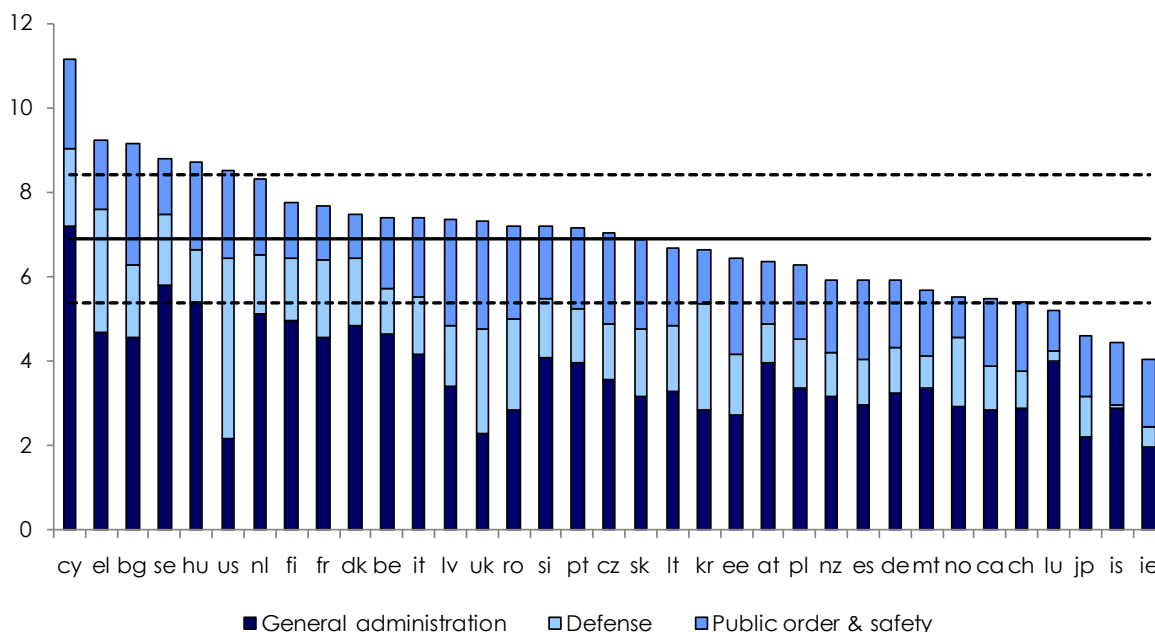
Source: EUROSTAT, OECD, WIFO calculations.

Average expenditures on core public services in 35 countries amount to 6.9% of GDP over the years 2004-2008.[12] The smallest expenditure ratios (less than 5% of GDP) are found in Ireland, Iceland and Japan; Cyprus, Greece, Belgium, Sweden, Hungary and the USA observe the highest spending on core services in relation to GDP (see *figure 2.7*). In relation to total spending (over the years 2004-2008), expenditure on core services on average equal 16.9%, with a range between 9.8% (Iceland) and 26.5% of total spending in Cyprus.

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[12] Source: COFOG-databases of EUROSTAT and OECD. Interest spending that is allocated to COFOG-division 1 (General Public Administration) is deducted. For New Zealand, Canada, and Japan, data are only available until 2005/2006/2007. Hence, we calculated an average for shorter time periods. Data for Switzerland include only the years 2007 and 2008, as earlier data are unavailable. Data for Australia are not available.

To some extent, these differences can be explained by spending on military services. Over the respective period, the USA, for example, spent more than 4% of GDP on defense, followed by Greece with almost 3% of GDP. On the other hand, some countries (Iceland, Ireland, Luxembourg, Malta, Austria, Japan and Switzerland) observed defense expenditure of less than 1% of GDP. This partly shows country preferences for military spending, but might also indicate a perceived reduced necessity due to a lack of external threats as well as some free-riding on other countries' defense efforts.

Subtracting defense spending, figure 2.8 illustrates no clear evidence that expenditure on general administration and public order and safety are characterized by economies of scale. Neglecting the obvious outlier Cyprus, a hump-shaped relation between population size (in logs) and core public service spending appears to exist, with smaller expenditure ratios in very small and very large countries.

Figure 2.8: Government expenditure on general administration, public order & safety) vs. population size
Averages 2004-2008, in % of GDP
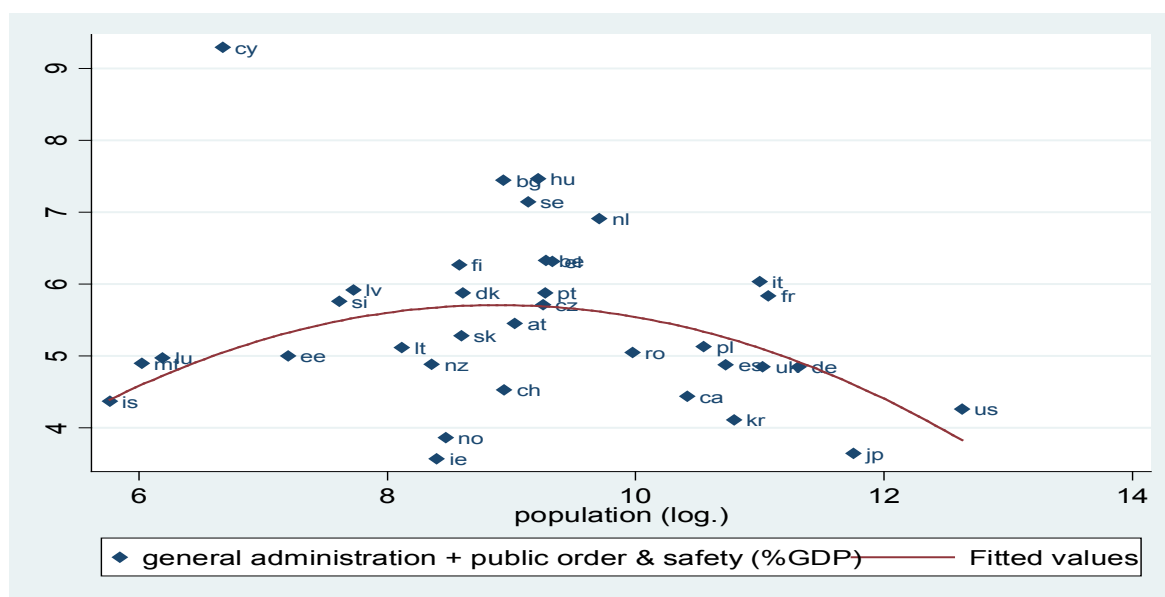
Looking at country groups we find median spending on core services (without defense) in EU15 slightly increasing from 1995-2009. Expenditures are about 1 ½ percentage points higher than in the remaining OECD countries. The EU12 member states have reduced their spending over the past 15 years (on average), so that the group-median is now slightly below that of the EU15.

Figure 2.9: Median government spending on general administration, public order & safety in groups of EU15, EU12 and further OECD-countries
1995-2009, in % of GDP
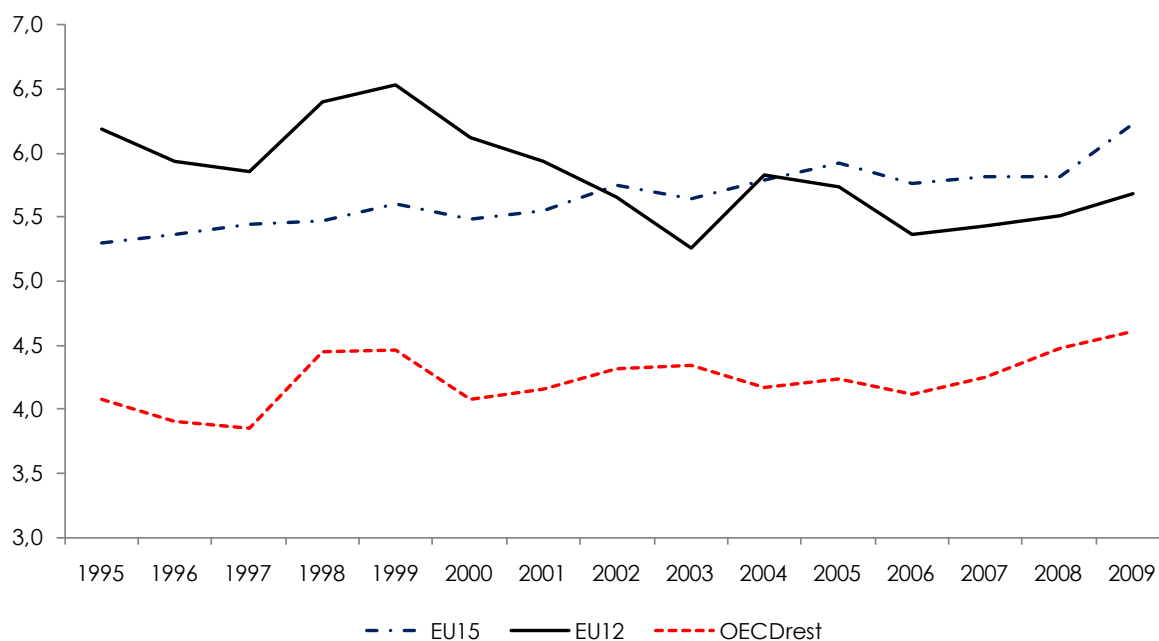
Source: EUROSTAT, OECD, WIFO calculations.

Infrastructure spending

A high quality physical infrastructure is a productivity-enhancing input in private production processes and thus a major driver of a country's growth performance (e.g. *Aschauer, 1989; Romp – de Haan,* 2007; *Crafts*, 2009; *Egert – Kozluk – Sutherland*, 2009). Public infrastructure capital includes utilities and devices for transport and communication, energy and water supply etc. Government spending for infrastructure purposes is frequently approximated by gross fixed investment in the government sector. However, such a statistical recording entails a number of difficult-to-solve problems (e.g. *Alegre et al.,* 2008):

- Important parts of a country's infrastructure are provided by private firms, often formerly state-owned enterprises (SOEs). Although many of these enterprises are still under government control, investment spending is counted as private sector expenditure.

- Not all government investment is infrastructure spending. Substantial parts of government investment is spending for long-lived goods (cars, computers, etc.) or for other purposes (e.g. sporting halls or public administration buildings) that should not be recorded as infrastructure investment.

- Not all relevant infrastructure spending is government investment in SNA classification. For example, governments subsidize former SOE to provide services. Maintenance spending

required to preserve the necessary infrastructure quality is often counted as consumption expenditure in the SNA statistics.

Hence, we decided to use a somewhat different classification: According to our definition, infrastructure spending encompasses total government expenditure (current _and_ investment spending) in COFOG divisions 5 (Environmental protection) and 6 (Housing and community amenities) plus gross government investment in division 4 (Economic affairs). In our view, this classification captures best of what should be subsumed under the heading of infrastructure spending, which is not necessarily identical to investment expenditure.

Mean infrastructure spending defined along these lines is on average 2.8% of GDP in the sample (averaged over 2004-2008).[13] The range is between 1.4% (Denmark) and 5.2% (Czech Republic). The high spending group also includes Korea, Ireland, Japan, and Romania, whereas Austria, Switzerland, the USA, Finland and Belgium all belong to a group with low infrastructure spending (_figure 2.10_). In relation to total government spending, infrastructure expenditure make up on average 7%. Smallest shares of less than 3% of total spending are observed in Denmark and Austria; the highest shares in Korea (16.1%) and Ireland (12.1%).

Figure 2.10: Government spending on infrastructure
Averages 2004-2008, in % of GDP
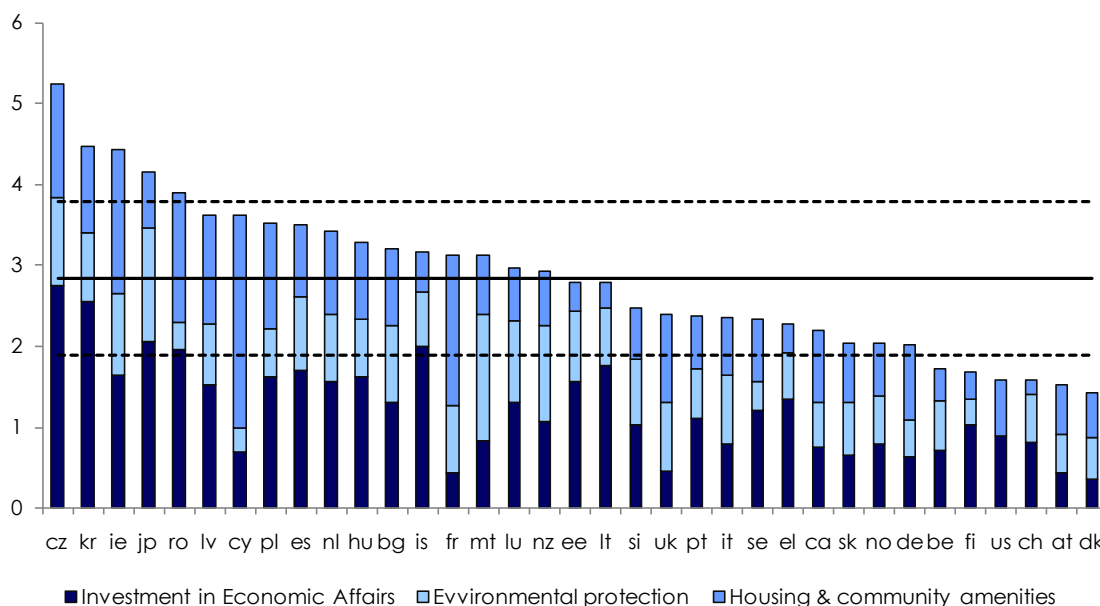
Source: EUROSTAT, OECD, WIFO calculations.

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[13] With respect to data availability and gaps in the data, see footnote 11.

Figure 2.11: Government spending on infrastructure versus GDP per capita 2003

Source: Penn World Tables 7.0, EUROSTAT, OECD, WIFO calculations
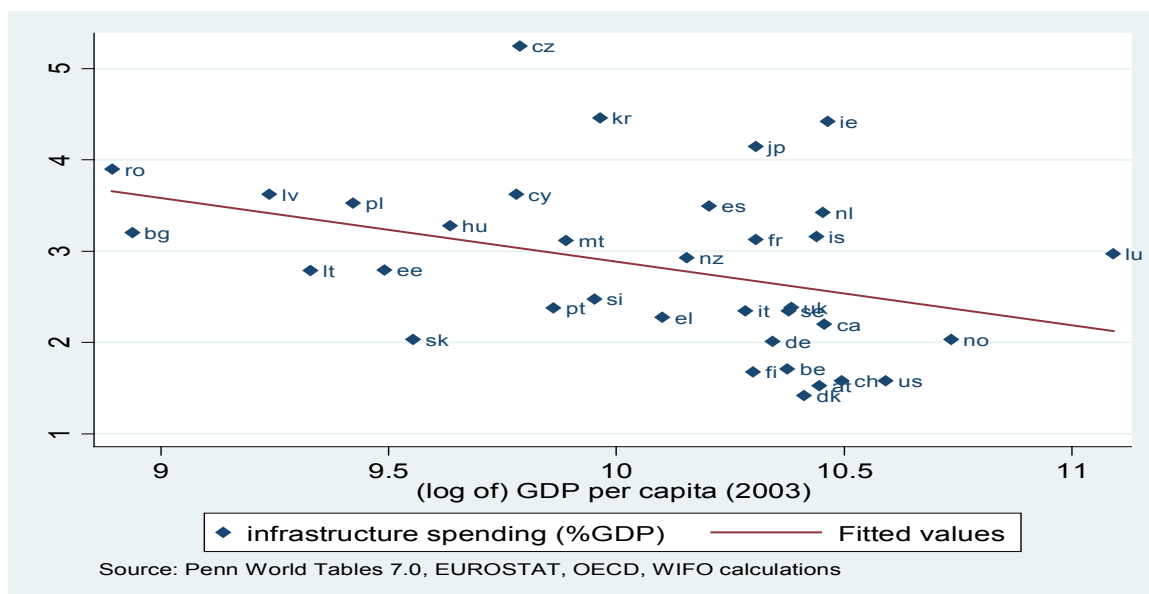
Figure 2.11 plots infrastructure investment levels over 2004-2008 against real GDP per capita (in international US-Dollars (logs) in 2003.[14] A strong negative relation indicates that countries in a catching-up process tend to have higher infrastructure expenditures, whereas countries that already have a high GDP per capita, and presumably a higher quality public capital stock, observe smaller spending in relation to GDP. Smaller government spending on infrastructure may therefore also be a sign of diminishing returns to public capital (see also *Kamps*, 2006).[15] Empirical evidence for such a saturation effect is, however, not very strong (*Välilä – Kozluk – Mehrotra*, 2005), but some country data may be severely biased by off-budget investment that is accounted for as private sector spending.

Figure 2.12 illustrates that since the mid-1990s in EU15 and "Rest-OECD" groups infrastructure spending remained almost constant in relation to GDP. The new EU-members, clustered in group EU12 appear to foster strongly public infrastructure investment since the beginning of the 2000s.

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[14] Data are from the Penn World Tables 7.0.

[15] In some countries new modes of financing infrastructures by Public-Private-Partnerships or outsourcing may also have contributed to a decline in government investment figures. For an empirical analysis of economic and political factors affecting government investment spending in Europe, see *Kappeler – Välilä* (2008) or *Pitlik* (2010).

Figure 2.12: Median government spending on infrastructure in groups of EU15, EU12 and further OECD-countries,
1995-2009, in % of GDP
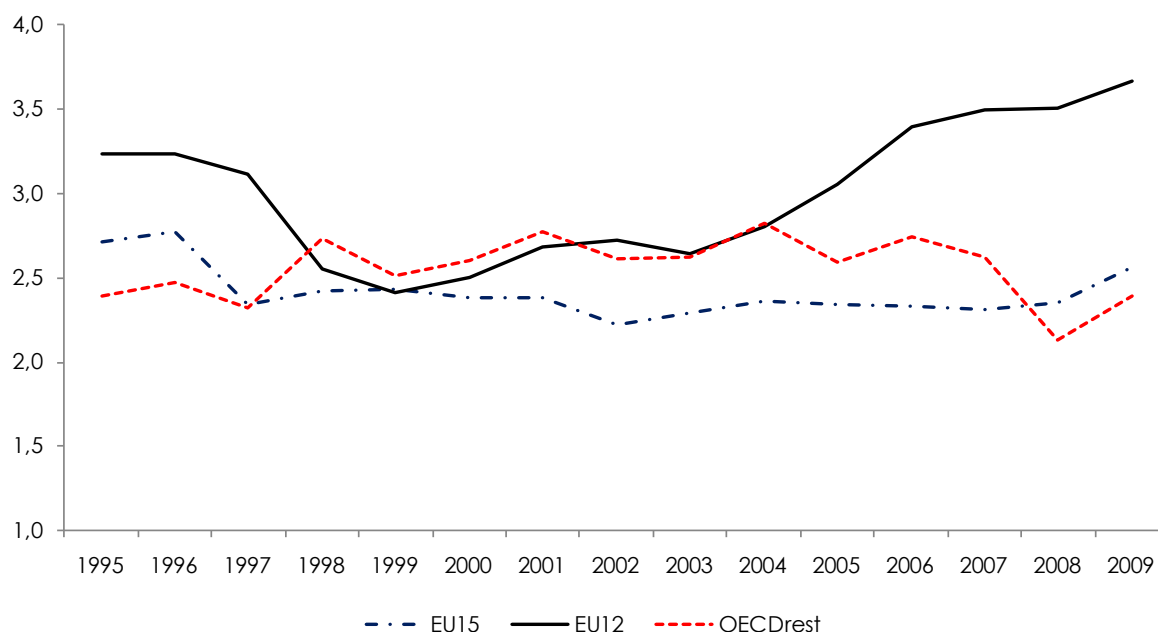
Source: EUROSTAT, OECD, WIFO calculations.

