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The Labor Productivity Puzzle

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Abstract: In recently released economic forecasts both the International Monetary Fund (IMF 2017) and the European Commission (EC 2017) have revised upward the projected economic growth rates for the European Union (EU). We summarize the main elements of the forecasts and note the continued concerned over the widespread incidence in advanced economies of depressed rates of labor productivity growth. These secular stagnation trends are investigated in detail by examining fundamental data recently released in a study by the Organization for Economic Cooperation and Development (OECD): *OECD Compendium of Productivity Indicators 2017*, OECD Publishing, Paris (http://dx.doi.org/10.1787/pdtvy-2017-en).

Introduction

In 2015 the United States continued to lead the global economy in the most fundamental measure of economic productivity, Gross Domestic Product (GDP) per hour worked: measured in US dollars with conversion using exchange rates based upon Purchasing Power Parity (PPP). France and Germany had levels of labor productivity closely following the United States, with Italy and the United Kingdom coming in at figures slightly above the OECD average of $51.10. These levels of labor productivity translate into more variability in per capita GDP as we take into account labor utilization, which in turn depends on labor force participation and employment rates. Fundamental variation in the dynamic changes of these factors across countries has produced a growing concern about the ability of advanced global economies to maintain acceptable rates of economic growth.

2017 started with the EU having posted the fourth consecutive year of growth at a very moderate rate but in an environment of increased global economic uncertainty resulting primary from concerns surrounding Brexit and the policy environment of a new US administration. These trepidations have not translated directly into economic performance as the EU economy has continued to move ahead. Moderation has been supported by strengthening fiscal policy positions and continued expansionary monetary policy. Growing consumer and producer confidence has paralleled a slow but sure expansion in world trade supported in part from having the advantage of a competitive exchange rate for the euro.

The hoped for upturn in economic activity has been disappointing in good part because the lingering effects of the financial crisis have constrained household and company balance sheets. With stagnant wage growth there has not been a reinforcing increase in investment in support of an expanding consumer expenditure pattern. Wage growth has been short-circuited from underlying employment growth due to a lack of labor market tightness. In effect, expanded job creation is not counter balancing temporary inflationary impacts on consumer purchasing power.

The major summary of the EC spring 2017 forecast is presented in ***Table 1*** on the following page. The global economic upturn in late 2016 continuing into 2017 has been pervasive across both advanced and emerging economies and global growth is expected to continue on a moderate upward trend into 2018. This uptick has stimulated growth in global trade, which is now forecasted to be marginally higher than what was expected as recently as last winter. In contrast, financial markets have cooled down from the high levels of optimism recorded last fall as expectations concerning the new US administration fiscal stimulus plans have been revised downward. There has also been a divergence in the direction of US and eurozone monetary policies as the Fed moves toward tightening while the ECB tracks along a steady course. As European banks have in general repaired and strengthened their balance sheets, increased lending capacity is expected to complement capital market sources to expand corporate funding in the near term.

Eurozone employment growth, which was relatively strong in 2016, should continue into next year and will remain significantly above labor force growth, resulting in continued downward trends in unemployment rates. While investment has been slow to pick up, the favorable interest rate environment has offset policy and demand uncertainty to steady the rate of investment as firms have successfully reduced their leverage and can now move forward in sourcing investment funds from both capital markets and retained earnings via strengthened cash flows.

Inflationary pressures remain muted and the noticeable recent uptick in inflation has been driven by temporary factors in commodity markets such as the upward movement in oil prices. With very limited wage pressures, core inflation rates are likely in the near term to settle comfortably below the ECB's 2 percent limit. Public sector budget deficits and debt levels in proportion to GDP have shown a steady decline supported in good part by lower interest costs. Thus, the near-term outlook is for a stable EU economy making slow but steady progress in terms of growth in a low-inflation environment characterized by improving labor market conditions.

***Table 1:* Overview - The Spring 2017 Forecast**

Source: European Commission, *European Economic Forecast*, Spring 2017, Institutionsl Paper 053, May 2017, Page 1.