Spending on merit goods/externalities: education and health

A substantial share of government expenditure of modern Welfare States is devoted to spending on merit goods that – at least in principle – could be provided by markets as well. The two most prominent examples are education and health spending, although there is also some theoretical evidence that markets fail in the provision of basic education and health services due to information asymmetries and capital market imperfections. Nevertheless, from a purely allocative reasoning it is theoretically less clear whether governments should provide educational and health care services beyond some basic support level (*Poterba*, 1996).[16]

With respect to the growth effects of both spending categories the impact of human capital investment is common wisdom now (e.g. *Bassanini – Scarpetta*, 2002; *Baldacci et al.*, 2008). If public spending on education and health care improve human capital then this should show up in a better growth performance. Especially for economies that operate at the technology frontier human capital investment through education and health care improvements are of crucial importance (e.g. *Aghion*, 2008).

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[16] Recent empirical research fails to find significant non-pecuniary externalities that can be generated from schooling (*Acemoglu – Angrist*, 2000; *Ciccone – Peri*, 2006). *Cutler – Lleras-Muney* (2006) analyze possible causal relationships between education and health and the mechanisms behind them.

Figure 2.13: Government spending on education and health
Averages 2004-2008, in % ofGDP

Source: EUROSTAT, OECD, WIFO calculations.

Figure 2.13 illustrates a range of merit goods spending in the sample between 7.2% of GDP (Switzerland) and 16.3% (Iceland); average expenditure during 2004-2008 amounts to 11.4% of GDP. Education spending is remarkably high in Iceland, New Zealand, Canada and Denmark (over 7% of GDP), and comparably low in Greece, Romania, Slovakia, and Japan (less than 4% of GDP). Government health expenditures exceed 7.5% of GDP in Iceland, France, and the USA (several other countries observe levels of 7% and more), while spending in Switzerland is less than 2% of GDP.

These figures reflect a great many of factors, from different policy preferences, income levels and demographic structures to institutional determinants (organization and division of labor between private and public sector) and variation in the efficiency of service provision. There is contradicting evidence, for example, whether a higher share of elderly in the population is related to smaller education budgets (e.g. *Ladd – Murray*, 2006; *Busemeyer*, 2007) or increased health spending (e.g. *Hall – Jones*, 2007; *Breyer – Costa-Font – Felder*, 2010). *Fiorito – Kollintzas* (2004) show for a sample of European countries that government health and education spending does not crowd out but is rather a complement to private expenditure.

Figure 2.14: Median government spending on education and health in groups of EU15, EU12 and further OECD-countries
1995-2009, in % of GDP
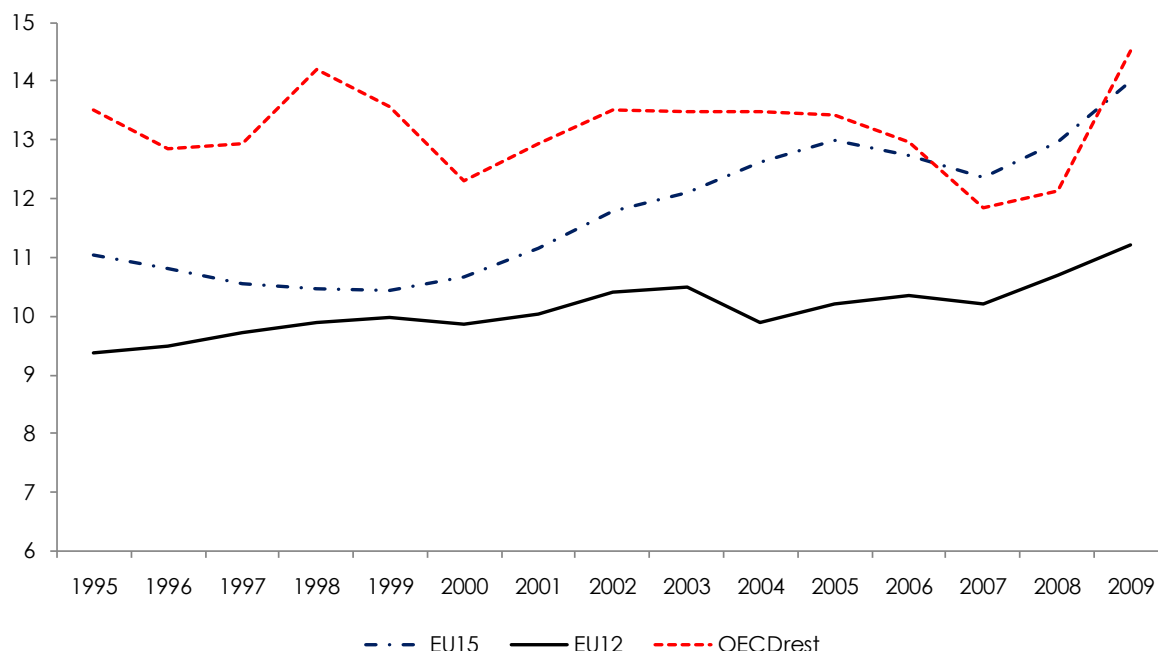
Source: EUROSTAT, OECD, WIFO calculations.

Figure 2.14 shows a small upward trend in spending on health and education over GDP in EU15 and EU12 according to the respective group medians. Spending in the remainder OECD-countries somewhat fluctuates between 12 and 14% of GDP. In EU15, the upward trend is mainly due to higher spending on health issues *in % GDP(, while education spending only increased slightly.

Redistributive spending

The impact of transfer payments on growth is theoretically ambiguous. On the one hand, redistributive spending may be long-run growth-enhancing if it helps to support and maintain social peace, correct labor market failures or enters as input in private production. *Lindert* (2004), for example, claims that social welfare spending is almost a 'free lunch' without (net) growth deterring effects. Properly designed capital transfers to enterprises may also stimulate growth by promoting private investment. On the other hand, redistributive spending will inhibit growth as it generates disincentives for potential recipients, or stimulate socially unproductive rent seeking (e.g. *Murphy – Shleifer – Vishny*, 1991). Empirical evidence shows mixed results, although studies that find negative effects of government transfers on economic growth appear to dominate (see e.g. *Romero-Ávila – Strauch*, 2008, but see also *Afonso – Furceri*, 2010). Government spending that is predominantly redistributive is generally categorized as non-productive.

Distinguishing between redistribution which is benefiting private households and redistribution benefiting enterprises (market producers), the fiscal size of redistribution can be illustrated statistically from an 'instrumental' ('economic') and a 'functional' classification perspective. The instrumental approach is more technical in that it classifies spending according to the formal beneficiaries of (monetary) transfers, regardless of the purpose of a transfer. Although this approach has its merits, we take a different route here and characterize redistributive spending from a functional view, which is also more in line with recent empirical studies of the growth effects of fiscal policies (e.g. *Gemmell – Kneller – Sanz*, 2011).

Figure 2.15: Government spending on social protection
Averages 2004-2008, in % of GDP

Source: EUROSTAT, OECD, WIFO calculations.

Figure 2.15 displays spending on social protection affairs. It includes cash benefits as well as transfers-in-kind and government services for social protection purposes.[17] Spending on these issues is 20% of GDP or more in Denmark, Sweden, France, Germany, Finland and Austria, whereas Korea, the USA, Iceland, Canada and Latvia spend less than 10% of GDP on social protection. Average government expenditure in the sample is 14.3% of GDP.

A substantial part of social protection expenditure is devoted to old-age pensions. *Figure 2.16* reveals a strong positive relation between demographic structures, as measured by the share of old-age persons (over 65 years) in total population and spending on social protection.

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[17] Note that this classification does not include health care spending as in the European System of integrated Social Protection Statistics (ESSPROS) categorization of social protection spending.

Figure 2.16: Spending on social protection conditional on the share of older persons on total population

Source: WIFO-calculations, based on EURSTAT, OECD
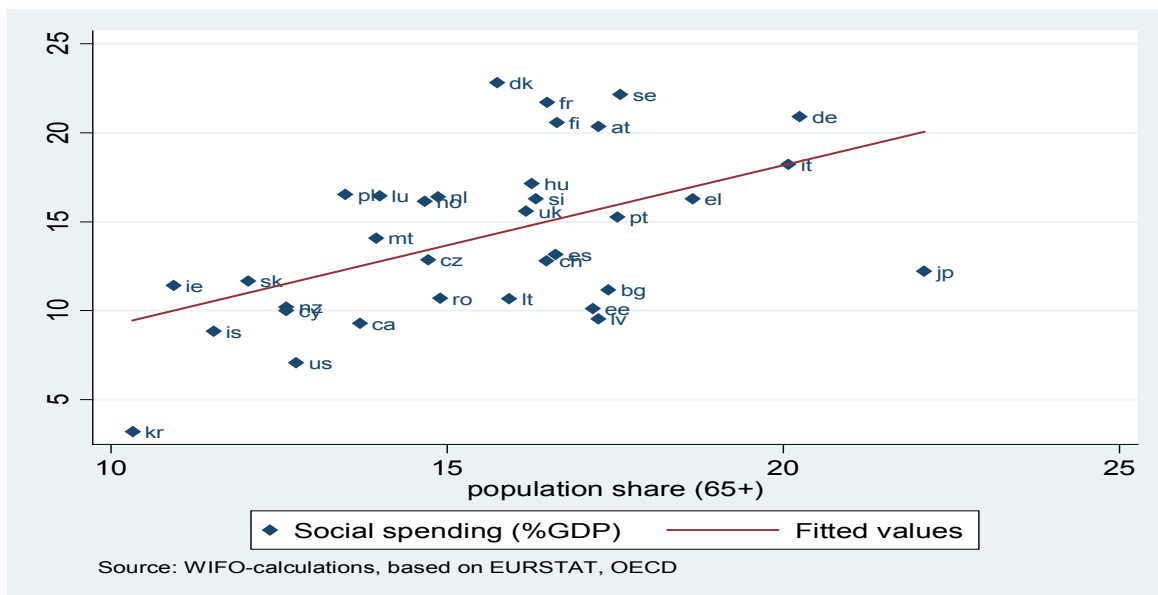
Figure 2.17: Median government spending on social protection in groups of EU15, EU12 and further OECD-countries

1995-2009, in % of GDP
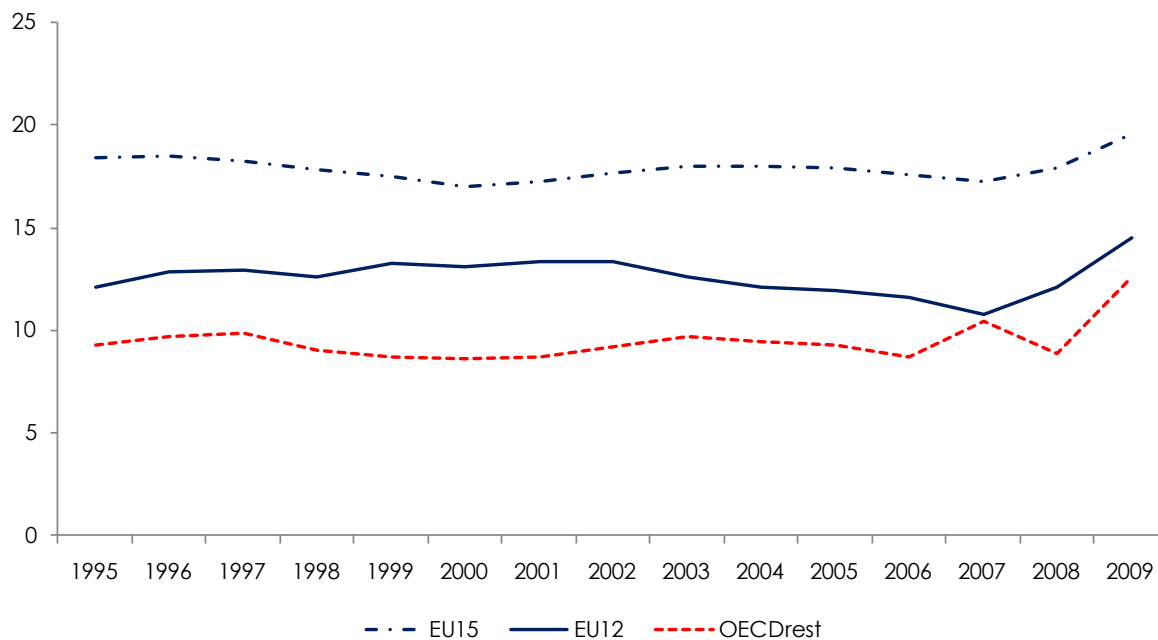
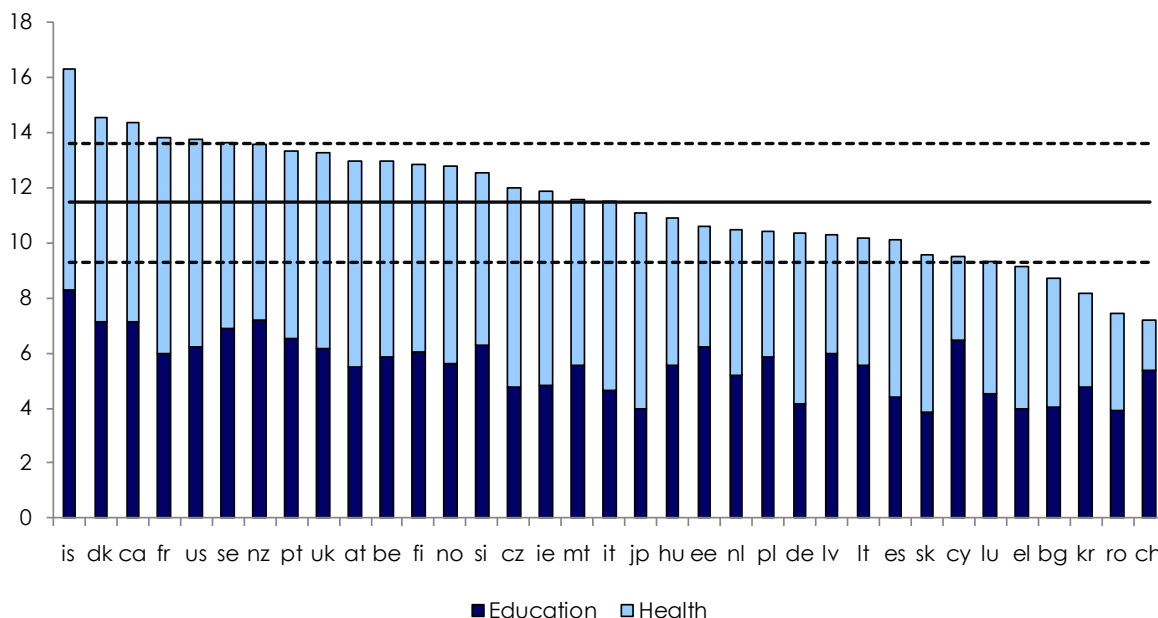Source: EUROSTAT, OECD, WIFO calculations.

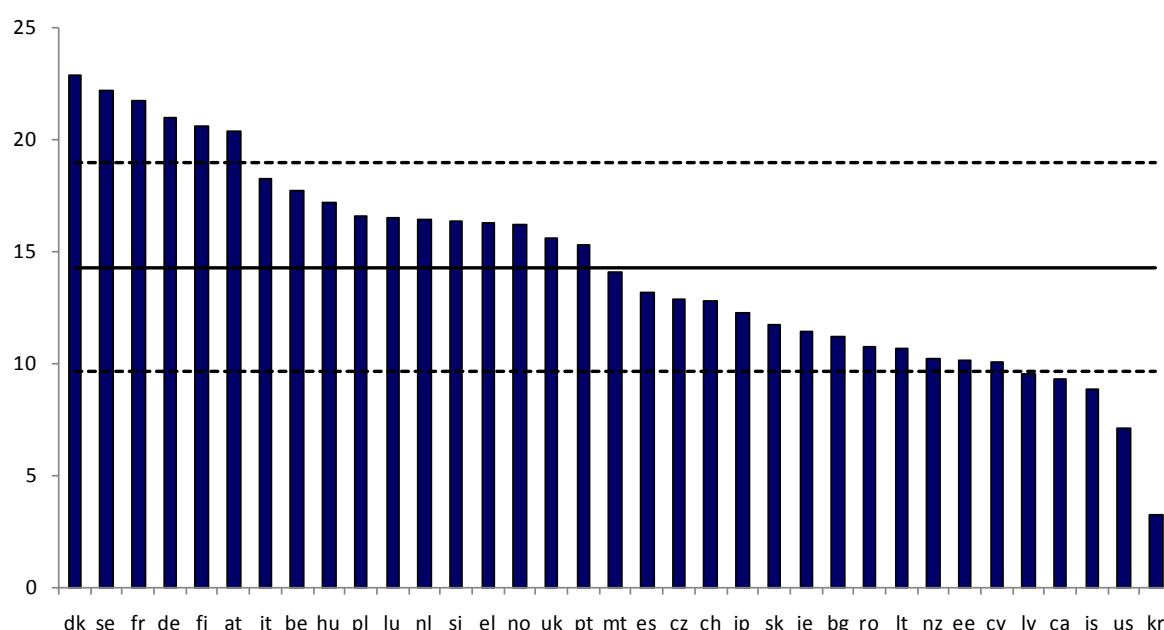Spending on social protection has broadly remained constant over the last 15 years in the three country groups, apart from annual fluctuations depending on the business cycle. In 2008/2009 we observe a strong increase in all country groups, devoted to the crisis (see figure 2.17). Median EU15 social protection pending as a share of GDP is still substantially higher than in EU12 and in "Rest-OECD". The difference to the remaining OECD countries amounts to 9 percentage points in some years.

A second type of redistributive spending takes the form of sectoral aid for private enterprises. Subtracting the probably productive investment spending, government support for specific industries and branches (e.g. agricultural or mining) as well as horizontal aid for several purposes (e.g. regional aid) is documented in COFOG-division 4, Economic Affairs. *Figure 2.18* illustrates that average government support over the years 2004-2008 was by far highest in Iceland, amounting to almost 7% of GDP. This is, however, due to Iceland's special aid during the banking crisis of 2008, which boosted spending from 3.7% of GDP (2007) to 16.9%.[18] Malta and Austria offer support slightly above 5% of GDP. The average spending level in the sample is 3.4% of GDP. Relatively little support is given by Japan, with slightly more than 2% of GDP.

Figure 2.18: Government spending on Economic Affairs (infrastructure investment deducted Averages 2004-2008, in % of GDP
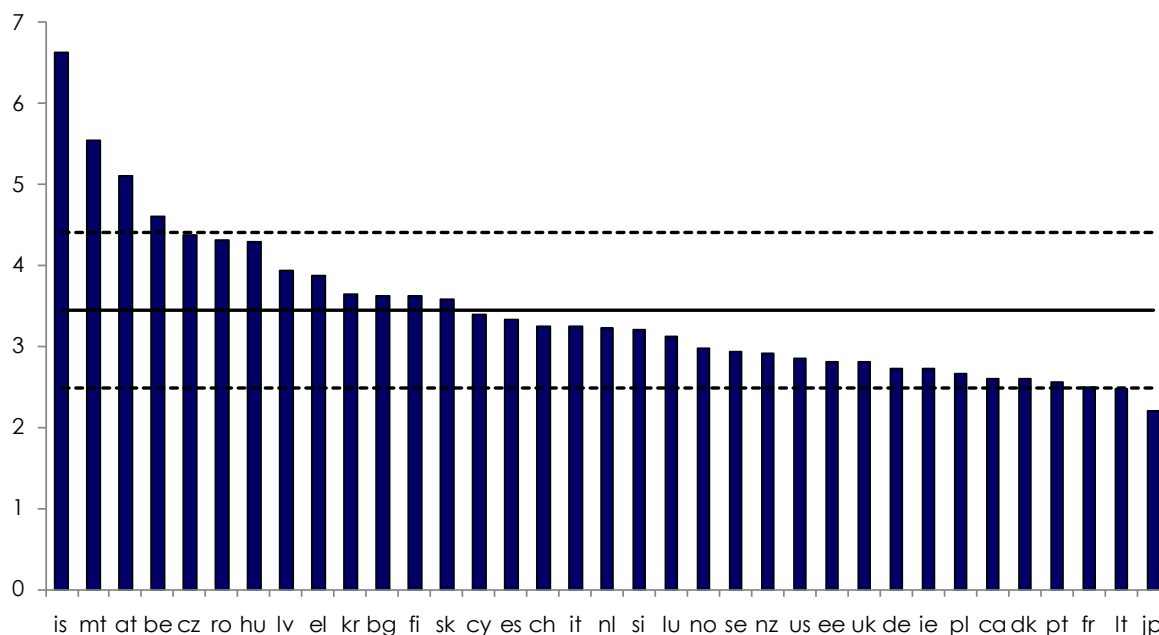
Source: EUROSTAT, OECD, WIFO calculations.

While median spending on Economic Affairs in EU15 and EU12 countries remained more or less constant over 1995-2009, EU12 countries observed a sizeable reduction during that period

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[18] If the 2008 figure is not used for calculation of the mean, then the Iceland figures drop to 4.1% of GDP.

(see figure 2.19). This should be partly due to the fact that local industries in the new member states are not in need of subsidies any more in order to become competitive in world markets. It probably also reflects the need for subsidy cuts to fulfill the requirements of state aid in the European Union. In 2009, the median spending ratios of all three country groups lie in a small range of 3-4% of GDP.

Figure 2.19: Median government spending on Economic Affairs (infrastructure investment deducted) in groups of EU15, EU12 and further OECD-countries
1995-2009, in % of GDP
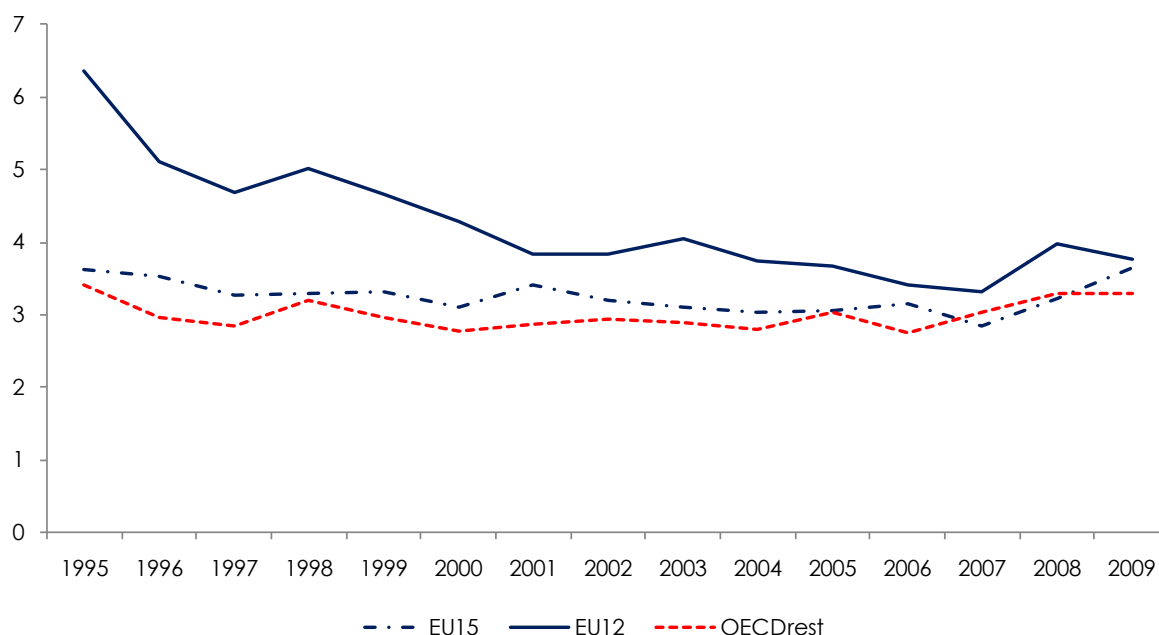
Source: EUROSTAT, OECD, WIFO calculations.

2.2.4 The overall growth-friendliness of government spending

So far, our investigations show that governments in our sample follow very different spending patterns. In particular, we observe clear differences considering the 'budget mix' of productive and non-productive expenditure. *Table 2.2* sheds some light on this. In order to investigate the 'overall' growth friendliness of a country's spending patterns we simply calculate the share of productive expenditure types (according to our definitions) in total government spending. We use again averages over the years 2004-2008 in order to reduce the impact of temporary fluctuations due to singular events. As the general productivity of defense spending is the most controversially debated topic, we differentiate between two definitions of productive expenditures, the first including, and the second excluding military spending. The countries are ranked in order of productive spending without defense.

The highest budget share of productive spending items is observed for Korea, according to both definitions. Almost 70% of general government expenditure is allocated to productive

uses if defense is included, and still more than 60% if defense spending is counted as non-productive. New Zealand and Ireland follow, with a productive spending budget share of 57.2% and 54.7%, respectively. At the lower end of the ranking we find Germany, Greece and Austria with productive budget shares of slightly less than 40%, if military expenditures are excluded. The largest change of productive spending shares when defense spending is included is observed for the USA (+11.6 percentage points), Korea (+9), Greece (+6.3) and Romania (+6.1).

Table 2.2: Total spending and productive spending shares (averages 2004-2008)

country	code	total (%GDP)	productive (% total exp.)	productive (w/o defense) (% total exp.)
Korea	kr	27.9	69.1	60.1
New Zealand	nz	38.9	60.0	57.2
Ireland	ie	36.3	56.0	54.7
Latvia	lv	36.8	57.7	53.8
Cyprus	cy	42.1	57.7	53.3
United States	us	36.8	64.9	53.3
Canada	ca	39.6	55.7	53.1
Iceland	is	45.5	53.1	53.0
Lithuania	lt	34.5	56.9	52.4
Estonia	ee	35.1	56.4	52.4
Czech Republic	cz	43.9	55.3	52.3
Japan	jp	36.9	53.8	51.2
Bulgaria	bg	38.0	55.3	50.8
Portugal	pt	44.8	51.0	48.1
Spain	es	39.2	49.9	47.1
Slovenia	si	44.5	49.8	46.6
Slovakia	sk	36.3	51.0	46.6
Romania	ro	35.5	52.1	46.0
United Kingdom	uk	44.5	51.6	46.0
Netherlands	nl	45.5	48.8	45.7
Norway	no	41.9	48.5	44.5
Malta	mt	44.1	46.2	44.4
Poland	pl	43.1	46.9	44.3
Luxembourg	lu	39.1	44.6	44.0
Sweden	se	52.7	47.0	43.9
Hungary	hu	49.9	45.7	43.3
France	fr	52.9	46.6	43.1
Finland	fi	49.2	45.3	42.3
Belgium	be	49.8	44.4	42.2
Denmark	dk	52.3	44.7	41.7
Italy	it	48.3	44.1	41.2
Switzerland	ch	33.8	44.0	41.2
Austria	at	50.5	41.4	39.6
Greece	el	46.2	44.7	38.4
Germany	de	45.3	40.3	38.0

Source: WIFO-calculations based on Eurostat, OECD

This simple 'additive' procedure has some serious limitations, however. It is implicitly assumed that

- the productive impact of each additional Dollar is the same, regardless of how much is already spent for the respective category ('constant instead of diminishing returns');

- all productive spending categories are perfect substitutes, i.e. it does not matter, whether an additional Dollar is spent for one or another spending type.[19]

Figure 2.20: Total spending (% GDP) and productive spending shares (without defense spending) in total spending
Averages 2004-2008
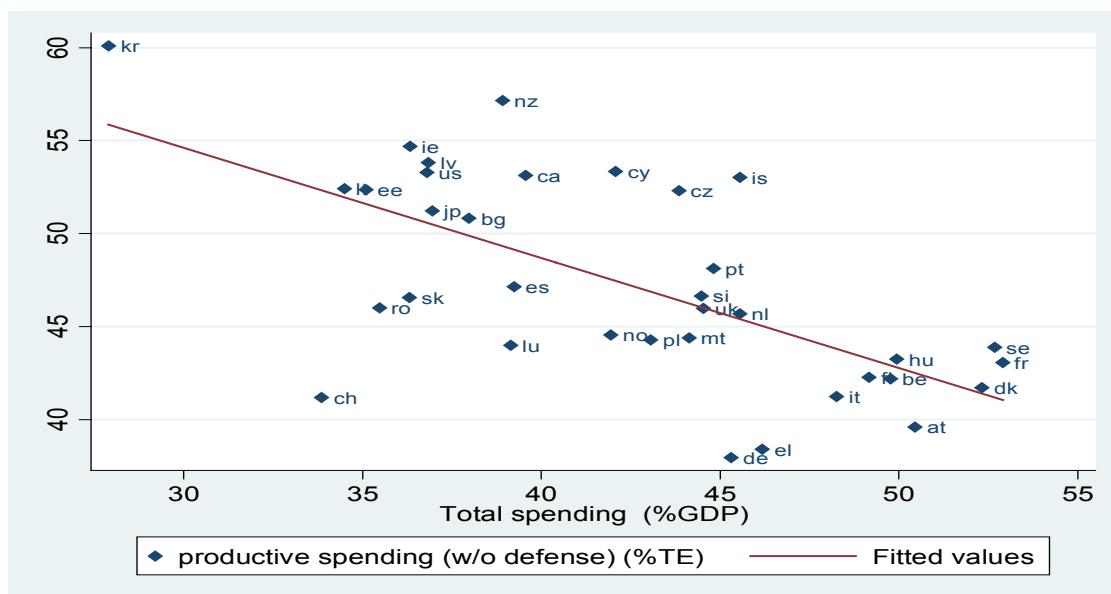
Figure 2.20 illustrates that there is in general a negative relation between total government spending and productive expenditure shares (without military spending)[20]. This is an indication that expansion of government size is mainly due to non-productive spending items.

Development of productive spending over time in relation to GDP in three country groups is illustrated in *figure 2.21*. Somewhat surprisingly, there is not too much difference between these groups. The respective median value increases slightly in the EU15 and the EU12 group since 1995, but in general the average spending shares over GDP remain almost constant.

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[19] *Barrios – Schaechter* (2009), among others, tried to deal with these shortcomings by construction of an index for the quality of government spending composition. We however refrain from doing so as this also leads to several severe problems.

[20] Results are almost identical if defense spending is included.

Figure 2.21: Median government productive spending in groups of EU15, EU12 and further OECD-countrie

1995-2009, in % of GDP
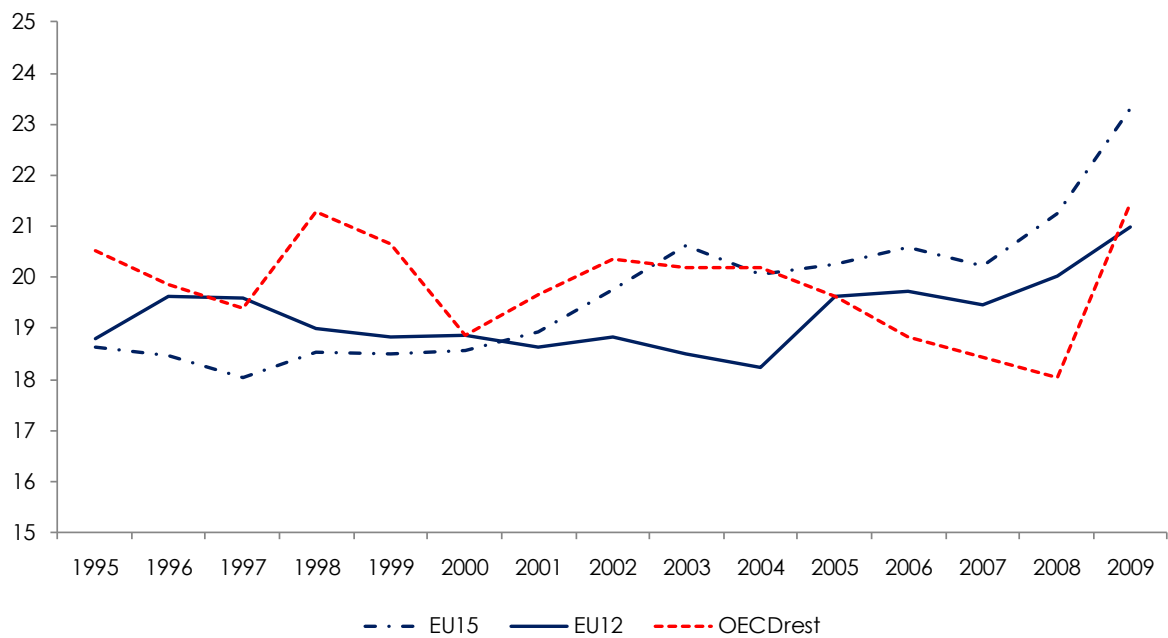
Source: EUROSTAT, OECD, WIFO calculations.

WIFO

3   Taxation

Taxes are the most important revenue source for governments to finance their expenditures. Besides their revenue-generating capacity tax systems traditionally have been assigned the task to support the government in fulfilling its most important functions: the correction of market failures (Pigouvian taxes on public bads or demerit goods aiming at curtailing activities with negative externalities or negative individual effects); the smoothing of business cycles (as automatic stabilizers or by discretionary variations of taxes); or the correction of an unequitable market distribution of income and wealth. Particularly with the advancement of endogenous growth models implying – in contrast to neoclassical growth theory – that tax policy is able to impact on the long-run growth level itself and not only on the growth rate during the transition of the economy to the steady-state growth rate, the relationship between taxes and economic growth has attracted increasing attention: in the scientific literature as well as in practical economic policy. For example, after having stressed the role of taxes for growth and employment in its "White Paper on Growth, Competitiveness, Employment" from 1994 as well as in the Lisbon Strategy valid through the past decade already, the European Commission also in "Europe 2020 – A Strategy for Smart, Sustainable and Inclusive Growth" (which replaces the Lisbon Strategy) points out the necessity to enhance the growth-friendliness of tax systems.

Against the background of the significant increases of public deficits and debt many countries affected by the recent financial and economic crisis are experiencing, the growth-friendliness of tax increases to consolidate public budgets currently is of particular interest and an important element of the policy recommendations of the supranational organisations (e.g. *European Commission* 2010A, or *OECD* 2010A).

This section firstly sketches the theoretical background concerning the (potential) influence of taxes on economic growth. Secondly, the most important empirical studies are briefly reviewed to derive the most important and robust empirical results on the relationship between taxation and growth. Thirdly, the tax structures of a sample of OECD/EU countries are analyzed and evaluated against the background of the theoretical considerations and empirical results on the impact of taxes on an economy's growth perspectives.

3.1   Growth-friendly tax systems: Theoretical background

Physical and human capital, labor supply and technological progress are the crucial determinants of long-run economic growth. To the extent to which taxes influence these growth determinants, they impact on long-run growth. While taxes on capital may dampen savings of private households and firms' investments as well as their innovative activities, taxes on labor may decrease labor supply and demand and adversely affect incentives to invest in human capital. These distortionary effects and disincentives for economic activities of private households and firms may be aggravated by an increasing international integration of goods and factor markets, as a comparatively high tax burden may drive economic activities

abroad or may be detrimental for a country's attractiveness for foreign investment or qualified labor (*Afonso et al.,* 2005, *Handler et al.,* 2005).

As, however, the existing theoretical models trying to depict the relationships between taxes and growth or growth-relevant factors, respectively, do not always yield clear-cut results[21], an increasing number of econometric analyses attempt to tackle this complex question empirically. Therefore in the last three decades an ever-increasing number of empirical studies investigated the influence of taxation on economic growth.[22]

3.2 Growth-friendly tax systems: Empirical results

Initially empirical analyses focused on the growth effects of the total level of taxation. However, they only partially support the theoretical expectation of a significant (negative) relationship between the total tax burden and economic growth: Endogeneity problems, the neglect of growth-enhancing expenditures financed by tax revenues, the disregard of taxation structures as well as statistic/conceptual problems in defining the tax ratio limit the explanatory power of the existing empirical studies (*Arnold,* 2008; *Myles,* 2009; *European Commission*, 2010A). The only safe conclusion that may be drawn from the existing empirical evidence is that a high tax ratio does not impact positively on growth (*Afonso et al.,* 2005).

Lately, in the wake of the rather new debate on the "quality of public finance" concentrating on the structure of government activities, the potential growth impact of the tax structure has attracted more attention than the pure level of the tax burden. The starting point of this more recent empirical work is the assumption – also warranted by theoretical considerations – that different tax categories affect growth with differing intensity and via different channels. In the meantime, a rather large body of empirical analyses has emerged. Most authors focus on growth-relevant effects of specific taxes in a more or less isolated perspective, only few studies examine the growth implications of different tax categories in a comparative perspective.[23]

Of the latter, a rather recent study by a group of economists associated with the OECD (*Johannson et al.,* 2008) has achieved some prominence and gained considerable attention also among policy-makers. Based on a macroeconomic perspective, a hierarchy of individual taxes with respect to their growth-friendliness is derived. Taxes on property have the least growth-dampening effect, followed by taxes on consumption (including environmental taxes in particular). In comparison, personal income taxes (including social security contributions and payroll taxes) are more harmful, and corporate income taxes are most detrimental to growth. This suggests that tax systems relying more on property and

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[21] For example, it is not clear ex ante whether an increase of labor taxes increases or decreases labor supply, as it will have both an income and a substitution effect running in the opposite direction.

[22] For recent overviews over relevant empirical work see *Schratzenstaller* (2007), *European Commission* (2008) or *Myles* (2009).

[23] Mostly these studies analyse the growth effects of distortionary versus non-distortionary taxes, e.g. *Bleaney – Gemmell – Kneller* (2001) or *Kneller – Bleaney – Gemmell* (1999).

consumption taxes display more favourable growth properties than those strongly based on personal and corporate income taxes.

While a crucial advantage and the innovative aspect of this approach is that it does not direct an isolated focus on the effects of single tax categories but on the effects of a (revenue-neutral) trade-off between them, one has to be aware of the methodological drawback that the macroeconomic tax structure is of limited use as an indicator for the effective tax burden on individual tax bases, because it does not account for the structure of the overall tax base: Differing country-specific macroeconomic tax structures could simply result from country-specific differences in the overall tax base, not (only) from different tax rates and/or tax provisions. Moreover, marginal tax rates which shape incentives for economic decisions of private households and firms are neglected. Thus, an analysis of the tax structure of a given country should not be restricted to tax revenues only, but should also include macroeconomic effective tax rates reflecting the distribution of total tax revenues as well as microeconomic (marginal and average) tax rates influencing individual behaviour of private households and firm decisions. Moreover, a complementary look at studies examining growth-relevant effects of individual tax categories certainly is useful to gain deeper insights regarding the concrete channels via which individual tax categories may directly or indirectly impact on economic growth. Two aspects are of particular interests in this respect: namely the influence of corporate income taxes on firm decisions and of labor taxes on labor supply.

While labor taxes can be assumed to influence various individual decisions shaping the quality and quantity of labor supply (employment in the shadow economy or in non-taxed sectors of the economy, investment in human capital, occupational choices, individual work effort and productivity, etc.), their effect on labor market participation and hours worked has been investigated most intensely and with the most robust results. These can be summarised as follows:[24]

- The influence of labor taxes differs for different demographic groups and educational levels due to differing wage elasticities of labor supply.
- For some groups – e.g. mothers with young children – labor taxes strongly impact on the decision about participation and hours worked.
- The participation decision is rather tax sensitive in the group of lone mothers and men with low qualifications.
- Participation as well as hours worked of men in general and highly-qualified men in particular hardly react to labor tax variations.