	Real GDP			Inflation			Unemployment rate			Current account			Budget balance		
	2016	2017	2018	2016	2017	2018	2016	2017	2018	2016	2017	2018	2016	2017	2018
Belgium	1.2	1.5	1.7	1.8	2.3	1.5	7.8	7.6	7.4	1.2	1.5	1.7	-2.6	-1.9	-2.0
Germany	1.9	1.6	1.9	0.4	1.7	1.4	4.1	4.0	3.9	8.5	8.0	7.6	0.8	0.5	0.3
Estonia	1.6	2.3	2.8	0.8	3.3	2.9	6.8	7.7	8.6	2.0	1.1	1.2	0.3	-0.3	-0.5
Ireland	5.2	4.0	3.6	-0.2	0.6	1.2	7.9	6.4	5.9	4.7	4.8	5.0	-0.6	-0.5	-0.3
Greece	0.0	2.1	2.5	0.0	1.2	1.1	23.6	22.8	21.6	-0.5	-0.5	-0.3	0.7	-1.2	0.6
Spain	3.2	2.8	2.4	-0.3	2.0	1.4	19.6	17.6	15.9	1.9	1.6	1.6	-4.5	-3.2	-2.6
France	1.2	1.4	1.7	0.3	1.4	1.3	10.1	9.9	9.6	-2.3	-2.4	-2.5	-3.4	-3.0	-3.2
Italy	0.9	0.9	1.1	-0.1	1.5	1.3	11.7	11.5	11.3	2.6	1.9	1.7	-2.4	-2.2	-2.3
Cyprus	2.8	2.5	2.3	-1.2	1.2	1.1	13.1	11.7	10.6	-5.7	-5.9	-6.3	0.4	0.2	0.7
Latvia	2.0	3.2	3.5	0.1	2.2	2.0	9.6	9.2	8.7	1.9	-0.9	-2.6	0.0	-0.8	-1.8
Lithuania	2.3	2.9	3.1	0.7	2.8	2.0	7.9	7.6	7.2	-1.1	-2.0	-1.9	0.3	-0.4	-0.2
Luxembourg	4.2	4.3	4.4	0.0	2.4	1.8	6.3	6.1	6.0	4.7	4.5	5.0	1.6	0.2	0.3
Malta	5.0	4.6	4.4	0.9	1.6	1.8	4.7	4.9	4.9	7.9	6.5	9.0	1.0	0.5	0.8
Netherlands	2.2	2.1	1.8	0.1	1.6	1.3	6.0	4.9	4.4	7.9	7.4	7.1	0.4	0.5	0.8
Austria	1.5	1.7	1.7	1.0	1.8	1.6	6.0	5.9	5.9	2.1	2.0	2.2	-1.6	-1.3	-1.0
Portugal	1.4	1.8	1.6	0.6	1.4	1.5	11.2	9.9	9.2	0.5	0.5	0.5	-2.0	-1.8	-1.9
Slovenia	2.5	3.3	3.1	-0.2	1.5	1.8	8.0	7.2	6.3	7.0	6.2	5.8	-1.8	-1.4	-1.2
Slovakia	3.3	3.0	3.6	-0.5	1.4	1.6	9.7	8.6	7.6	0.2	0.1	0.4	-1.7	-1.3	-0.6
Finland	1.4	1.3	1.7	0.4	1.0	1.2	8.8	8.6	8.2	-1.3	-1.8	-1.6	-1.9	-2.2	-1.8
Euro area	**1.8**	**1.7**	**1.8**	**0.2**	**1.6**	**1.3**	**10.0**	**9.4**	**8.9**	**3.4**	**3.0**	**2.9**	**-1.5**	**-1.4**	**-1.3**
Bulgaria	3.4	2.9	2.8	-1.3	1.3	1.5	7.6	7.0	6.4	4.2	2.4	1.8	0.0	-0.4	-0.3
Czech Republic	2.4	2.6	2.7	0.6	2.5	2.0	4.0	3.5	3.5	0.3	0.0	-0.2	0.6	0.3	0.1
Denmark	1.3	1.7	1.8	0.0	1.4	1.7	6.2	5.8	5.7	8.1	7.8	7.7	-0.9	-1.3	-0.9
Croatia	2.9	2.9	2.6	-0.6	1.6	1.5	13.3	11.6	9.7	2.6	2.9	1.3	-0.8	-1.1	-0.9
Hungary	2.0	3.6	3.5	0.4	2.9	3.2	5.1	4.1	3.9	5.0	3.5	2.8	-1.8	-2.3	-2.4
Poland	2.7	3.5	3.2	-0.2	1.8	2.1	6.2	5.2	4.4	0.2	-0.6	-1.2	-2.4	-2.9	-2.9
Romania	4.8	4.3	3.7	-1.1	1.1	3.0	5.9	5.4	5.3	-2.4	-2.8	-2.9	-3.0	-3.5	-3.7
Sweden	3.3	2.6	2.2	1.1	1.4	1.4	6.9	6.6	6.6	4.9	5.2	5.4	0.9	0.4	0.7
United Kingdom	1.8	1.8	1.3	0.7	2.6	2.6	4.8	5.0	5.4	-4.4	-3.9	-3.2	-3.0	-3.0	-2.3
EU	**1.9**	**1.9**	**1.9**	**0.3**	**1.8**	**1.7**	**8.5**	**8.0**	**7.7**	**2.1**	**1.9**	**1.9**	**-1.7**	**-1.6**	**-1.5**
USA	1.6	2.2	2.3	1.3	2.2	2.3	4.9	4.6	4.5	-2.5	-2.8	-3.3	-4.8	-4.7	-5.2
Japan	1.0	1.2	0.6	-0.1	0.4	1.0	3.1	3.1	3.0	3.9	4.1	4.2	-3.7	-4.2	-3.6
China	6.7	6.6	6.3	:	:	:	:	:	:	:	:	:	:	:	:
World	**3.0**	**3.4**	**3.6**	:	:	:	**:**	**:**	**:**	**:**	**:**	**:**	**:**	**:**	**:**

This environment of slow economic growth is linked to the fundamental underlying trends of low productivity and weak wage growth. To examine the details of these common determinants we explore the data recently released by the OECD in the *Compendium of Productivity Indications* (OECD 2017). We can decompose per capita GDP into the simple product of two measures: labor productivity (GDP per hour worked) and labor utilization (hours worked per capita) or $\left(\frac{GDP}{hrs\ worked}\right)\left(\frac{hrs\ worked}{\#persons}\right)$ = GDP per capita. Using 2007 as the base year for the financial crisis, we find that by 2015 several eurozone economies had failed to return real GDP per capita to the level realized in 2007.[1] This reflects a long-term decline in labor productivity in advanced economies. This is true even among those economies which have managed to improve GDP per capita. Here the increases have been associated with raised levels of labor utilization. ***Figure 1*** shows the long-term decline in labor productivity growth rates over the past two decades for a selected group of major OECD economies. Only Spain has countered this trend and seen a positive and increasing rate of growth in labor productivity. Italy has seen no growth in labor productivity over the past decade. You might also note that the long-term pattern for Germany, Japan, and France are similar in terms of labor productivity growth rates.