Corporate income taxes influence firm behaviour in various respects. In a rather recent review of the rich empirical evidence, including a meta analysis of studies investigating the influence of taxation on international investment, *de Mooij – Ederveen* (2008) distinguish five decision margins:

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[24] For the following short summary see the extensive literature reviews by *Meghir – Phillips* (2008) or *Task Force of the Monetary Policy Committee of the European System of Central Banks* (2008).

- impact of corporate versus personal income tax on the organisational form
- impact of the tax treatment of debt and equity finance on firms' financial policy
- impact of the statutory corporate income tax rate on profit shifting
- impact of effective marginal tax rates (EMTR) on intensive investment (i.e. size of investment at a given location) and effective average tax rates (EATR) on extensive investment (i.e. locational choice), respectively.

Calculating the semi-elasticity of the corporate tax base for these five decision margins, the authors reach the conclusion that the largest tax-base elasticities can be found in empirical studies on profit shifting (with a typical semi-elasticity with respect to the statutory tax rate of - 1.2%). Also marginal investment displays a significant elasticity with respect to EMTR (-0.4%), and even more so discrete location decisions (with a semi-elasticity with respect to EATR of - 0.65%).

3.3 Size and structure of taxation

As already indicated, there are different types of indicators that may be used to measure and evaluate the growth-friendliness of tax systems. While the macroeconomic tax structure (i.e. the shares of individual tax categories in total tax revenues or over GDP) can give a first impression concerning (potentially unfavourable) overall tax structures, macroeconomic effective tax rates are required to measure the distribution of the overall tax burden on the respective macroeconomic tax bases. Incentives influencing growth-relevant decisions by firms and individuals are affected by effective microeconomic tax rates. For all three groups of indicators we will present data for a sample consisting of 36 OECD and EU27 countries, which are complemented by additional data for peripheral European countries where these data are available. To detect some regional patterns and differences, we will – depending on data availability – group the respective countries in EU15 countries, EU12 countries, rest-OECD[25] countries, and peripheral countries.

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[25] I.e. those OECD countries included in our country sample which are not EU members.

3.3.1 Total tax burden and macroeconomic tax structure

Figure 3.1: Tax-to-GDP-ratios
Averages 2004-2008, in % of GDP
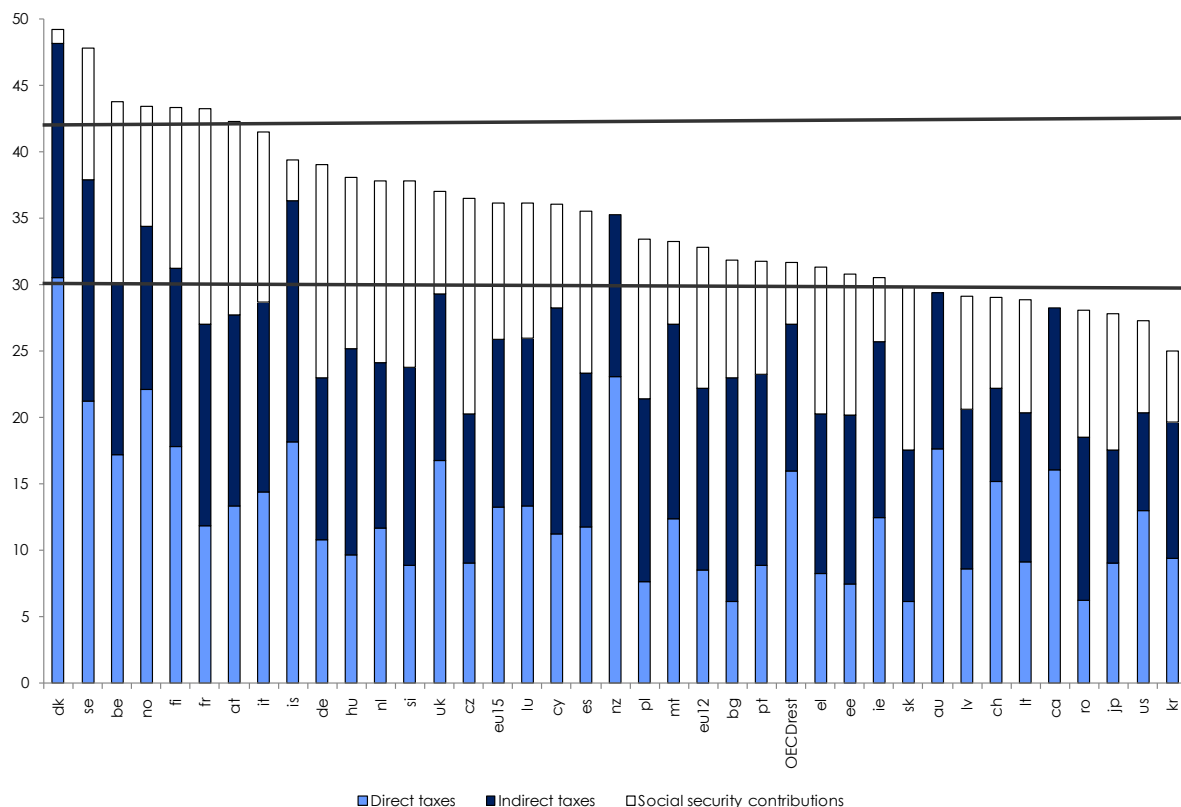
Sources: European Commission 2011, OECD (Revenue Statistics 2010), 2010, WIFO calculations. EU12: new members. OECD: samples´countries which are not EU members.

Figure 3.1 shows the total tax burden (including social security contributions) in% of GDP (the most common indicator for the overall tax level) for the sample of 36 countries as five-year averages for the period 2004 to 2008. We group – somewhat arbitrarily – the countries regarded in high-tax countries (tax burden above 42% of GDP[26]), in low-tax countries (tax burden below 30% of GDP[27]) and in a group with a medium tax burden (between 30% and 42% of GDP[28]). The country-specific values cover a wide range, from 25% of GDP in South

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[26] This corresponds approximately to the mean tax ratio plus one standard deviation (41.4%); the resulting group of 8 high-tax countries includes Denmark, Sweden, Belgium, Norway, Finland, France, Austria, and Italy.

[27] This corresponds approximately to the mean tax ratio minus one standard deviation (29.1%); the 10 low-tax countries are the Slovak Republic, Australia, Latvia, Switzerland, Lithuania, Canada, Romania, Japan, the United States and South Korea.

[28] This is the biggest group with 18 countries, consisting of Iceland, Germany, Hungary, the Netherlands, Slovenia, the United Kingdom, the Czech Republic, Luxembourg, Cyprus, Spain, New Zealand, Poland, Malta, Bulgaria, Portugal, Greece, Estonia, and Ireland.

Korea to 49.3% of GDP in Denmark. The average tax level for the rest-OECD countries included in our sample amounts to 31.7% of GDP, for the EU15 countries the average is 36.2% and for the EU12 countries 32.8%.

In a comparable definition the tax ratios in four potential EU candidate countries are available for the year 2008 (*European Commission,* 2010B): According to the above definition, only Albania would qualify as a low-tax country, with a tax burden of 22% of GDP; while Bosnia and Herzegovina (33.6% of GDP), Serbia (35.8% of GDP) and Montenegro (38.6%) may be considered as countries with a (partially above-average) medium overall tax burden.

In a first rough categorization, total tax revenues can be grouped into three main categories: indirect taxes, direct taxes, and social security contributions. Related to GDP, direct taxes dominate on average for the rest-OECD countries in our sample, with 16%; indirect taxes reach 11.1% (see *figure 3.1*). Social security contributions are of considerably smaller significance, with 4.6% of GDP on average for the rest-OECD countries regarded. In the EU12 indirect taxes are clearly dominating on average, with 13.6% of GDP, followed by social security contributions with 10.6% and direct taxes with 8.6% of GDP. In the EU15 the shares of the respective tax categories are comparatively balanced, with direct taxes reaching 13.3%, indirect taxes 12.6%, and social security contributions 10.3% of GDP.

Figure 3.1 also shows that the shares of these main tax categories in GDP vary considerable between countries. Averaged over the period 2004 to 2008, direct taxes reach 6.2% of GDP in (the flax tax countries) Bulgaria, Romania and the Slovak Republic on the low end, and 30.6% of GDP in Denmark on the high end. Indirect taxes range from 7.1% of GDP in Switzerland to 18.1% in Iceland. While social security contributions make up for 1.1% of GDP in Denmark only, they amount to 16.3% of GDP in France.

Without being able to go into further detail here, it is interesting to note that there seems to be a certain relationship between the total level of taxation and its structure, which is most pronounced for the group of high-tax countries: These countries (all of them EU member countries) to an overproportionate extent (compared to the average for the whole 36-country-sample) rely on direct taxes (Denmark, Sweden, Norway), on social security contributions (Austria, France, Italy), or on both direct taxes and social security contributions (Belgium, Finland), while none of them displays an overproportionate share of indirect taxes. Less clear-cut is the pattern in the far more heterogenous low-tax country group: The new EU member states Slovak Republic, Lithuania, Latvia and Romania have an overproportionate share of indirect taxes and of social security contributions; direct taxes are the most important tax source for the US, Canada, Australia and Switzerland. Japan uses social security contributions, South Korea indirect taxes most.

Figure 3.2 shows the development of the median values of the overall tax ratios between 1995 and 2008 for the EU15, the EU12, and the rest-OECD countries included in our country sample. With some, but altogether limited fluctuations, the overall tax burden in 2008 is roughly the same as in 1995 in the EU15 and the rest-OECD countries regarded. Starting from a considerably higher level (about 10 percentage points more) the median values in the

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EU15 run rather parallel to those of the rest-OECD countries included. In the EU15, the median tax burden is at about 40% both in 1995 and 2008, in the rest-OECD countries it reaches about 29% both at the beginning and the end of the time period regarded. In the EU12, a rather strong decrease of the total tax burden can be observed between 1995 and 2001; afterwards median values increase again without, however, reaching the initial level. Thus, the median tax burden went down from about 36% in 1995 to about 33% of GDP in 2008 in the EU12.

Figure 3.2: Total tax burden (median)
1995-2008, in % of GDP
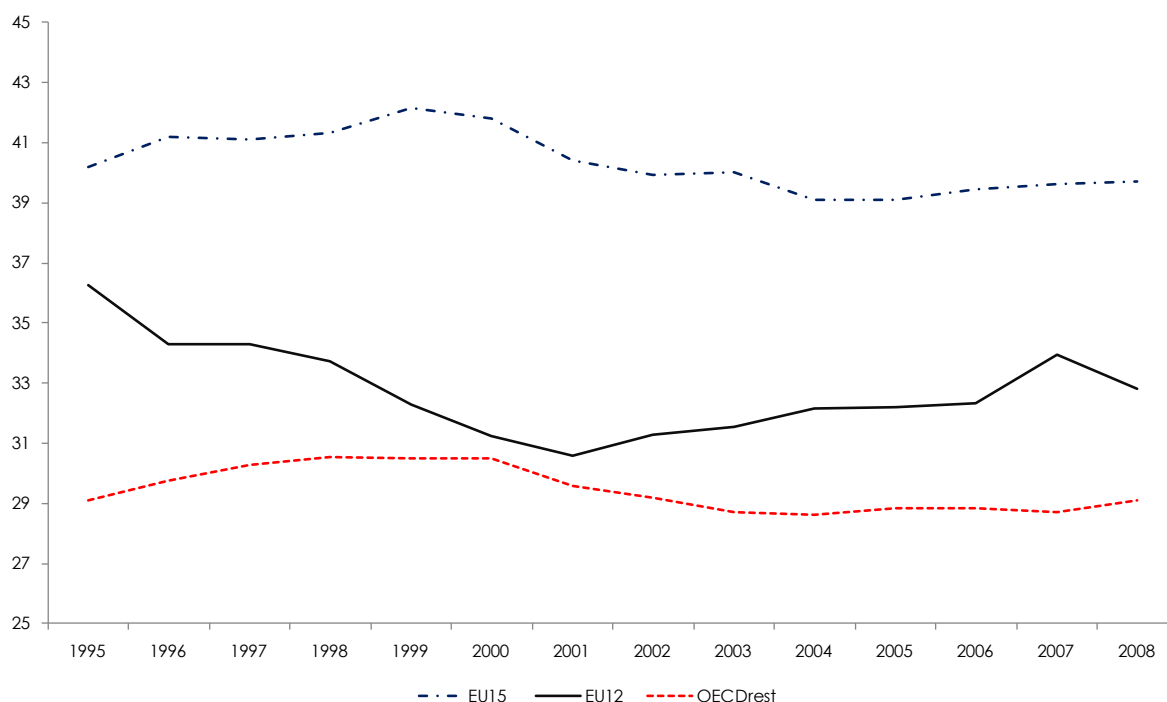
Sources: European Commission 2011, WIFO calculations. Total tax burden excluding imputed social security contributions. EU12: new members. OECD: samples´countries which are not EU members.

The changes in the shares of the three main tax categories in overall tax revenues between 1995 and 2008 in our 36-countries sample are depicted in *figure 3.3*. Developments in the three country groups are heterogenous: While the share of indirect taxes decreases in the EU15 and the rest-OECD (by 0.4 percentage points and 5.1 percentage points, respectively), it increases by 1.2 percentage points in the EU12. The share of direct taxes increases in the EU15 and the rest-OECD (by 1.4 and 4.2 percentage points, respectively) and decreases by 0.6 percentage points in the EU12. Social security contributions are losing in importance in the EU15 and the EU12, while their share in overall tax revenues grows by 0.9 percentage points in the rest-OECD countries under scrutiny here.

The averages, however, disguise significant structural changes in various countries.[29] Hereby, no unambiguous trends towards certain features of tax structures can be discerned: the number of countries with increases and decreases of the shares of indirect taxes and social security contributions, respectively, is roughly the same, while significantly more countries increased the share of direct taxes since the mid-nineties.

Figure 3.3: Change in the share of indirect taxes, direct taxes and social security contributions in overall tax revenues
1995-2008, in percentage points
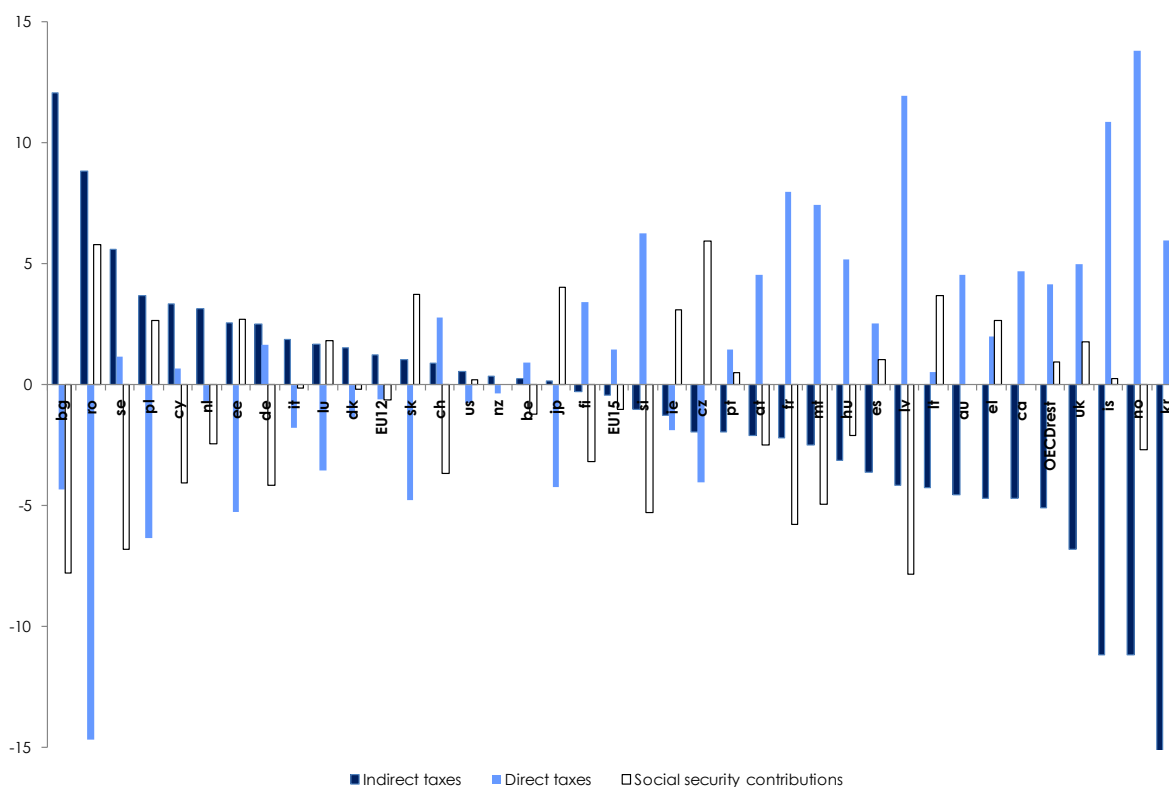
Sources: European Commission 2011, OECD, WIFO-calculations. Bulgaria: 1999-2008, Korea, Australia, New Zealand: OECD-data. EU12: new members. OECD: samples´countries which are not EU members.

Figure 3.4 provides a more detailed break-down of total tax revenues for the sample of 36 countries averaged over the time period 2004 to 2008, which – following the OECD tax-and-growth hierarchy – distinguishes between corporate income taxes, personal income taxes including social security contributions, taxes on goods and services, and taxes on property. Within our sample of 36 countries, only in Bulgaria the relatively growth-friendly consumption taxes and taxes on property in sum account for more than half of total tax revenues. In all other countries revenues from corporate income tax, personal income tax and social security

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[29] It should be noted that changes in the tax structure to a certain degree may also have been caused by the business cycle.

contributions are dominating, with summed up shares of these revenue categories ranging between 51.3% of total taxation in South Korea and 71.5% in Japan.

Corporate income tax shares lie between 4.95% in Iceland and 26.9% of tax revenues in Norway; the average is 8.5% in the EU15, 9.7% in the EU12, and 14.4% in the rest-OECD countries regarded. Austria has the highest share of personal income taxes including social security contributions (64.3%), in South Korea this share is smallest (36.2%); the average is 55% in the EU15, 47.6% in the EU12, and 49.6% in the rest-OECD countries. Consumption taxes make up for 17.5% of tax revenues only in the US, compared to 43.2% in Cyprus; the average is 30% in the EU15, 40% in the EU12, and 27.3 in the rest-OECD countries. South Korea is on top concerning the property tax share (12.21%), on the other end ranges the Czech Republic with a property tax share of 1.15% of total taxation; the average is 5.3% in the EU15, 2.4% in the EU12, and 8.2% in the OECD cent.