Figure 2 decomposes the growth in per capita GDP over the 2000-2010 and 2010-2015 periods. Countries are ordered from left to right by the annual growth rate over the later period. With the exceptions of Ireland and the Baltic countries, annual growth rates in the early period were higher than in the later period but the preponderance of the per capital GDP growth came from significant growth in labor productivity rather than labor utilization, which in fact was reduced in a number of countries. The period 2010-2015 has seen consistently lower rates of growth in labor productivity translating into .considerably lower growth rates in per capital GDP. Those Member States which have managed to sustain higher levels of per capital GCP growth have in general accomplished this by considerably increasing labor utilization.

Using aggregate production function modeling to derive labor productivity demonstrates the dependency of labor productivity on capital and structural changes incorporated under multifactor productivity. The OECD database gives estimated decompositions of labor productivity growth rates across the categories of (1) Information and Communications Technologies (ICT) capital deepening, (2) Non-ITC capital deepening, and (3) Multifactor productivity. ***Figure 3*** outlines these decompositions for major EU Member States in comparison with the US and Japan over the past five 5-year periods. Capital deepening has seen a substantial decline in the post-crisis era in parallel with a drop in multifactor productivity. This demonstrates the critical linkage between a recovery in labor productivity growth and a necessary revival of capital investment producing both capital deepening and new levels in terms of the embodiment of technological advancements.

[1]GDP per capita measured in the national currency at constant prices for Greece, Italy, Finland, Spain, Portugal, Slovenia, Luxembourg, Denmark are included with the first four listed remaining more than 10% below.

Figure 1 - Growth Rates in Labor Productivity 1999-2016
Data Source for Figures: OECD Productivity Statistics, April 2017, see: http://www.oecd-ilibrary.org/employment/data/oecd-productivity-statistics_pdtvy-data-en

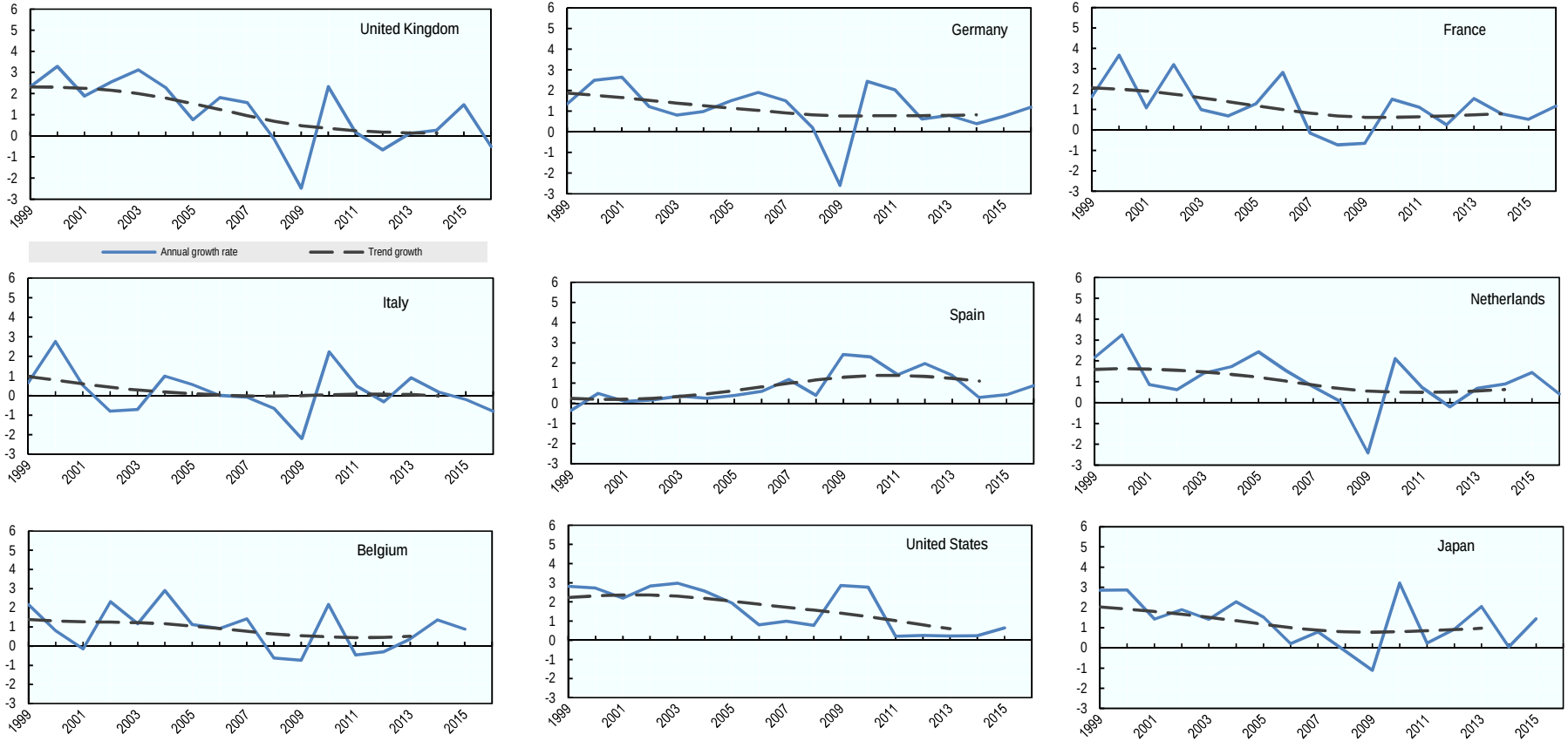


Figure 2 - GDP per capita Decomposition (percentage change at annual rate)

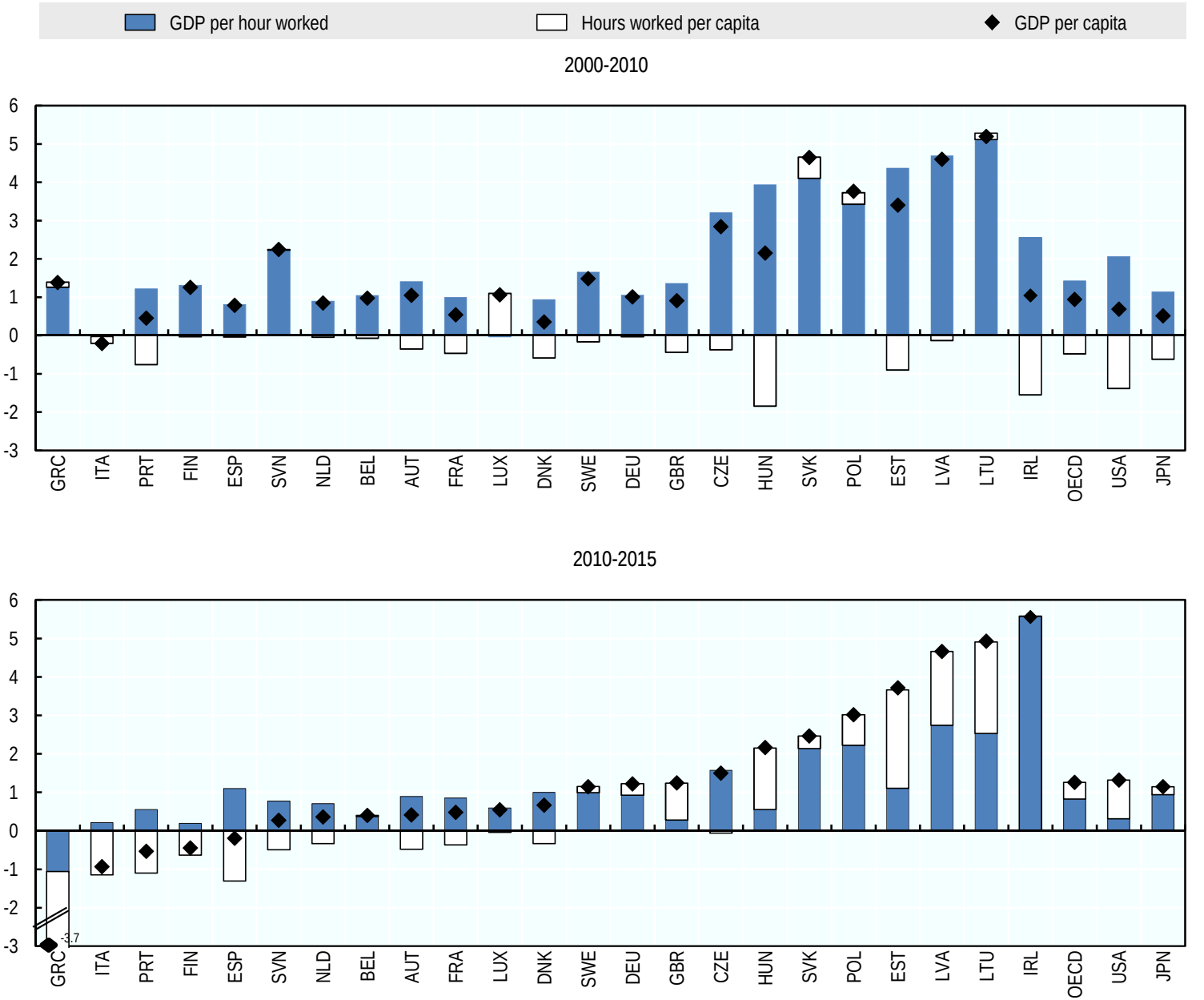
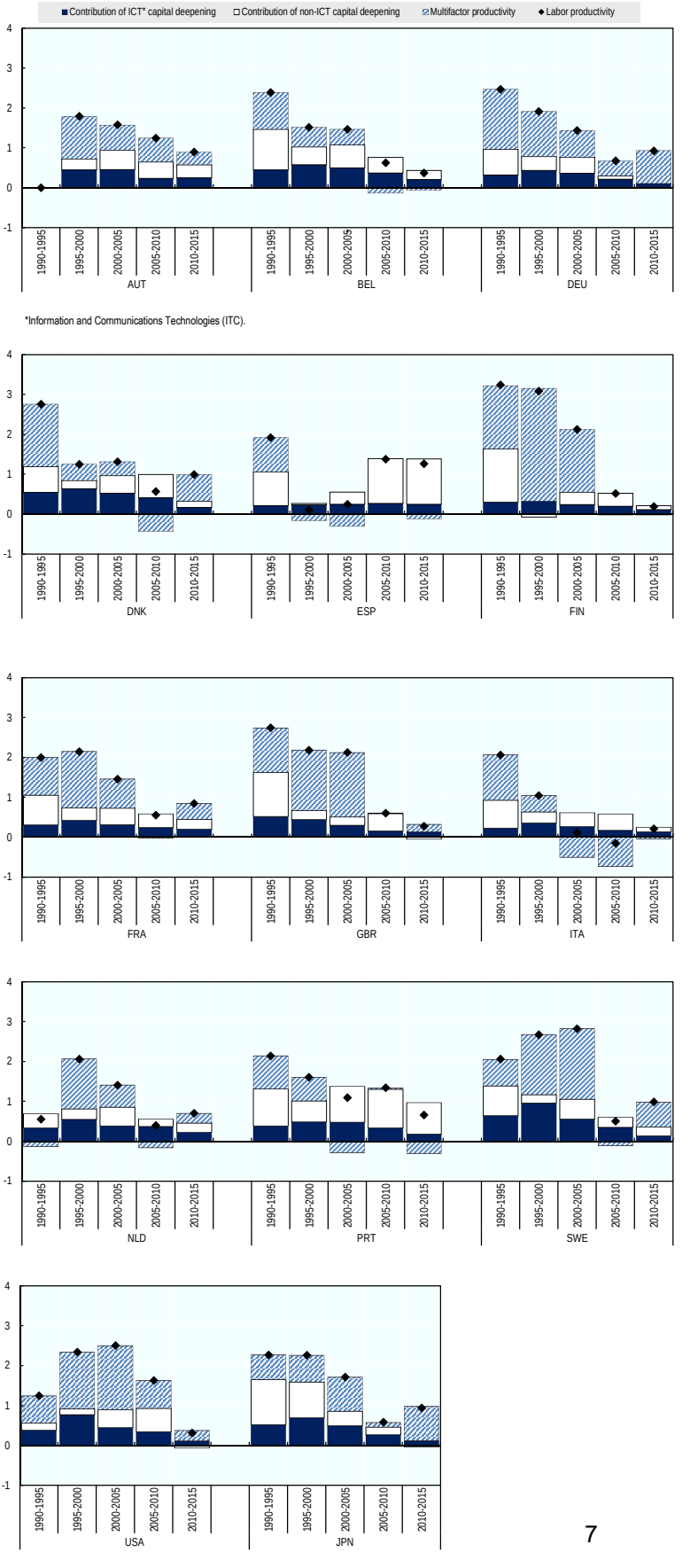