Figure 3.4: Tax structures (components)
Averages 2004-200 , in % of total taxation
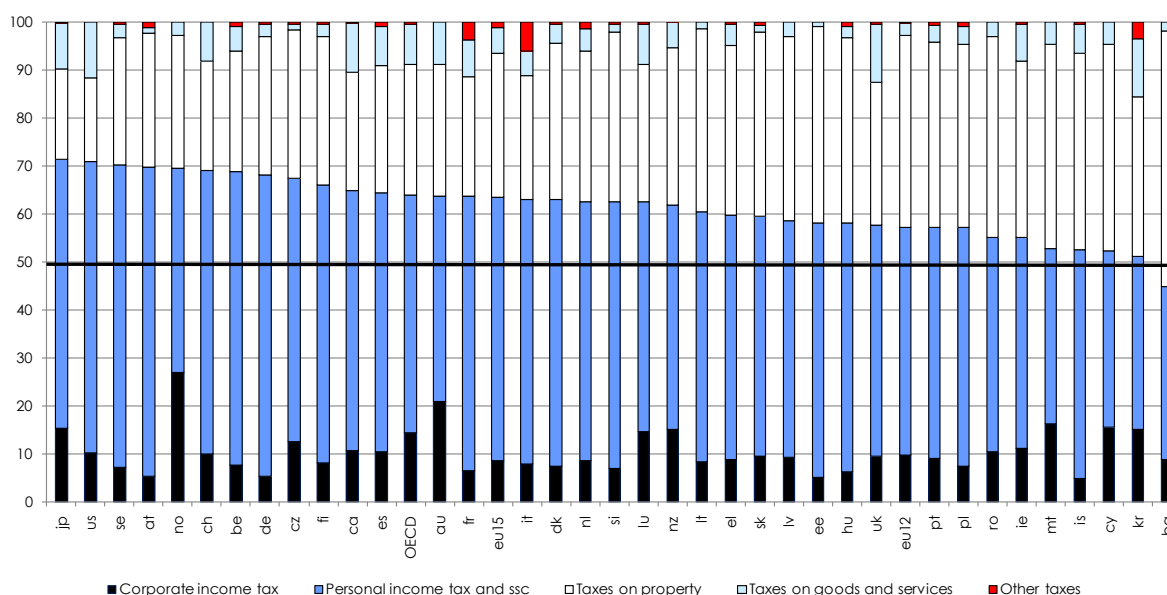
Sources: OECD 2010B (Revenue Statistics, download actual data), European Commission 2011, WIFO-calculations.

3.3.2 Macroeconomic effective tax rates

The data on macroeconomic tax structures presented in the preceding section do not take (structural differences in) tax bases into account. However, cross-country differences in tax structures, as measured by the shares of different tax categories in GDP or in total tax revenues, may not only result from different tax levels, but may as well be caused by cross-country differences in the structure of the overall tax base. Macroeconomic or implicit effective tax rates relating total revenues stemming from one tax category to the corresponding tax base and thus reflecting the effective tax burden on individual tax bases

are calculated regularly by Eurostat for the EU27 countries plus Iceland and Norway. Eurostat calculates implicit effective tax rates for labor, energy, consumption, and on capital (which are divided further in implicit tax rates on capital and business income and on corporate income). *Table 3.1* contains implicit tax rates for 2000 and 2008 in comparison. On average, implicit tax rates for all macroeconomic tax bases decreased in the EU15. In the EU12, on the other hand, only implicit tax rates on labor and corporate income decreased, while they increased on consumption, energy, and capital.

A closer look at developments in individual countries reveals that they are differently affected by these general trends: Firstly the extent to which tax burdens have changed during the last decade varies considerably across countries. Secondly, about one third of the EU countries regarded are moving against the general trends with regard to implicit tax burdens on labor, capital, and corporate income; in about one fourth of the EU countries analyzed here the implicit tax rate on energy and in half the EU countries the implicit consumption tax rate went down.

Table 3.1: Implicit tax rates on labor, consumption, energy, capital, corporate income, EU 27 in 2000/2008

	Labor			Consumption			Energy [1])			Capital			Corporate Income		
	2000	2008	Δ2000-2008	2000	2008	Δ2000-2008	2000	2008 [2])	Δ2000-2008	2000 [3])	2008 [4])	Δ2000-2008	2000 [5])	2008 [6])	Δ2000-2008
BE	43,6	42,6	-1,0	21,8	21,2	-0,6	92,4	97,1	4,7	29,6	32,7	3,1	24,4	21,4	-3,0
BG	38,7	27,6	-11,1	19,7	26,4	6,8	36,4	71,7	35,3	:	:	:	:	:	:
CZ	40,7	39,5	-1,2	19,4	21,1	1,7	55,2	127,1	71,9	20,9	21,5	0,6	26,2	25,7	-0,5
DK	41,0	36,4	-4,5	33,4	32,4	-1,0	300,8	267,8	-33,1	36,0	43,1	7,1	23,0	24,9	1,9
DE	40,7	39,2	-1,6	18,9	19,8	0,9	192,7	193,8	1,1	28,4	23,1	-5,3	:	:	:
EE	37,8	33,7	-4,1	19,5	20,9	1,5	32,2	71,5	39,3	6,0	10,7	4,8	4,1	8,3	4,3
IE	28,5	24,6	-3,9	25,7	22,9	-2,8	140,5	153,1	12,5	14,9	15,7	0,8	10,0	7,6	-2,4
EL	34,5	37,0	2,5	16,5	15,1	-1,4	117,3	102,0	-15,3	19,9	15,8	-4,1	29,0	18,6	-10,4
ES	28,7	30,5	1,9	15,7	14,1	-1,6	137,8	114,6	-23,2	29,8	32,8	3,0	30,7	34,0	3,3
FR	42,0	41,4	-0,6	20,9	19,1	-1,8	173,2	160,7	-12,5	38,3	38,8	0,4	29,6	29,1	-0,5
IT	42,2	42,8	0,6	17,9	16,4	-1,5	248,7	187,4	-61,3	29,5	35,3	5,8	19,2	31,5	12,3
CY	21,5	24,5	2,9	12,7	20,6	7,8	43,1	110,0	66,9	23,7	36,4	12,6	28,6	37,3	8,7
LV	36,7	28,2	-8,4	18,7	17,5	-1,2	48,3	48,4	0,1	11,2	16,3	5,1	8,6	15,2	6,6
LT	41,2	33,0	-8,2	18,0	17,5	-0,4	58,0	78,5	20,5	7,2	12,4	5,2	3,9	11,1	7,1
LU	29,9	31,5	1,6	23,0	27,1	4,1	164,3	173,3	9,0	:	:	:	:	:	:
HU	41,4	42,4	1,0	27,5	26,9	-0,6	79,7	98,0	18,3	17,1	19,2	2,0	28,7	19,9	-8,8
MT	20,6	20,2	-0,4	15,9	20,0	4,1	142,2	197,0	54,9	:	:	:	:	:	:
NL	34,5	35,4	0,9	23,8	26,7	2,9	154,4	189,8	35,3	20,8	17,2	-3,7	18,5	11,9	-6,6
AT	40,1	41,3	1,2	22,1	22,1	0,0	141,8	150,2	8,4	27,7	27,3	-0,3	27,1	26,1	-1,0
PL	33,6	32,8	-0,8	17,8	21,0	3,2	58,9	108,0	49,0	20,5	22,5	2,0	37,1	20,0	-17,1
PT	27,0	29,6	2,7	18,9	19,1	0,2	111,8	143,4	31,6	33,6	38,6	5,0	25,5	22,6	-2,9
RO	33,5	29,5	-4,0	17,0	17,7	0,7	58,2	26,2	-32,0	:	:	:	:	:	:
SI	37,7	35,7	-2,0	23,5	23,9	0,4	118,3	121,7	3,4	15,7	21,6	5,9	19,6	27,4	7,7
SK	36,3	33,5	-2,8	21,7	18,4	-3,3	42,4	84,6	42,2	22,9	16,7	-6,2	40,2	20,7	-19,4
FI	44,1	41,3	-2,7	28,5	26,0	-2,5	108,7	114,5	5,8	36,1	28,1	-7,9	30,4	19,3	-11,1
SE	46,0	42,1	-3,8	26,3	28,4	2,2	182,0	190,1	8,1	43,2	27,9	-15,3	41,0	23,2	-17,8
UK	25,3	26,1	0,7	18,9	17,6	-1,4	249,5	180,2	-69,3	44,7	45,9	1,2	31,0	22,2	-8,8
EU 15	36,5	36,1	-0,4	22,1	21,9	-0,3	167,7	161,2	-6,5	30,9	30,2	-0,7	26,1	22,5	-3,6
EU 12	35,0	31,7	-3,3	19,3	21,0	1,7	64,4	95,2	30,8	16,1	19,7	3,6	21,9	20,6	-1,3

Source: European Commission 2010C, WIFO-calculations. - [1]) Energy taxes in Euro per tons of oil equivalent (TOE), base year: 2000, [2]) Island 2006; Greece, France, Malta 2007 . - [3]) Ireland 2002. - [4]) Greece 2006, Norway 2007. –[5]) Ireland 2002. - [6]) Greece, Portugal 2006.

3.3.2 Microeconomic tax rates

The macroeconomic indicators presented in the preceding section are important to give an impression of the structures of overall tax revenues and their distribution on the different tax bases (whole groups of tax payers or aggregate taxable activities, respectively). However, they are hardly of use when trying to assess the incentive effects of individual taxes. Such evaluations of the effects of taxes on labor supply and investment need to be based on microeconomic tax rates. Ideally, these should be forward looking, as the tax burden of the past is of limited relevance for future decisions of economic agents about, for example, investment or labor supply. Taking data availability into account, this section of the paper concentrates on microeconomic effective tax rates on labor and for corporations.

3.3.2.1 Microeconomic tax rates on labor

We start with a look at top income tax rates for our sample of 36 countries, which we enrich by 6 peripheral European countries (Croatia, Ukraine, Kazakhstan, Armenia, Republic of Serbia, Turkey). Between 2003 and 2010, a clear downward trend of personal income tax rates can be observed for the EU12 and the peripheral European countries, where the average top income tax rate went down from 34.8% in 2003 to 24.3% in 2010 and from 31.7% to 22.5%, respectively. In the EU15 countries, on the other hand, top income tax rates stagnated on average, amounting to 47.5% in 2010. In the rest-OECD countries analyzed here the average top income tax rate increased from 38.9% to 40.1%.

Only in a few countries (Norway, Ireland, United Kingdom, Portugal, Greece, Iceland, Latvia, Republic of Serbia) the top income tax rate increased during the past decade, mostly due to budgetary pressures in the wake of the recent financial and economic crisis. Of the 42 countries considered here, 8 countries[30] have a top income tax rate of about 50% or above in 2010, with Sweden having the highest rate (56.6%). In 11 countries top income tax rates are at a maximum of 26% or below; all of them "new" EU member countries or peripheral European countries. 9 countries within this group apply a flat rate tax[31] with tax rates between 10% (Kazakhstan) and 26% (Latvia).

There is a certain correlation between the overall tax ratio and the top personal income tax rate: of the 8 countries with top personal income tax rates of at least about 50%, 5 countries are high-tax countries measured by the total tax burden and 2 countries (United Kingdom, the Netherlands) are in the country group with a medium tax burden; Japan being the only country with a high top personal income tax rate and a low overall tax burden. At the same time, all high-tax countries also have a high top personal income tax rate of at least 41% – while only the Eastern European EU countries with a low tax burden also have a low personal income tax rate (Latvia, Lithuania, Romania, Slovak Republic). In the advanced low-tax

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[30] Sweden, Denmark, the Netherlands, United Kingdom, Austria, Belgium, Japan, Finland.

[31] Republic of Serbia, Latvia, Estonia, Bulgaria, Kazakhstan, Czech Republic, Lithuania, Slovak Republic, Romania, Ukraine.

burden countries (Canada, United States, South Korea, Switzerland, Australia) top personal income tax rates range between 29% and 45%.

Figure 3.5: Personal income tax rate 2003/2010
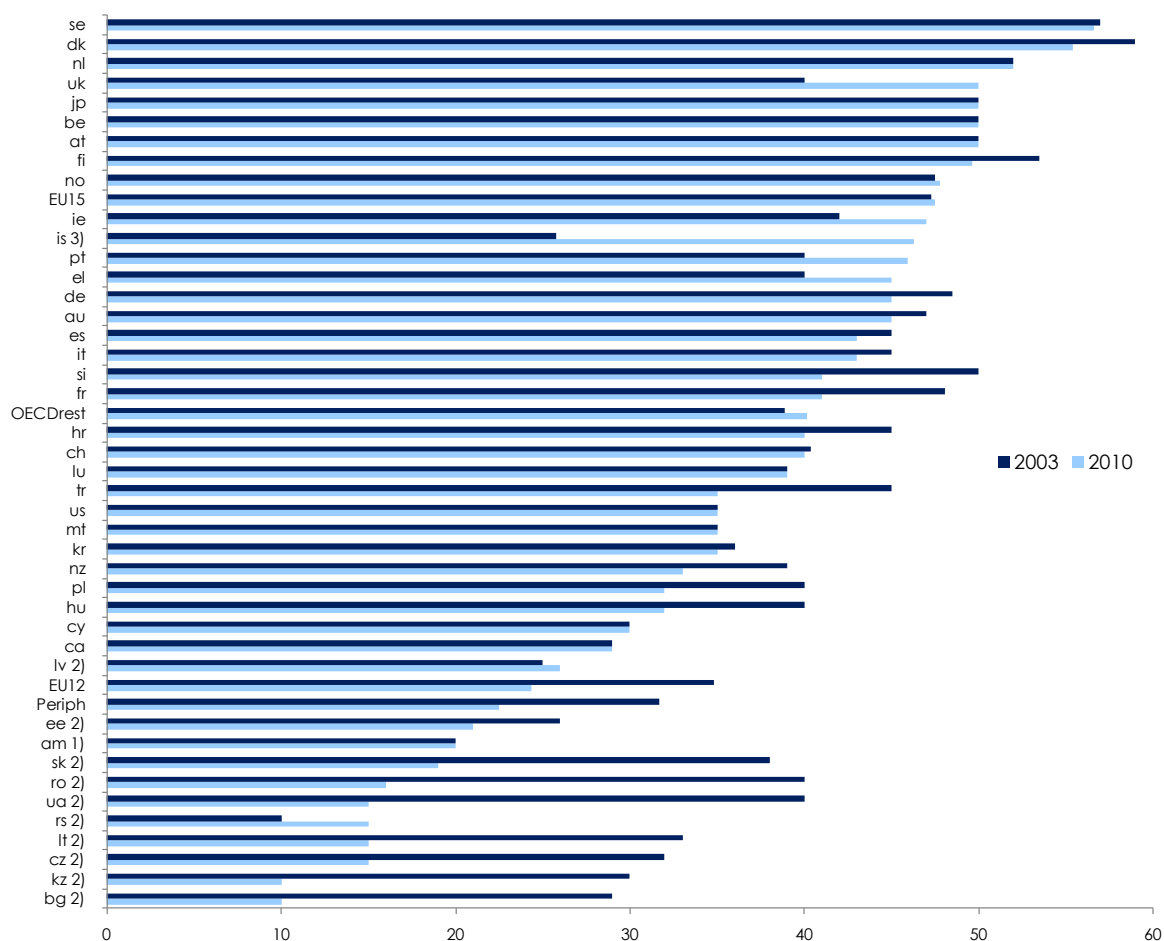
Source: KPMG, 2010. - [1]) Introduction of flat tax in 2011. - [2]) Flat tax. - [3]) Introduction of flat tax in 2007, abolished in 2010.

To assess the incentive effects of personal income taxation with regard to labor supply, a focus on top personal income tax rates is far too narrow, however. Firstly, tax sensitivity of labor supply of workers in the top income groups – as the results of the overwhelming majority of empirical studies reported above show – is rather limited; tax elasticity is much higher in lower income groups. Secondly, marginal tax rates are important for decisions about the numbers of hours worked; the participation decision, however, is influenced by average tax rates which also take into account the rules to determine the tax base. Thirdly, to identify the incentive effects of taxation for labor supply all relevant taxes need to be considered: As can be seen in the macroeconomic data above, the majority of countries do not only levy wage

taxes, but also social security contributions on labor incomes. Thus, to derive a more complete picture of the possible incentive effects of labor taxation, effective marginal as well as average microeconomic tax rates for different income groups with different tax rate elasticities of labor supply must be determined, which include personal income taxes as well as social security contributions.

Effective marginal and average tax wedges including personal income taxes and social security contributions are calculated regularly by the OECD. Thus they are neither available for all 36 countries of our basic sample nor for any peripheral European countries except Turkey.

For sake of complexity reduction, we choose from the considerable selection of family constellations and income sizes the OECD offers two simple cases: a single earner with 67% of average production worker income (as representative for a rather low income group), and a single earner with an average production worker income. In *figures 3.6 to 3.9*, marginal and average tax wedges (resulting from wage tax and social security contributions minus cash benefits), respectively, are presented in comparison for the years 2000 and 2009.

Figure 3.6: Marginal tax wedge, 67% of gross labor income, 2000/2009
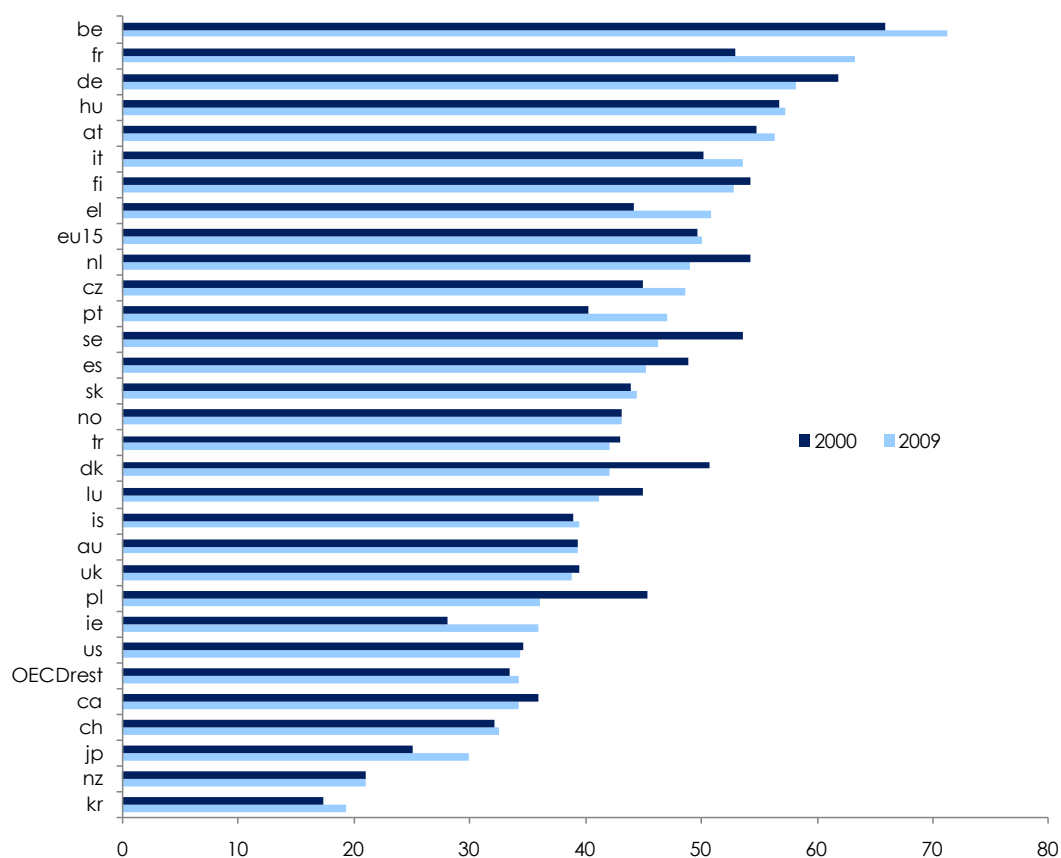
Source: OECD, 2011.