Figure 3 - Labor Productivity Decomposition (annual rates)



*Information and Communications Technologies (ITC).

Figure 4 and ***Table 2*** give alternative presentations of the dynamics of investment rates over the past two decades. For example, in 2015 Spain's investment rate was 15.27% of GDP down from a level of 19.30% in 2007 and down significantly from the rates in 1995 and 2001. For the large majority of countries, investment rates in 2015 had not recovered to the 2007 levels and should not be expected to in the near term.

To determine a widely used indicator of international competitiveness, we can combine information on labor productivity and wage growth rates. To the extent that labor productivity growth outpaces wage growth, unit labor costs will decline and competitiveness will improve. ***Figures 5a*** and ***5b*** examine unit labor cost dynamics over the 2010-15 period using two alternative measures of hourly compensation. Labor productivity is proxied by Gross Value Added (GVA) per hour worked and compensation per hour worked is computed based either a CPI or GVA deflator. For example, in the case of Belgium measured labor productivity has showed a very slow rate of growth and by 2015 was bounded above and below symmetrically by the two compensation indices. This indicates that Belgium's competitiveness in terms of unit labor costs has been effectively stagnant over the 2010-2015 period. In contrast, the Czech Republic has seen steadily higher growth in labor productivity at rates exceeding both of the alternative labor compensation indices rates of growth and can be said to have improved its competitiveness.

In ***Figure 6*** we examine the contributions of the growth rates of labor productivity and hours worked toward the growth rate of per capita GDP in the pre- and post-crisis periods of 2001-2007 and 2009-2015 respectively. After the comparative figures for the United States and Japan, EU member states are listed in order from the lowest post-crisis per capita GDP growth rate to the highest. With the exceptions of Germany and Ireland, the post-crisis period has seen lower per capital GDP growth rates and corresponding slower growth rates in labor productivity. Great Britain, Germany, and Sweden have offset the productivity growth slump to some extent by increasing the growth rate in hours worked per capita while others have accentuated the productivity slump with a decline in hours worked per capita. Included in this group are Greece, Spain, Italy, Portugal, Finland, Slovenia, the Netherlands, Austria, France, Denmark, and Hungary.

In closing we would like to point out that the *OECD Compendium of Productivity Indicators 2017* incorporates an innovative interactive **StatLinks** tool allowing users of the report in Adobe Acrobat format to directly download Excel data files from any of the text-based tables and figures. These feature gives easy and rapid data access while permitting the researcher to modify and edit the corresponding datasets. The report and data access provided should prove valuable research tools for those interested in detailed and comparable data on OECD productivity measures.

Figure 4 - Investment Rates (annual rates)

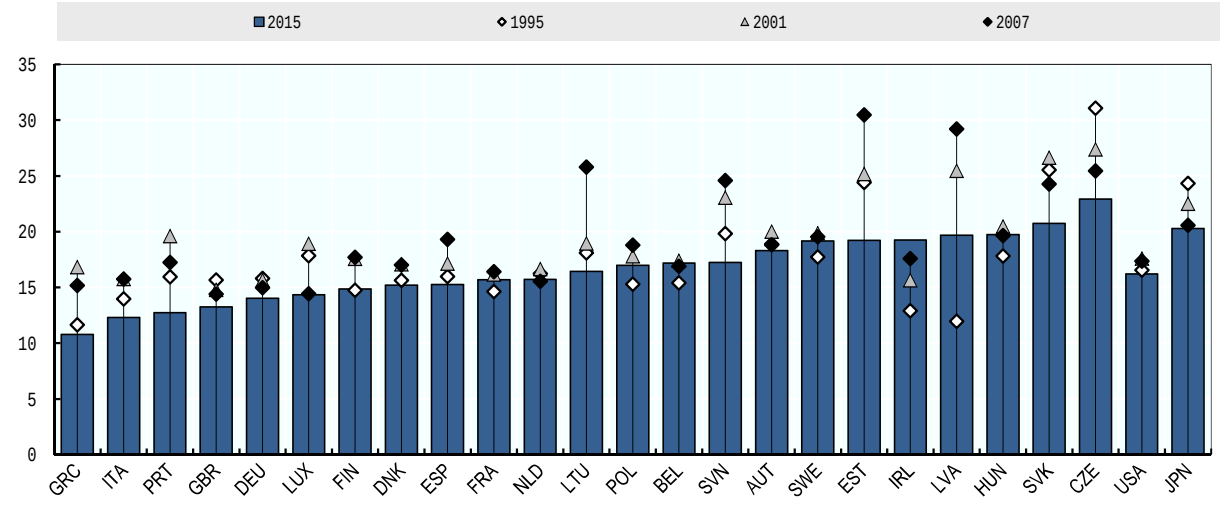


Table 2 - Non-residential gross fixed capital formation as a share of GDP

Country		1995	2001	2007	2015
Greece	GRC	11.65	16.82	15.18	10.80
Italy	ITA	13.98	15.75	15.76	12.32
Portugal	PRT	15.96	19.59	17.25	12.75
United Kingdom	GBR	15.65	14.79	14.40	13.26
Germany	DEU	15.81	15.62	14.98	14.03
Luxembourg	LUX	17.85	18.91	14.42	14.35
Finland	FIN	14.75	17.56	17.70	14.87
Denmark	DNK	15.64	17.06	17.01	15.19
Spain	ESP	15.97	17.12	19.30	15.27
France	FRA	14.63	16.16	16.41	15.69
Netherlands	NLD	16.25	16.65	15.55	15.72
Lithuania	LTU	18.09	18.94	25.78	16.43
Poland	POL	15.28	17.80	18.80	16.99
Belgium	BEL	15.40	17.38	16.91	17.18
Slovenia	SVN	19.84	23.02	24.59	17.23
Austria	AUT	18.87	20.01	18.83	18.30
Sweden	SWE	17.74	19.85	19.54	19.17
Estonia	EST	24.40	25.16	30.47	19.22
Ireland	IRL	12.91	15.63	17.58	19.25
Latvia	LVA	11.97	25.44	29.20	19.68
Hungary	HUN	17.81	20.44	19.66	19.73
Slovak Republic	SVK	25.54	26.61	24.26	20.75
Czech Republic	CZE	31.06	27.37	25.45	22.93
United States	USA	16.56	17.57	17.35	16.22
Japan	JPN	24.33	22.50	20.58	20.29

Source:
OECD National Accounts Statistics (database), April 2017.

Figure 5a - Labour productivity and average labour compensation per hour, total economy

Selected OECD countries, GVA per hour worked and average hourly labour compensation, indices 2010=100