For low income earners, in the EU15 the marginal tax wedge slightly rose on average between 2000 and 2009, to a rather high level of 50.1%: Thus it approached the marginal tax rate for an average earner, who faced a marginal tax wedge of 52.1% in 2009 (compared to 54.8% in 2000). The marginal tax wedge for low incomes was lowest in South Korea (19.3%) and highest in Belgium (71.3%). Average incomes were burdened with the lowest marginal tax wedge in South Korea (29.1%) and with the highest marginal tax wedge in Hungary (71.5%). The average tax wedge for the EU15 went down by about 3 percentage points both for low incomes (to 37.2%) and average incomes (to 41.6%). The average tax wedge for low and for average incomes was lowest in New Zealand (15.6% and 18.4%, respectively). Low as well as average incomes faced the highest average tax wedge in Belgium (48.9% and 55.2%, respectively). Interestingly, during the past decade the marginal tax wedge for low incomes went down in only about half the countries regarded, while the marginal tax wedge for average incomes as well as the average tax wedges for low and average incomes went down in a clear majority of countries.

Figure 3.7: Marginal tax wedge, 100% of gross labor income, 2000/2009
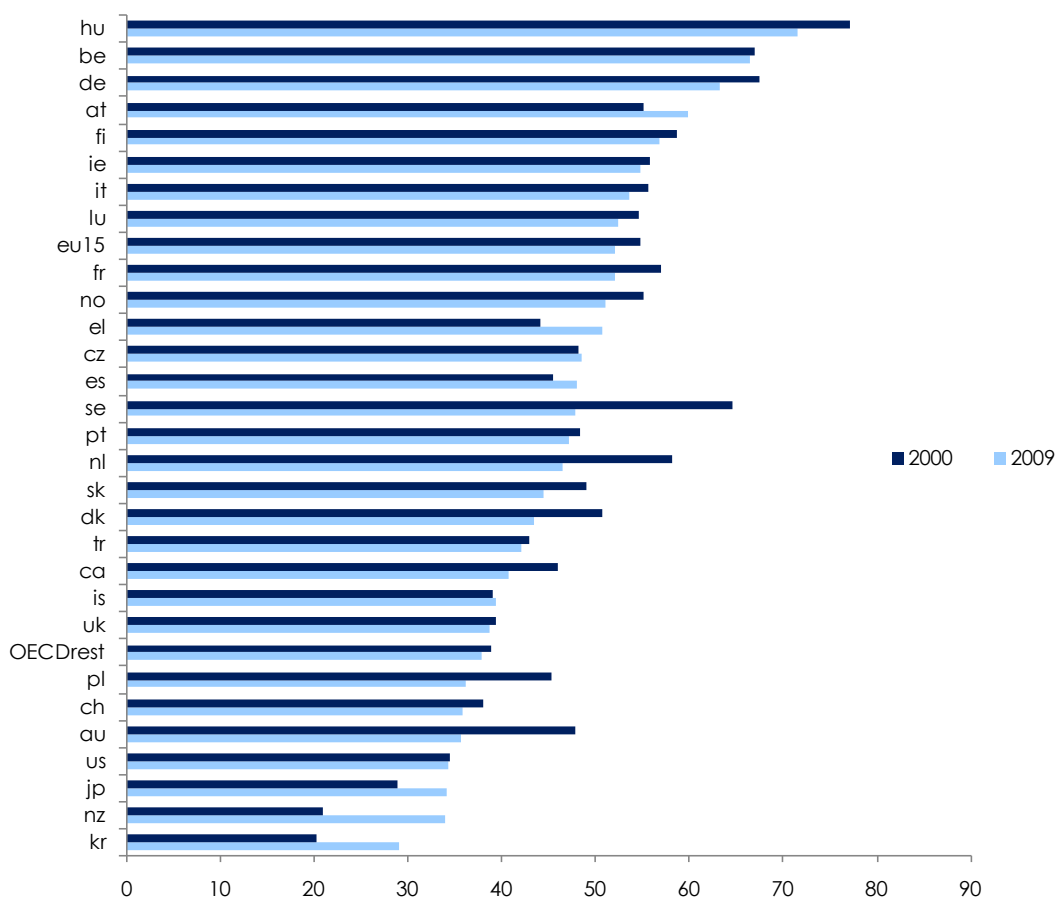
Source: OECD, 2011.

Figure 3.8: Average tax wedge, 67% of gross labor income, 2000/2009

Source: OECD, 2011.

WIFO

Figure 3.9: Average tax wedge, 100% of gross labor income, 2000/2009
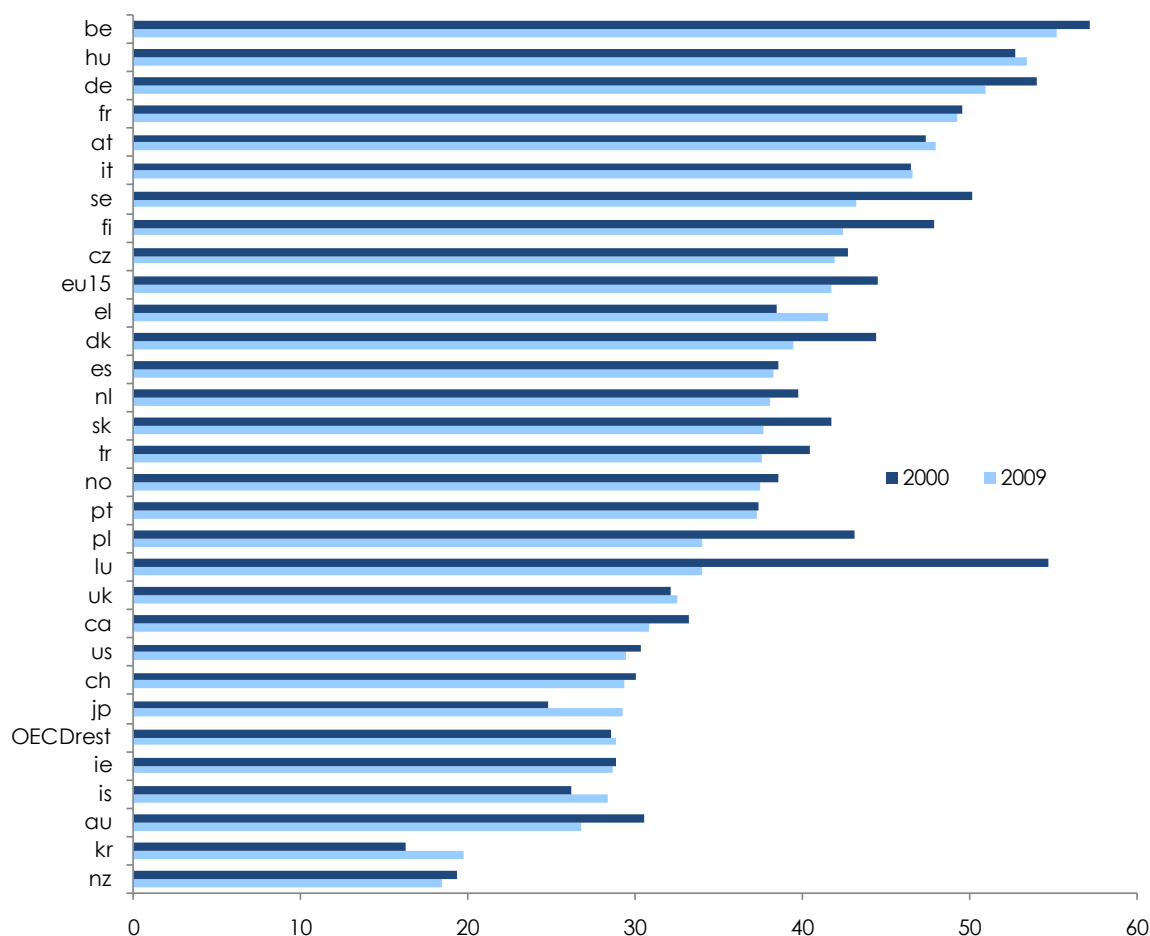
Source: OECD, 2011.

3.3.2.2 Microeconomic corporate income tax rates

As mentioned above, a number of recent empirical studies corroborate the theoretical expectation that firm decisions – also in an international context – are influenced by corporate taxation. Hereby statutory corporate income tax rates as well as effective marginal (EMTR) and average (EATR) tax rates are relevant. Before looking at tax rates and their evolution over time, however, it should be noted that an isolated analysis of the effects of corporate taxation has clear limits: While individuals and households pay a variety of different taxes on different tax bases so that the assignment of specific taxes to specific public goods and services is impossible, the link between tax payments and public services is much more visible and direct in the case of corporate taxation. Therefore, several empirical studies (e.g. *Bénassy-Quéré – Gobalraja – Trannoy*, 2007, *Leibrecht – Bellak – Joze*, 2009) conclude that public inputs may act as a backstop to unfettered cross-border tax competition.

Figure 3.10 shows that in our sample of 36 countries plus 10 peripheral European countries statutory corporate income tax rates fell markedly between 1995 and 2010. Only one country (Finland) slightly increased its corporate income tax rate, in 6 other countries (among them the 3 peripheral countries Montenegro, Armenia, and Belarus, but also Malta, Norway, and the United States) it remained constant. Again, the most marked reduction took place in the EU12 countries, where the average corporate income tax rate went down from 31.8% to 18.5%. But also the fall in the EU15 countries (from an average of 37.7% in 1995 to 27% in 2010) as well as in the European peripheral countries (from 24.6% to 16.8%) is considerable. Less pronounced is the upward trend in the group of rest-OECD countries included in our sample; here the average statutory corporate income tax rate fell from 36.2% to 29.1%. The distance between the high-tax and the low-tax countries narrowed down since the mid-nineties, and while in 1995 3 countries in our sample of 46 countries had a corporate income tax rate of over 50%, 2010 only 2 countries remained in which the corporate income tax rate reached about 40%; it was below this threshold in all other countries.

Figure 3.10: Corporate income taxe rates 1995/2010
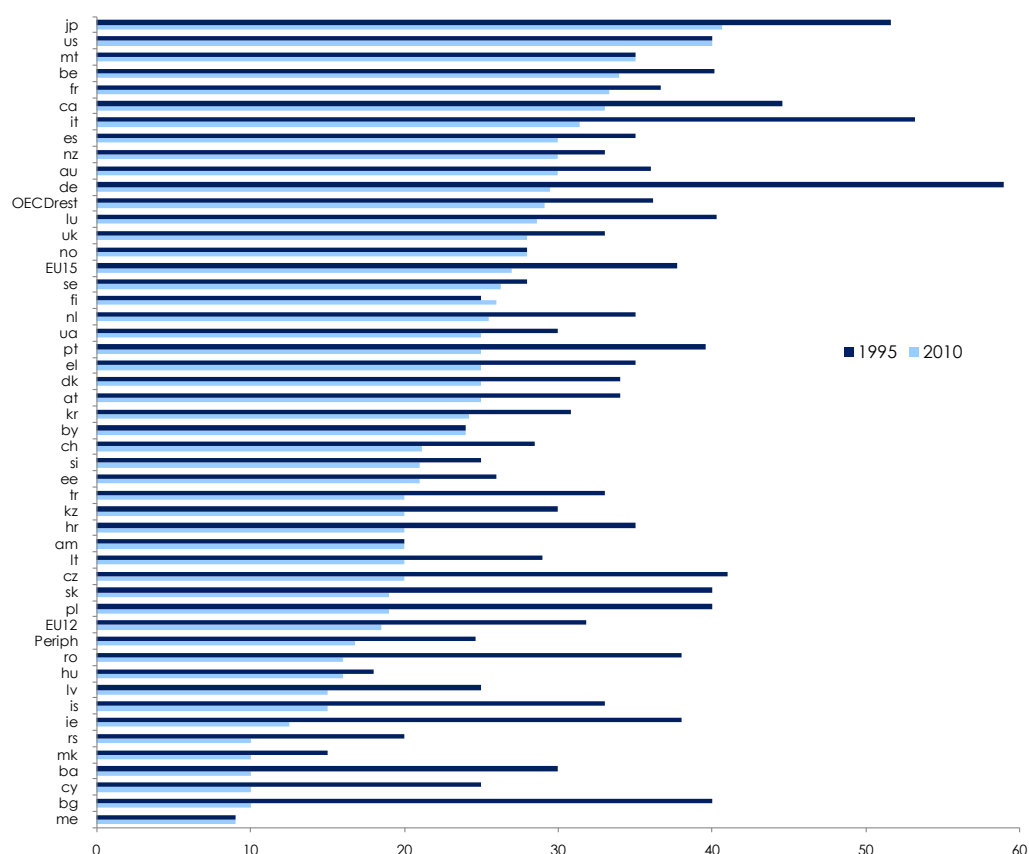
Sources: KPMG (2010), WIFO-calculations. Earliest data 1995, except for Korea: 1997, Croatia, Kazakhstan, Macedonia: 1999, Serbia: 2002,

Table 3.2 contains EMTR and EATR for all 27 EU countries plus 5 developed OECD countries as well as 3 European periphery countries for 2009 compared to 1998. On average EMTR and EATR were reduced in the rest-OECD countries, from 24.1% to 22% and from 27.4% to 25.9%, respectively. In the EU15, EMTR fell from 23.6% to 19%, in the EU12 from 20.4% to 11.9%. EATR went down from 30.7% to 25.1% in the EU15 and from 27.4% to 17%in the EU12. In this sample of 35 countries, EATR went up in 3 countries only and EMTR increased in 5 countries only; constant EATR and EMTR, respectively, can be observed in 2 identical countries.

Table 3.2: Effective average (EATR) and marginal corporate (EMTR) tax rates, 1998/2009

	EATR			EMTR		
	1998	2009	Δ 1998-2009	1998	2009	Δ 1998-2009
Austria	29,7	22,7	-7,0	20,2	17,4	-2,8
Belgium	34,5	24,7	-9,8	22,7	-5,1	-27,8
Bulgaria	32,0	8,8	-23,2	21,2	5,5	-15,7
Canada [1])	37,1	32,9	-4,2	38,6	32,8	-5,8
Cyprus	27,5	10,6	-16,9	24,4	9,5	-14,9
Czech Republic	26,4	17,5	-8,9	23,0	11,2	-11,8
Denmark	30,0	22,5	-7,5	21,5	16,7	-4,8
Estonia	22,4	16,5	-5,9	13,4	3,6	-9,8
Finland	25,9	23,6	-2,3	21,5	18,1	-3,4
France	39,8	34,6	-5,2	36,8	34,9	-1,9
Germany	41,2	28,0	-13,2	37,9	21,7	-16,2
Greece	30,4	21,8	-8,6	20,5	14,1	-6,4
Hungary	19,0	19,5	0,5	18,7	15,5	-3,2
Ireland	9,4	14,4	5,0	7,8	13,3	5,5
Italy	32,0	27,4	-4,6	9,7	20,8	11,1
Japan [1])	41,7	41,3	-0,4	42,8	41,9	-0,9
Latvia	22,7	13,8	-8,9	17,5	10,8	-6,7
Lithuania	23,0	16,8	-6,2	6,7	8,3	1,6
Luxembourg	32,6	25,0	-7,6	22,4	16,5	-5,9
Malta	32,2	32,2	0,0	26,9	26,9	0,0
Netherlands	32,3	23,7	-8,6	27,2	19,6	-7,6
Norway [1])	26,4	26,5	0,1	23,1	23,3	0,2
Poland	32,4	17,5	-14,9	25,3	13,7	-11,6
Portugal	33,4	23,7	-9,7	25,5	17,1	-8,4
Romania	34,0	14,8	-19,2	26,0	11,9	-14,1
Slovakia	36,7	16,8	-19,9	30,8	11,3	-19,5
Slovenia	20,9	19,1	-1,8	10,5	14,5	4,0
Spain	36,5	32,8	-3,7	35,4	33,4	-2,0
Sweden	23,8	23,2	-0,6	17,9	17,4	-0,5
Switzerland [1])	18,8	18,7	-0,1	12,5	12,4	-0,1
United Kingdom	29,7	28,3	-1,4	27,3	28,9	1,6
United States [1])	38,3	37,4	-0,9	35,9	35,1	-0,8
Croatia [1])	16,5	16,5	0,0	6,9	6,9	0,0
Macedonia [1])	13,3	7,9	-5,4	8,8	1,9	-6,9
Turkey [1])	26,8	17,9	-8,9	19,6	12,6	-7,0
EU 15	30,7	25,1	-5,7	23,6	19,0	-4,6
EU 12	27,4	17,0	-10,4	20,4	11,9	-8,5
OECD rest	27,4	25,9	-1,6	24,1	22,0	-2,0

Source: European Commission, 2010C, WIFO-calculations. - [1]) Earliest data: 2005.

3.4 Conclusions

Some overall trends may be discerned based on the preceding – necessarily rather superficial – first look at the development of overall tax structures and the tax burden on various tax bases. Most pronounced is the downward trend in top personal income tax rates as well as (statutory and effective) corporate income tax rates. There also seems to be a certain – albeit not very clear-cut – general trend towards an alleviation of the tax burden on labor. Further and deeper analyses than are possible here are required, specifically regarding the design of individual tax categories (e.g. the degree of progressivity within personal income taxation or the lowest personal income tax rate, etc.) and its growth relevance.

Table 3.3 gives an overview of the ranks of the countries regarded here (as far as available) with respect to the indicators presented above, whereby higher values of the tax burden indicators imply higher ranks. Of particular interest appears the relationship between the total tax burden on the one hand and the individual tax burden indicators on the other hand. However, a more detailed analysis of the relationships between the individual tax burden indicators goes beyond the scope of the study.

Table 3.3: Country-specific ranks with respect to tax burden indicators

Country	total tax burden	share of growth-dampening taxes	top personal income tax rate1)	marginal tax wedge 100%	average tax wedge 100%	corporate income tax rate	EMTR	EATR
Australia	28	13	13	24	26	8		
Austria	7	4	4	4	5	18	13	17
Belgium	3	7	5	2	1	4	32	12
Bulgaria	22	36	36	n.a.	n.a.	35	30	32
Canada	32	11	29	19	20	6	5	4
Cyprus	17	34	28	n.a.	n.a.	36	28	31
Czech Republic	15	9	34	12	9	26	26	23
Denmark	1	16	2	18	11	19	16	18
Estonia	25	25	31	n.a.	n.a.	24	31	27
Finland	5	10	8	5	8	16	12	15
France	6	14	18	9	4	5	3	3
Germany	10	8	14	3	3	11	9	8
Greece	24	22	15	11	10	20	20	19
Hungary	11	26	26	1	2	30	18	20
Iceland	9	33	11	20	25	32		
Ireland	26	31	10	6	24	34	22	29
Italy	8	15	16	7	6	7	10	9
Japan	34	1	6	26	23	1	1	1
Korea	36	35	22	28	27	22	n.a.	n.a.
Latvia	29	24	30	n.a.	n.a.	33	27	30
Lithuania	31	21	35	n.a.	n.a.-	27	29	25
Luxembourg	16	19	21	8	17	12	17	11
Malta	21	32	23	n.a.	n.a.	3	7	6
Netherlands	12	17	3	16	13	17	11	13
New Zealand	19	20	25	27	28	9	na	na
Norway	4	5	9	10	15	13	8	10
Poland	20	29	27	22	18	28	21	24
Portugal	23	28	12	15	16	21	15	14
Romania	33	30	33	n.a.	n.a.	31	24	28
Slovakia	27	23	32	17	14	29	25	26
Slovenia	13	18	19	n.a.	n.a.	25	19	21
Spain	18	12	17	13	12	10	4	5
Sweden	2	3	1	14	7	15	14	16
Switzerland	30	6	20	23	22	23	23	22
United Kingdom	14	27	7	21	19	14	6	7
United States	35	2	24	25	21	2	2	2

Source: WIFO.

4 Regulation

4.1 The regulatory framework and economic growth

A further dimension of government size is the intensity of regulation. Governments provide the framework for market transactions by setting the rules for voluntary exchange and market entry (and sometimes also: exit). Government regulations impose restrictions on individual market participants' actions and thereby limit the range of opportunities. Put differently, the regulatory framework is the set of rules governing the markets.

On the one hand, a minimum set of regulations is a pre-condition for the functioning of markets and competition so that they can unfold their productivity enhancing power. A good regulatory framework reduces transaction costs on goods and factor markets and thus contributes to growth. Moreover, regulations may also improve the allocation of resources by channeling economic behavior of market participants in order to correct market failures from asymmetric information, externalities or natural monopoly markets. In this respect, regulation can also take over the role of a substitute for fiscal interventions. On the other hand, overly rigid regulatory systems can be an obstacle to economic growth if the set of implemented rules impedes welfare-enhancing voluntary transactions. Regulatory restraints can be so strict that they prevent an economy to respond quickly to technological change and to allocate scarce resources to their most productive uses.

While too little regulation is bad for growth because the necessary framework for competitive markets is not provided, too much regulation can be bad for growth if it restricts competition (by entry limitations) and voluntary exchange. A lack of competition in markets can thwart incentives for productivity improvements and therefore lead to reduced innovation dynamics through barriers to entrepreneurship (*Aghion et al.*, 2001, *Cincera – Galgau*, 2005). Severe regulations place an additional burden on economic activities and thus reduce the rate of return from investment in physical or human capital. As such, the burdens from regulation are similar to burdens of taxation. Structural policies and regulations which influence the working properties of markets can therefore contribute to cost differences in goods and factor markets. In case of excessive entry regulations, a liberalization or de-regulation can improve allocative efficiency by reducing monopoly rents and bringing prices in line with marginal costs. Also, enhanced competition will raise the productive efficiency of an economy by changing incentives for businesses. Moreover, a more open economy with reduced entry restrictions is also more attractive to foreign trade and investment (*Nicodeme – Sauner Leroy*, 2007; *Djankov*, 2009). Finally, regulation also can serve as a means for state enforced re-distribution towards organized special interest groups. Achieving regulatory protection from competition is therefore a goal in socially unproductive rent seeking (*Posner,* 1975).

Seen from this view, the theoretical problems regarding the choice of an 'optimal degree of regulation' are not too different from the questions with respect to the optimal fiscal size of government.[32]

Empirical evidence on the growth effects of the regulatory framework almost always points to the advantages of less heavily regulated markets. A number of empirical papers find that a more market-friendly regulatory environment is conducive to economic growth performance, and that too strict regulatory policies and lack of competition in markets are at the heart of a disappointing growth performance, specifically in some OECD nations (e.g. *Dutz – Hayri*, 1999; *Griffith – Harrison – Simpson*, 2006; *Nicodeme – Sauner Leroy*, 2007). *Nicoletti – Scarpetta* (2003) find that productivity growth is boosted by reforms that promote private corporate governance and competition, and claim that "... entry-limiting regulation may hinder the adoption of technologies, possibly by reducing competitive pressures, technology spillovers, or the entry of new high-tech firms." *Alesina et al.* (2005) report that a more competitive environment is good for growth as it stimulates private business investment. *Fernandes* (2008) finds a positive impact of de-regulation on productivity in the services sector in transition economies. *Djankov – McLiesh – Ramalho* (2006) use data from the World Bank's Doing Business reports as objective measures of business regulations in 135 countries. They find that countries with less regulation grow faster. *Dawson* (2006) reports a significant negative relationship between a broad measure of economic regulation and growth. Similar results are found when measures of credit market and business regulations are used.

Although it is still an ongoing debate, the vast majority of theoretical models and empirical papers conclude that trade is good for growth (e.g. *Grossman – Helpman*, 1991; but see also *Rodriguez – Rodrik*, 2001). The international division of labor is generally supposed to be a major driver for world-wide development. Restrictions on international trade – tariffs, quotas, hidden administrative regulations etc. – are therefore suspected to be growth depressing. What is more controversial among economists is whether freedom of international capital movements is unequivocally good for growth (e.g. *Klein*, 2005; *Edwards*, 2007). Even before the recent Financial Crisis a number of economists advocated capital controls as a means to protect local producers and financial markets at a developmental stage (e.g. *Stiglitz*, 2002).

The most heavily disputed regulations are concerned with labor market issues. On the one hand, market imperfections like asymmetric information and distribution of market power between employers and employees require some protection for workers through labor market legislation (*Beetsma – Debrun*, 2003). On the other hand, restrictive regulation of labor markets can easily cause sclerotic labor markets that are an obstacle to efficient allocation and growth. Empirical evidence on the growth effects of restrictive labor market regulations is scarce. Most empirical studies are rather concerned with employment effects. Rigid labor market institutions are frequently seen as a fundamental cause for high and persistent

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[32] *Wright* (2004) even develops a similar theoretically hump-shaped relation between regulation intensity and growth performance as in Figure 1 of the present paper.

unemployment in a number of European countries (e.g. *Blanchard – Wolfers*, 2000). Though empirical evidence is somewhat scarce, at least some empirical studies indicate that growth in industrial countries – especially in the European economies – could be enhanced by lower de facto labor market regulation (*Calderon – Chong*, 2005).

4.2   Regulatory policies

In this subsection we provide an overview of the degree of regulation in OECD and EU27 economies, as well as in a number of countries in the European periphery. Yet, whereas fiscal size can in principle be measured – though only imperfectly and involved with a lot of problems – the quality of regulations governing markets is even more difficult to gauge, as it is not the mere number of laws that is decisive. Nevertheless, during the last 20 years, numerous attempts have been made to measure the quality of the institutional environment, structural policies and regulatory systems, often initiated or supported by international organizations (e.g. the World Bank, European Union, OECD, World Economic Forum, etc.). Each of these measures highlights specific aspects of regulations, and each has its own merits and limitations. Hence, to date no commonly accepted standard indicator for the quality of the regulatory framework is in use.

Instead of introducing a vast number of different indicators and measurement systems for regulatory policies in this subsection, we employ the most comprehensive composite Economic Freedom of the World-index from the Fraser Institute, which is based on data from various international sources. We take the data from the most recent edition of the Economic Freedom of the World-report (*Gwartney – Lawson*, 2010) which provides data for the degree of regulation of certain markets and businesses up to 2008. We concentrate on the following dimensions of the *efw*-index:

*   the regulation of international trade and capital flows,
*   the regulation of domestic credit markets,
*   the regulation of business in general, and
*   the regulation of labor markets.

Each index is composed of a number of sub-indices, using data from various sources. The data are normalized on a 0-10-scale, with higher index-scores indicating less strict regulation. For details on the construction of the index, see the latest report (*Gwartney – Lawson*, 2010). *Table 4.1* displays the results for 2008. Countries are grouped into the OECD-EU27- sample and the European periphery sample, and ordered according to a summary index, which is calculated as the simple average of the four market regulation indices.

Table 4.1: Intensity of market regulations according to Economic Freedom of the World sub-indices (2008)

country	code	international trade & capital	domestic credit	domestic business	domestic labor	summary*
New Zealand	nz	7.9	10.0	7.8	8.5	8.6
Denmark	dk	7.7	9.5	7.4	7.5	8.0
Canada	ca	7.1	9.5	7.1	8.3	8.0
Ireland	ie	8.2	9.0	6.9	7.6	7.9
Australia	au	6.7	9.5	6.7	8.5	7.9
United Kingdom	uk	7.6	9.0	6.7	8.0	7.8
United States	us	7.6	7.7	6.7	9.2	7.8
Slovakia	sk	8.1	10.0	5.3	7.7	7.8
Netherlands	nl	8.3	9.5	6.4	6.7	7.7
Estonia	ee	8.0	10.0	7.3	5.6	7.7
Switzerland	ch	6.8	9.0	7.0	7.9	7.7
Belgium	be	8.0	9.4	6.3	6.9	7.7
Czech Republic	cz	7.8	9.3	5.6	7.7	7.6
Iceland	is	5.7	9.3	7.7	7.7	7.6
Bulgaria	bg	7.6	9.5	5.4	7.7	7.6
Hungary	hu	8.1	8.8	6.0	7.1	7.5
Luxembourg	lu	8.1	9.5	7.0	5.3	7.5
Austria	at	7.6	9.4	6.8	5.9	7.4
Latvia	lv	7.3	9.2	6.1	7.1	7.4
Sweden	se	7.7	9.5	7.1	5.1	7.4
Japan	jp	6.1	8.9	6.1	8.2	7.3
Finland	fi	7.4	9.8	6.9	5.1	7.3
France	fr	7.3	9.2	6.2	5.6	7.1
Malta	mt	7.1	9.4	4.6	7.0	7.0
Cyprus	cy	7.1	9.5	6.1	5.3	7.0
Lithuania	lt	7.5	9.2	5.7	5.6	7.0
Slovenia	si	7.3	9.0	6.0	5.4	6.9
Romania	ro	7.4	7.5	5.9	6.7	6.9
Norway	no	6.5	9.3	6.6	4.9	6.8
Spain	es	7.0	9.3	5.8	5.1	6.8
Poland	pl	7.1	8.7	4.9	6.5	6.8
Italy	it	7.1	7.9	5.4	6.3	6.7
Korea	kr	7.1	9.3	6.1	4.0	6.6
Germany	de	7.7	8.2	6.6	3.9	6.6
Portugal	pt	7.2	7.6	5.9	5.2	6.5
Greece	el	6.4	7.6	5.7	4.4	6.0
sample mean		7.4	9.1	6.3	6.5	7.3
Georgia	ge	7.7	8.7	7.5	7.3	7.8
Montenegro	me	7.2	9.6	5.3	7.9	7.5
Kyrgyzstan	kg	7.4	9.2	6.4	6.2	7.3
Croatia	hr	6.5	9.4	5.1	6.3	6.8
Armenia	am	6.6	9.0	5.3	6.1	6.8
Bosnia and Herzegovina	ba	6.2	8.9	5.2	6.7	6.8
Albania	al	6.3	8.1	6.1	5.8	6.6
Serbia	rs	6.7	8.7	4.8	5.7	6.5
Turkey	tr	6.4	7.5	6.3	4.4	6.2
Ukraine	ua	6.5	8.1	3.7	6.3	6.2
sample mean		7.2	8.6	6.1	5.7	6.9

Source: *Gwartney – Lawson* (2010). *Simple average of the four regulation sub-indices, WIFO calculations.

WIFO

International trade and capital flows

International openness promotes an efficient allocation of resources, fosters the dissemination of knowledge, and promotes competition. In gauging the freedom of international trade and capital flows the efw-subindex takes into account various forms of governmentally imposed restrictions on voluntary exchange of consumer goods and mobile capital. Also as a consequence of integration of international goods and capital markets through various international treaties, the countries in the sample observe a high level of trade and capital markets liberalization in 2008. On a 0-to-10-point-scale, average regulation index level is 7.4, lying in a range between 8.3 (Netherlands) and 5.7 (Iceland) (see *table 4.1*).

Trade and international capital movements are also reasonably liberalized in the 10 countries of the European periphery for which data are available. On average, the liberalization level is 7.2 points, with Georgia (7.7) having a regulatory regime that provides liberties comparable to Sweden or the USA.

Credit market regulations

Restrictions in domestic credit markets have also been eliminated in most countries of the sample. This sub-index measures the extent to which the banking industry is dominated by private firms and whether foreign banks are permitted to compete in the market. It also indicates the extent to which credit is supplied to the private sector and whether controls on interest rates interfere with the market in credit. The average liberalization level of domestic credit markets in 2008 was 9.1, only a few countries (Portugal, Greece, Romania, Italy, and the USA) observed a liberalization level that is slightly less than 8 points on the scale.

The efw-credit market regulations index also provides evidence that most countries in the European periphery have abandoned severe restrictions on domestic markets. The mean level in these countries is 8.6, only Turkey lagging somewhat behind.

Business regulations

The index of private business regulation identifies the extent to which regulatory policies and bureaucratic procedures restrain entry and reduce competition. It takes account of price controls on product markets, administrative requirements in doing business (e.g., licensing restrictions, required procedures to start a new business, etc.), bureaucratically imposed costs of following standards (except for environmental regulations) and undocumented extra payments and bribes that are required when getting into contact with the bureaucracy. In order to score high in this sub-index, governments must allow predominantly markets to determine prices and refrain from regulatory activities that retard entry into business and increase the cost of production.

On average, the countries in the OECD/EU27 sample arrive at a liberalization level of 6.3, which is far lower than the international trade regulations level. While New Zealand and Iceland observe the highest level of de-regulation of product markets, especially Malta and

Poland appear to have still a high potential to liberalize and, thus, enhance competition on domestic markets. According to the results of most empirical studies, this would boost growth in these countries. *OECD* (2005) hence expected a substantial increase of GDP per capita growth in the EU15 if competition-restraining regulations were abandoned.

In the 10 countries of the European periphery domestic product market liberalization has also shown impressing progress. Serbia and in particular the Ukraine yet have still comparably restrictive regulations for doing business.

Labor market regulations

The diversity of labor market regulations is captured by a number of measures for the relevance of minimum wages, employment protection regulations, centralized wage setting institutions, extension of union contracts to nonparticipating parties, and military conscription. The least regulated labor markets according to the efw-index can be found in the Anglo-Saxon Welfare States (USA, Australia, New Zealand, Canada, UK) as well as in Japan. Continental Europe, especially Germany in 2008, is lagging behind.[33] Greece, Spain, and Portugal also faced more rigid labor market regulations. Labor market legislation in the European periphery countries has also become less rigid. Only Turkey still appears to observe stricter regulations.

Summary index

Taking the simple mean of these four regulation-indices, New Zealand is the least regulated country in the sample, while Greece is the most heavily regulated. The countries in the European Periphery observe somewhat more economic regulation than the ones of the developed countries sample. Yet, the differences in 2008 are not very pronounced.

Figure 4.1 shows a positive relationship between the level of GDP per capita and the state of market liberalization in 2008, taking also into account countries from the European Periphery sample. A simple bi-variate cross-country regression indicates that the interrelation between both variables is statistically significant at a 1% level of confidence.

Figure 4.2 illustrates development of the summary regulation index over time in four country groups. While markets are already highly liberalized in EU15 and further OECD-countries, the EU12 and the European Periphery observed a liberalization of regulatory policies over time. Until 2008 the differences between the country groups have been substantially reduced.

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[33] In the meantime Germany put in place a number of labor market reforms which will probably improve its score of the labor market regulation index.

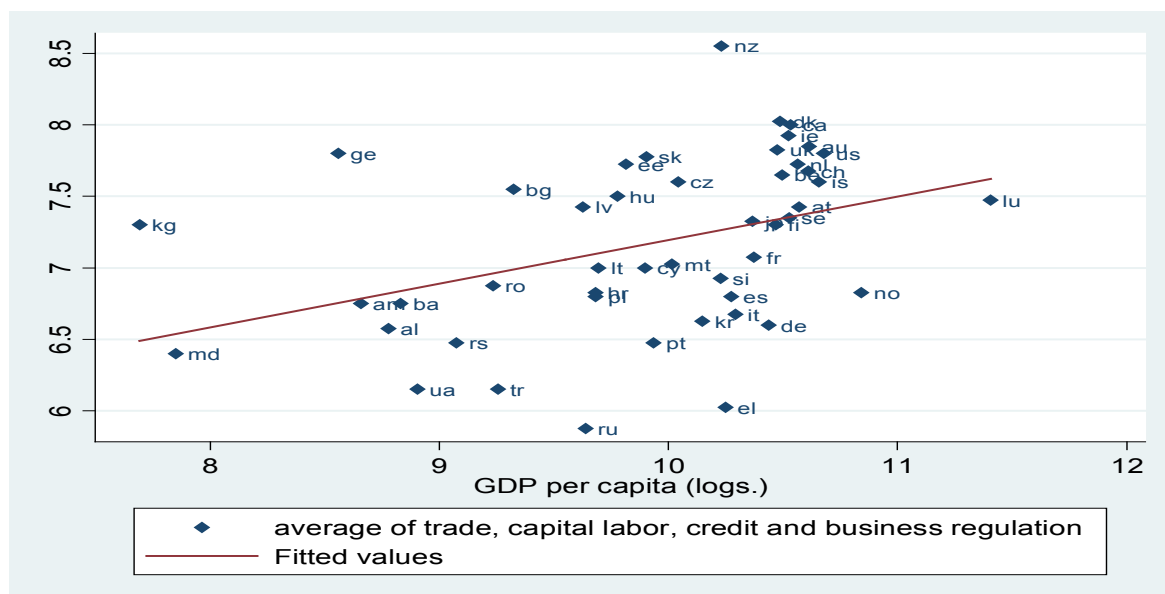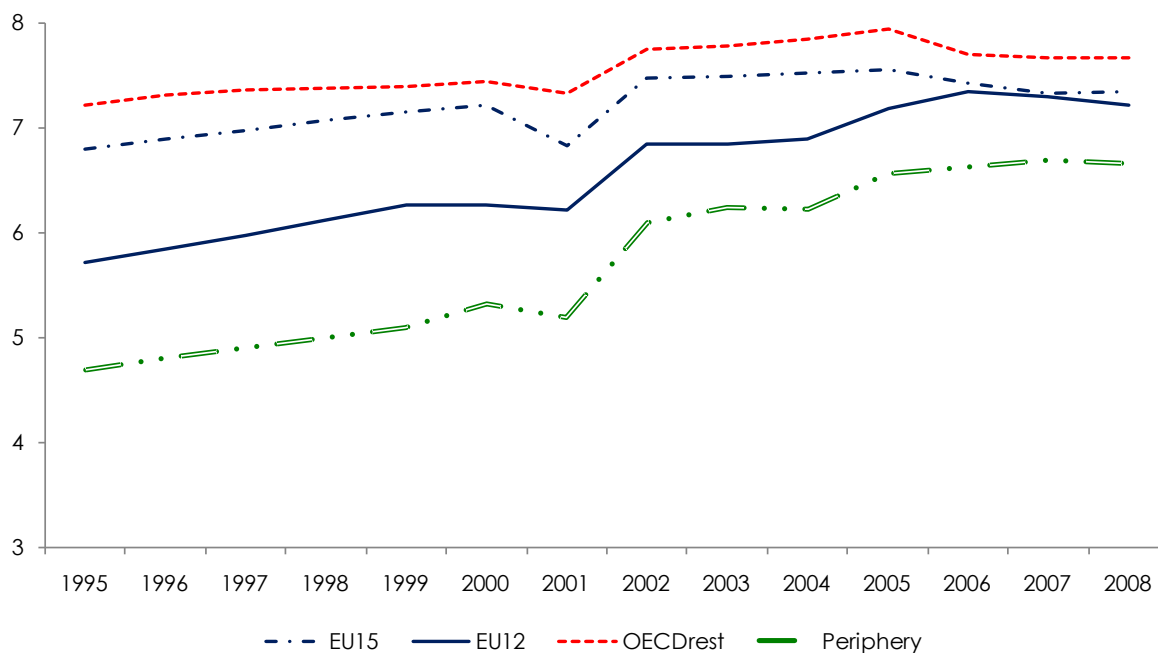*Figure 4.1: Intensity of market regulations and GDP per capita (2008)*

Figure 4.2: Median economic liberalization levels in groups of EU15, EU12 and further OECD-countries, 1995-2008(according to summary regulation-index)

Source: WIFO-calculations, based on *Gwartney – Lawson* (2010). Median values for the years 1996-1999 derived from interpolated data.

WIF0

5   Interplay between expenditures, taxation and regulation

5.1   The role of policy complementarities

Having analyzed separately the spending, taxation and regulation patterns of the countries in our sample, the focus of this section will be placed on the interplay of the respective policies. Although often neglected in theoretical as well as empirical investigations, complementarities between policies can play an important in role for the growth-friendliness of entire policy packages. As reforms are mutually interdependent, a country's economic policy package needs coherence, or, *economic complementarities*', "… in a sense that the effectiveness of one policy depends on the implementation of other policies" (*Orszag – Snower*, 1998).