*Note: Scale for Latvia has broader range than others

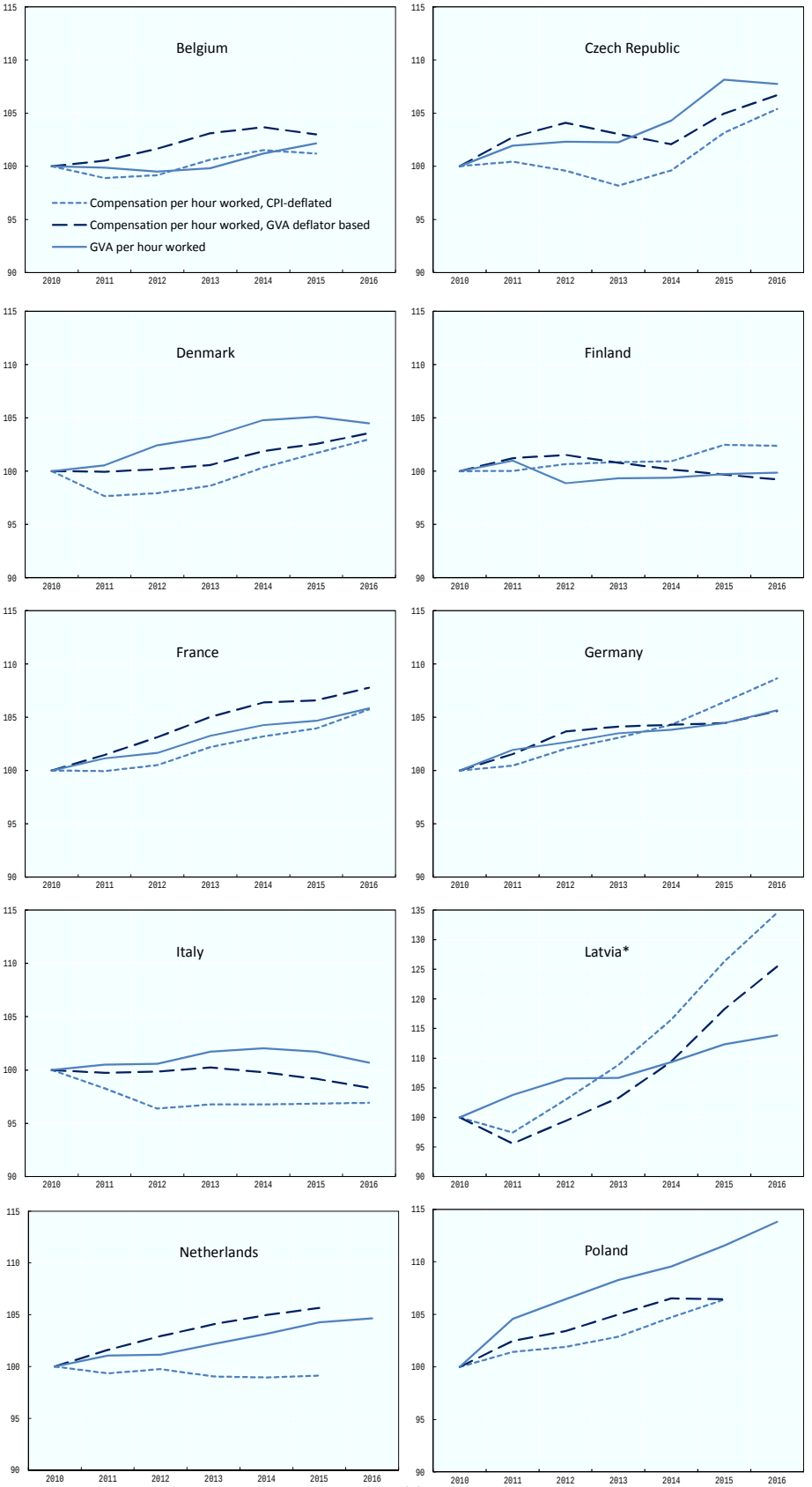


Figure 5b - Labour Productivity and Average Labor Compensation per hour, total economy

Selected OECD countries, GVA per hour worked and average hourly labour compensation, indices 2010=100