Neglecting such interdependencies between policies can result in a wrong assessment of the economic effects of single policy measures (*Aziz – Wescott*, 1997). For example, in an analysis of the prima facie disappointing effects of wage moderation on growth performance in the Euro area, *Estevao* (2005) reports that "… downward wage-curve shifts … do raise output and lower unemployment, but the size of the impact depends crucially on the degree of product market regulation. In more regulated product markets, weaker competition and barriers to entry allow incumbent firms to appropriate part of the improved labor supply conditions in the form of higher rents. ... Because product markets are more regulated in the euro area than in other industrial countries, wage moderation affects production and unemployment less strongly, which implies that labor market reforms are less effective in raising euro area's growth potential." Hence, economic complementarities of labor market regulations and product market reforms appear to be of crucial importance in determining whether policies can help to promote growth and employment (see also *Bassanini – Duval*, 2009).[34]

Amable (2009) goes even a step further by integrating the policy complementarities thinking into the Varieties of Capitalism discussion (*Hall – Soskice*, 2001). In particular, he states that from an institutional complementarities point of view, a simple combination of the supposedly best (most efficient) institutions would not necessarily lead to an optimal institutional design for growth and welfare. According to *Amable* (2009), the impact of different institutions on the economy should therefore not be investigated independently.

The role of the interaction between certain economic policies in promoting growth has only recently received significant attention in the empirical growth literature. *Aziz – Wescott* (1997) consider measures for international openness, macro stability and size of government in a sample of 76 developing countries, and report that – analyzed separately – virtually none of these policies is significant in boosting growth over a 10 year period from 1985-95. Introducing a concept of complementarities between these different policies, they find that countries which have high quality of policies in all three measures (or at least only one 'medium quality policy') have a significantly higher probability to observe higher growth.

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[34] *Belke – Fehn* (2002) find similar complementarities between labor market reforms and the regulation of venture capital markets.

Chang – Kaltani – Loayza (2009) find that the growth-promoting effect of trade openness depends on complementary reforms which help a country take advantage of international competition. Their estimates show that trade openness can reduce or increase growth, depending on the status of the complementary reforms in the areas educational investment, financial depth, inflation stabilization, public infrastructure quality, governance, labor-market flexibility, ease of firm entry, and ease of firm exit. This clearly indicates that the growth effects of an increase in international trade openness depend positively on the progress made in other policy areas. *Bokaky – Freund* (2004) also find that increased trade does not stimulate growth in economies with substantial regulatory interventions, it may even reduce growth in countries with excessive government regulation. In a similar vein, *Gwartney – Holcombe – Lawson* (2006) find countries with a higher overall institutional quality to experience a higher productivity of investment. More specifically, private investment is much more responsive to cross-country differences in economic freedom than are rates of government investment.

Most recently, *Braga de Macedo – Oliveira Martins – Rocha* (2010) assess the possible impact of complementarities over six broad policy areas cross-country estimates in a sample of 130 countries over a time span of 13 years (1994-2006). The policy areas included are (i) trade openness, (ii) business regulations, (iii) freedom of capital movement, (iv) openness of the domestic banking and financial system, (v) property rights protection and (vi) infrastructure quality. These major areas therefore resemble to some extent the policies that are considered to be growth enhancing in the present paper. Policy complementarities are captured by the standard deviation of the six aforementioned individual policy indicators, which have been standardized on a 0-100 scale.[35] The authors find evidence that the variables having the strongest explanatory power are the average change of policies towards more economic liberalization and the time-averaged standard deviation of individual policy indicators, even after the inclusion of several controls. They conclude that "[t]his implies that countries where policy complementarities can unfold to a greater extent grow faster. Achieving a higher level of policy complementarity has therefore a permanent effect on growth rates." Turning to panel techniques, the introduction of (country) fixed-effects destroys the significance of the complementarities measure, indicating that the effect is driven mainly by the cross-section variance. In a simple random-effects framework, the positive impact of more coherent policies remains. *Braga de Macedo – Oliveira Martins – Rocha* (2010) therefore confirm the findings of a previous paper on transition economies, where the authors used different measures for complementarities (*Braga de Macedo – Oliveira Martins,* 2008).

In contrast to these economic complementarities between policy areas, political policy complementarities arise when the ability to gain political consent for one policy depends on the implementation of others (*Orszag – Snower*, 1998). This somehow parallels the famous argument of *Rodrik* (1997) who claims that many countries have increased social security spending and social regulation in order to compensate for higher risks due to globalization

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[35] Instead of employing the Fraser Institutes measures the authors use instead the Economic Freedom index of Wall Street Journal and Heritage Foundation.

and market deregulation. On the other hand, *Bergh – Karlson* (2010) report evidence that high-tax countries might use a liberalization of trade as a substitute for excessive overall government size. Their results support the idea that countries with big government can use economic openness to mitigate the negative growth effects of high taxes and expenditures.

5.2   Some empirical facts

In this subsection we will aim to investigate the existence (or absence) of complementarities between public expenditures, taxation and regulation in our sample. Note, first, that there is no single measure for complementarities, and, second, that we do not have an exact notion of the 'optimal' level of productive spending or regulations. We therefore calculate a simple standardized index of the relative growth-friendliness of a country's policy package as well as for the coherence/dispersion of the respective policy package (see box "Construction of growth-friendliness and complementarities-indices"), taking into account the real world range and distribution of the data in our sample. The construction of the indices assumes linearity, i.e. possible non-linear relations between policy variables and economic outcomes are not reflected in the indices.

The first index is an index of the average growth-friendliness of a country's policy mix, consisting of indicators for spending, taxation and regulation policies. It is constructed by measuring the growth-friendliness of 13 policy indicators (see box) in relation to other countries in the sample. The resulting index is standardized on a 0-100 scale, where higher values reflect higher (average) growth-friendliness.

The second index is simply calculated as the standard deviation of the growth-friendliness-index of these 13 policies. Higher values indicate more dispersion and a less coherent overall policy package. *Table 5.1* indicates the respective values for 2008.

Construction of growth-friendliness and complementarities-indices

We calculated a simple standardized index of the relative growth-friendliness of a policy area i in country j during a single year t (t=2008), according to the formula

$$growthfriendliness_{jt} = \frac{V_{jt} - V_{min}}{V_{max} - V_{min}} \cdot 100,$$

if higher values *V* of a policy variable are considered to be good for growth (e.g. a higher productive spending type's share in the overall budget), and

$$growthfriendliness_{jt} = \frac{V_{max} - V_{jt}}{V_{max} - V_{min}} \cdot 100,$$

if lower values *V* of a policy variable are considered to be good for growth (e.g. a smaller overall level of taxation). V_{max} and V_{min} denote the respective sample maxima and minima. We consider the following policy area variables i:

Government spending

total government spending over GDP (-) [5-year-averages]

core services spending shares in total spending (defense spending not included) [5-year-averages] (+)

infrastructure spending shares in total spending [5-year-averages] (+)

health spending shares in total spending [5-year-averages] (+)

education spending shares in total spending [5-year-averages] (+)

Taxes

total taxation over GDP [5-year-averages] (-)

share of non-distortionary taxes in total tax revenues [5-year-averages] (+)

marginal tax wedge on labor income [current value] (-)

marginal effective corporate income tax rate [current value] (-)

Regulation

liberalization of international trade and capital movements [current value] (+)

liberalization of domestic credit market [current value] (+)

liberalization of domestic labor market [current value] (+)

liberalization of domestic business regulations [current value] (+)

(+) in parentheses means that higher values are expected to be conducive for growth performance, (-) denotes the opposite assumption. Note that due to the standardization procedure all values are in a range between 0 and 100, and higher values always reflect a higher growth-friendliness.

In a next step we calculate the year-by-year country means and standard deviations of all index values for the respective policy areas. We only consider countries in which data for at least 12 out of 13 different indicators are available. While the mean value reflects the 'average growth-friendliness' of a country's policy package in a given year, the standard deviation is a measure of policy dispersion. Lower values indicate a more coherent overall policy package.

The average index is lead by New Zealand, followed by Korea, Ireland and Bulgaria. At the bottom of the 2008 ranking we find Austria, Germany, Italy and Greece. With respect to the policy dispersion measure, the most coherent policy mix can be found in Latvia, Slovenia and Spain, while the USA, Iceland, and Japan observe the highest standard deviation of our set of 13 policy indicators. Both measures are not strongly correlated, though. *Figure 5.1* shows that average growth-friendliness and policy dispersion are not strongly connected. If anything, there is a slightly positive relation between the two variables. Simple correlation tests also reveal no significant between both indicators.

Table 5.1: Growth-friendliness-index and policy dispersion index in 2008

scode	country	growth-friendliness	dispersion
nz	New Zealand	71.3	26.6
kr	Korea	67.4	31.0
ie	Ireland	63.8	22.8
bg	Bulgaria	62.2	24.2
ee	Estonia	60.9	27.3
ca	Canada	59.1	29.3
us	United States	59.0	36.2
lv	Latvia	57.9	13.4
is	Iceland	56.4	34.0
uk	United Kingdom	56.0	22.6
cy	Cyprus	55.4	23.9
ch	Switzerland	54.6	30.1
sk	Slovakia	54.3	29.1
lt	Lithuania	53.7	18.7
jp	Japan	52.1	32.5
nl	Netherlands	51.0	21.1
cz	Czech Republic	50.5	22.0
lu	Luxembourg	49.6	21.2
ro	Romania	48.5	23.6
pl	Poland	46.3	18.7
mt	Malta	46.1	22.8
es	Spain	45.4	16.5
dk	Denmark	44.0	31.3
be	Belgium	42.3	32.0
si	Slovenia	41.3	14.3
pt	Portugal	41.1	21.2
fi	Finland	40.2	25.7
no	Norway	39.5	25.3
se	Sweden	37.7	29.5
fr	France	37.5	21.9
hu	Hungary	37.3	25.3
at	Austria	36.8	27.0
de	Germany	33.5	27.5
it	Italy	32.6	20.1
el	Greece	30.5	20.1

Source: WIFO-calculations

Figure 5.1: Policy dispersion and average growth-friendliness, 2008
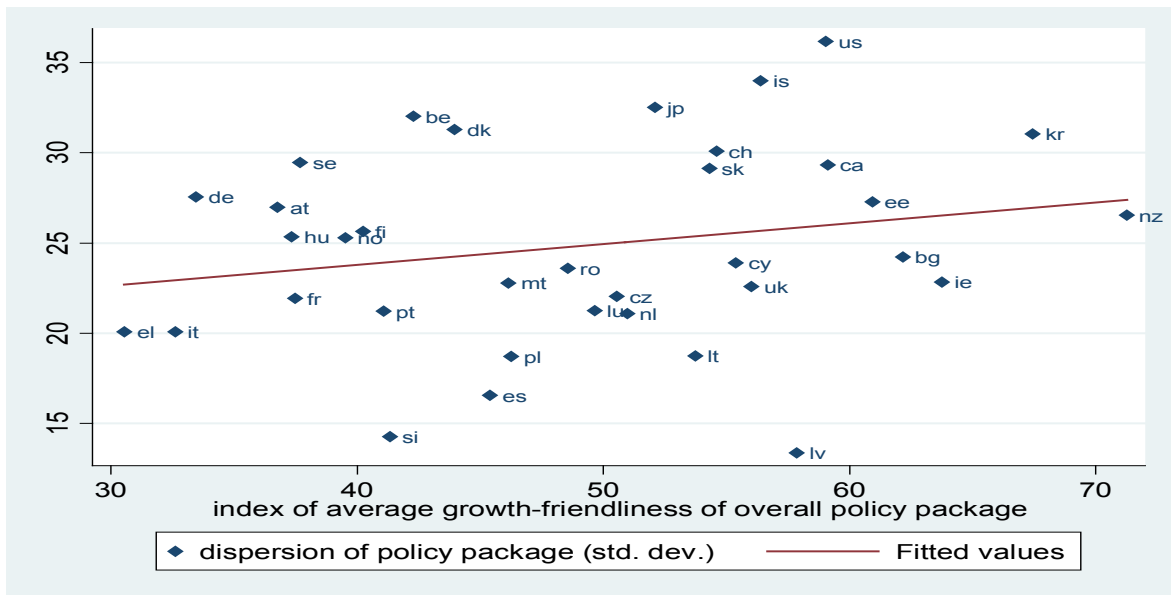
6   Summary and outlook

The relationship between government size and growth has received an enormous attention in the economics literature. A central point of interest in this respect is the controversial debate whether large governments are harmful for growth. Endogenous growth theory provides us with the view that fiscal and regulatory policies impact on the steady state growth rate of output as well as on transitional developments. Theoretical models and empirical studies show that the size and composition of public spending, the size and structure of taxation and the regulatory regime may be important for growth performance.

Are fiscal and regulation policies in Europe in line with the recommendations from the new growth literature? The present study provides an overview of the growth-friendliness of fiscal and regulatory structures in a sample of developed OECD countries and EU members (EU15 and EU12). Peripheral European (transition) countries are also included, whenever respective data are available. For most of the time we confine to a time period starting in 1995 and ending in 2008, due to restrictions in data availability and because we do not want to let our results be biased by fiscal and GDP developments during the recent Financial Crisis.

Based on several measures capturing the expenditure and the tax side of the budgets, as well as regulatory policies, the size and the structure of public sectors differ markedly across countries. With respect to general government spending levels we still observe large differences among the set of countries in our sample. Expenditures are much higher in the EU15 as compared to the EU12 and the remaining OECD countries. Expenditures in relation to GDP declined slightly since the 1990s, yet in many EU15-contries spending ratios remained well above 45% of GDP and increased markedly again since 2007. The difference to EU12 and other developed OECD members is substantial and amounts to 8 to 10 percentage points in some years. In the European periphery we observe even more sizeable heterogeneity of government spending.

The literature defines those components of government spending as 'productive' which enter the production function of private enterprises. In particular, we distinguish between spending for core public services (general administration, public order and safety, and defense), infrastructure services, health care and education. Our descriptive analysis shows substantial differences between countries' budget shares of productive spending categories, lying in a range from 40% to 70% of total spending. There is in general a negative relation between total spending and productive expenditure shares (with and without military spending). This is an indication that expansion of government size is mainly due to non-productive spending items. Somewhat surprisingly, there is not too much difference between EU15, EU12 and remaining OECD-countries. The respective median value increases slightly in the EU15 and the EU12 group since 1995, but in general the average productive spending shares over GDP remain almost constant.

Non-productive spending on social protection has broadly remained constant over the last 15 years in the three country groups, apart from short-term fluctuations depending on the

business cycle. In 2008/2009 we observe a strong increase in all country groups, caused by the costs of the crisis. The EU15 stands out because of its significantly larger share of expenditures for social protection. The difference amounts to 9 percentage points of GDP in some years and this explains the largest share of the spending differences among countries and country groups.

In the wake of the new debate concentrating on the structure of government activities, the potential growth impact of the tax structure has attracted more attention than the level of the tax burden. Based on a macroeconomic perspective, a hierarchy of individual taxes with respect to their growth-friendliness is derived by the OECD, according to which taxes on property appear to have the least growth-dampening effect, followed by taxes on consumption (including environmental taxes in particular). Personal income taxes (including social security contributions and payroll taxes) are more harmful, corporate income taxes are most detrimental to growth. Within our sample, only in Bulgaria the relatively growth-friendly consumption taxes and taxes on property in sum account for more than half of total tax revenues. In all other countries revenues from distortionary corporate income taxes, personal income taxes and social security contributions are dominating, with shares of these revenue categories ranging between 51.3% of total taxation in South Korea and 71.5% in Japan. The macroeconomic indicators are important to give an impression of the structures of overall tax revenues and their distribution on tax bases. However, they are hardly of use when trying to assess the incentive effects of individual taxes. Evaluations of the effects of taxes on labor supply (tax wedge) and investment (effective corporate income tax rates) show marked differences across countries. For example, average labor incomes were burdened with a marginal tax wedge lower than 30% in South Korea and higher than 70% in Hungary.

Empirical evidence on the growth effects of the regulatory framework almost always points to the advantages of less heavily regulated markets. A number of papers find that a more market-friendly regulatory environment is conducive to growth, and that too strict regulatory policies are at the heart of a disappointing growth performance. Our analysis of regulatory regimes is based on indicators for the liberalization of international trade and capital movements, as well as domestic credit markets, labor markets and business regulations. On average, New Zealand is the least regulated country in the sample, while Greece is the most heavily regulated. Countries of the European periphery observe a bit more strict economic regulation than those of the developed countries sample. Yet, the differences have become smaller over time and in 2008 they are not very pronounced any more.

Although often neglected in theoretical as well as empirical investigations, complementarities between policies play an important role for the growth-friendliness of entire policy packages. As reforms are interdependent, a country's economic policy package needs coherence, or, economic complementarities. Using a standardized index of the relative growth-friendliness of a country's policy package as well as for the coherence/dispersion of the respective policy mix of spending, tax and regulation policies, in 2008 the most coherent policy mix can be found in Latvia, Slovenia and Spain. The USA, Iceland, and Japan observe the least coherent

policy package, as measured by the standard deviation of our set of 13 policy indicators. Average growth-friendliness of public policy and the level of policy dispersion are not strongly related.

Future work will have to take a closer look at the economic and political determinants of these substantial differences in size and composition of government spending, structure and volume of taxation and the regulatory regimes. Are productive and growth-friendly spending, tax and regulation structures driven by demographic change or by income development? Empirical analyses suggest that population aging is linked to higher social expenditures (e.g. *Sanz – Velazquez*, 2007), but what about the economic determinants of productive spending (e.g. *Shelton*, 2007; *Pitlik*, 2009)?

At the heart of many empirical papers lies the discussion of the impact of globalization on budget structures, as reflected in the "efficiency vs. compensation-hypothesis"-controversy. The empirical literature yet finds no conclusive results supporting either hypothesis, i.e. it is not quite clear whether increasing capital mobility and openness lead to a re-allocation in favor of productive or non-productive expenditure items (e.g. *Garrett – Mitchell*, 2001; *Dreher – Sturm – Ursprung,* 2006; *Gemmell – Kneller – Sanz*, 2008). Some scholars stress the impact of voting systems, cabinet size, political fragmentation, and other institutional arrangements on spending and deficits (e.g. *Milesi-Ferretti – Perotti – Rostagno*, 2002).

A further point that is not addressed in the paper is the impact of the recent financial and economic crisis. Will the crisis change the underlying growth model? Does the crisis lead to a permanent re-allocation of public funds towards less productive spending components, a change in the tax structures and/or a different type of (and more strict) regulations of markets? At the current stage, however, the potential impact of the recent crisis on the size and structure of public sectors and public interventions, respectively, is yet an unresolved issue and far too premature to derive final conclusions.

Country list: OECD-EU27 sample

code	country
at	Austria
au	Australia
be	Belgium
bg	Bulgaria
ca	Canada
ch	Switzerland
cy	Cyprus
cz	Czech Republic
de	Germany
dk	Denmark
ee	Estonia
el	Greece
es	Spain
fi	Finland
fr	France
hu	Hungary
ie	Ireland
is	Iceland
it	Italy
jp	Japan
kr	Korea
lt	Lithuania
lu	Luxembourg
lv	Latvia
mt	Malta
nl	Netherlands
no	Norway
nz	New Zealand
pl	Poland
pt	Portugal
ro	Romania
se	Sweden
si	Slovenia
sk	Slovakia
uk	United Kingdom
us	United States

Country list: European periphery sample

code	country
al	Albania
am	Armenia
az	Azerbaijan
ba	Bosnia and Herzegovina
by	Belarus
ge	Georgia
hr	Croatia
kg	Kyrgyzstan
kz	Kazakhstan
me	Montenegro
mk	Macedonia FYR
rs	Serbia
tj	Tajikistan
tm	Turkmenistan
tr	Turkey
ua	Ukraine
uz	Uzbekistan

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