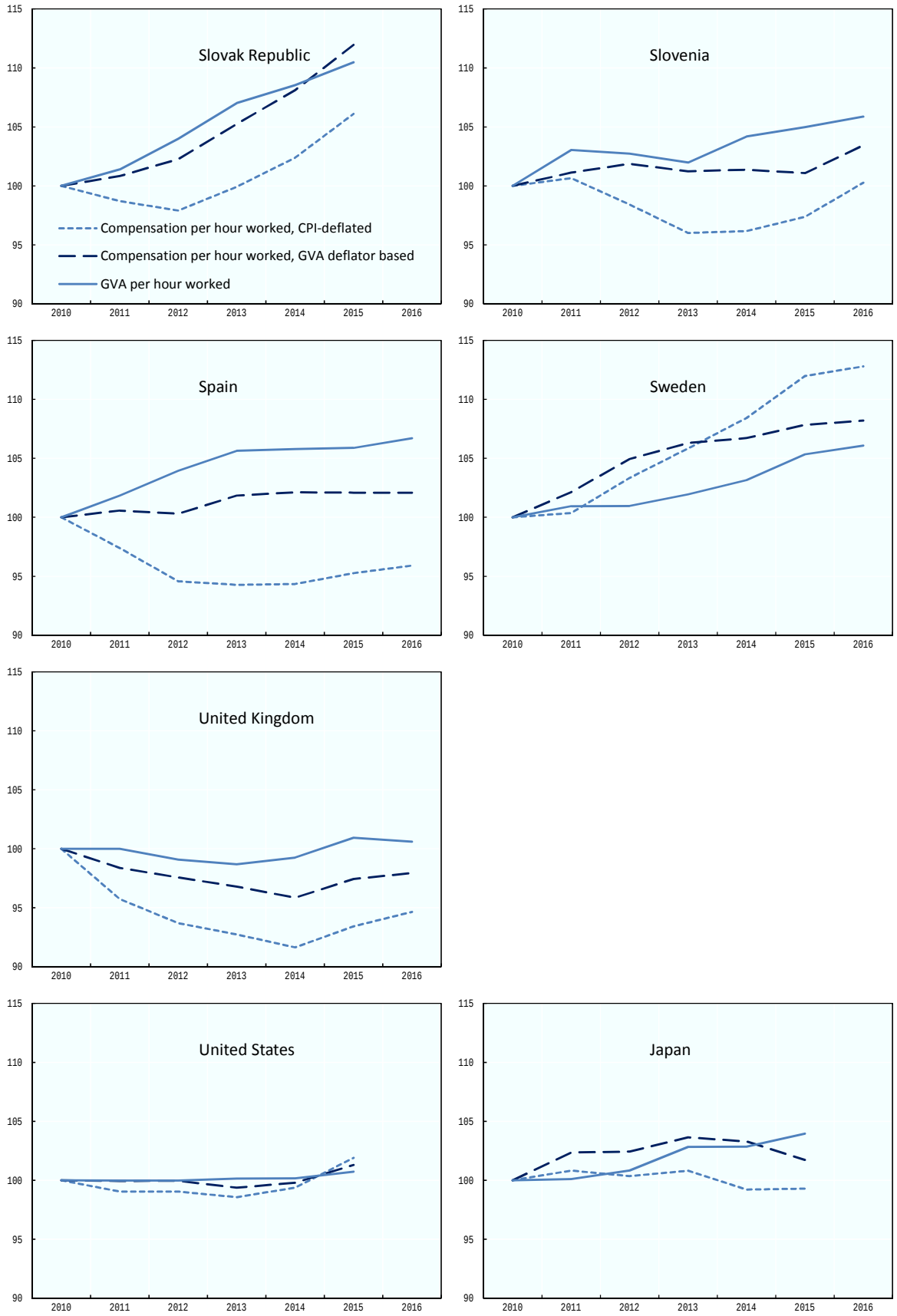
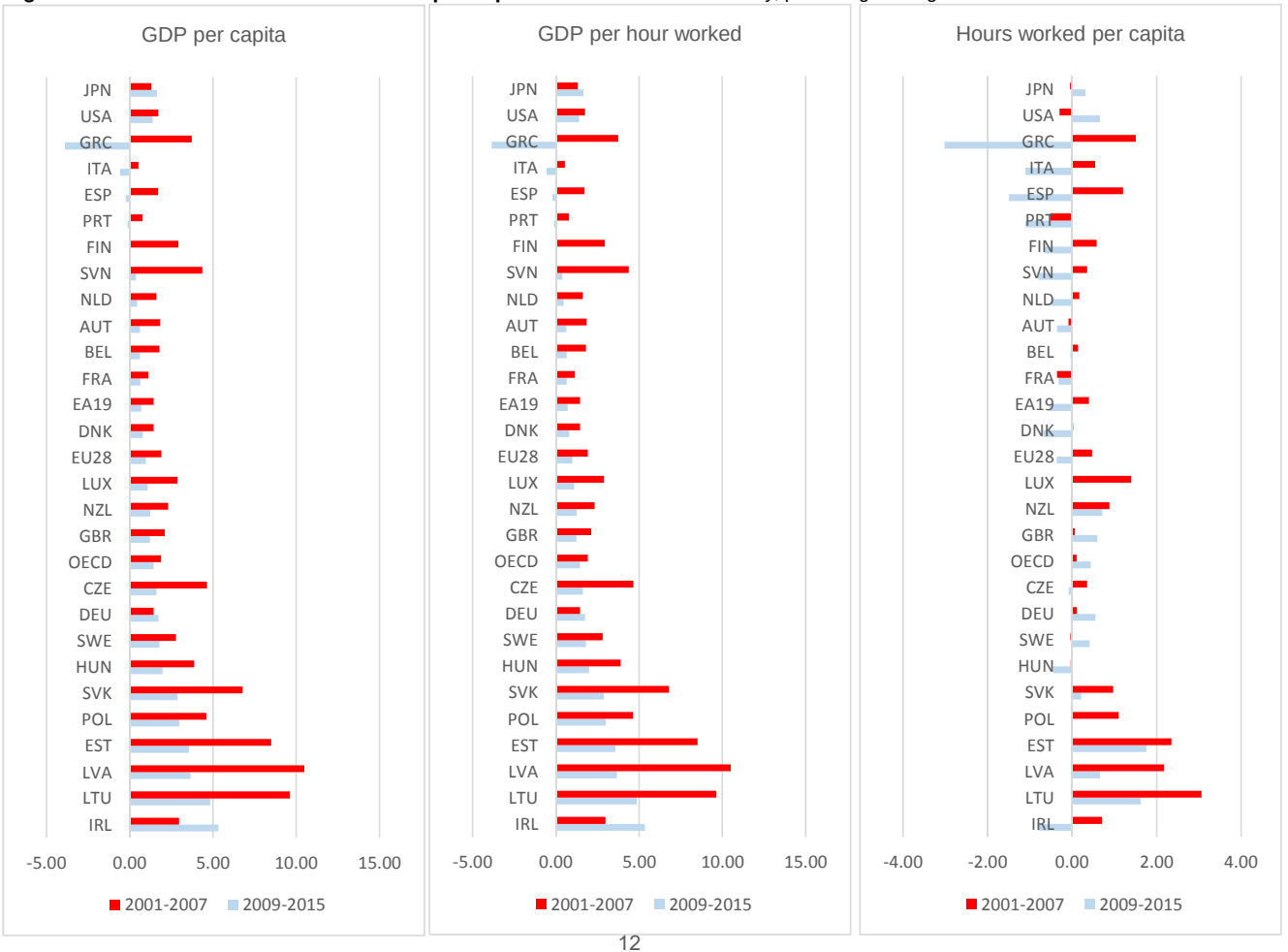


Figure 6 - Contributions to Growth in GDP per capita Total economy, percentage change at annual rate



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