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Global Trends of Multi-factor Productivity

Jeong Yeon Lee[*]

Abstract

Multi-factor productivity (MFP) compares the growth of gross domestic product with the growth of combined capital and labor inputs. The growth rate of MFP assumes theoretical significance because it represents the slope of the steady-state growth path, and hence is a major determinant of the long-term growth trend. This paper offers the balanced panel of the estimated growth rates of MFP for 24 OECD countries over 1986-2011. Based on the estimates of MFP growth, a number of notable trends in productivity growth are identified for the entire OECD area as well as three major economies – the United States, the Eurozone and Japan – within the OECD.

Keywords: Economic Growth; Multi-factor Productivity; OECD
JEL Classification Codes: O31; O40

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1. Introduction

The Organization for Economic Co-operation and Development (OECD) has published time series of productivity measures constructed at the level of entire economies since 2003. Among the available measures, multi-factor productivity (MFP) compares the growth of gross domestic product (GDP) with the growth of combined capital and labor inputs. As a result, MFP growth represents an improvement in the level of economy-wide efficiency with which capital and labor inputs are used in production. Viewed in this way, the growth rate of MFP is the slope of the steady-state growth path, and hence a major determinant of the long-term growth trend.

Therefore, the key role of MFP in long-term economic growth is conceptually clear, but its empirical verification gets somewhat complicated due to the fact that MFP is not something directly observable and thus its growth has to be estimated in an indirect manner. The indirect estimation inevitably involves restrictive assumptions, and the OECD estimates of MFP growth are not free from such limitations as well. However, these estimates hold clear advantages over most other MFP measures for the purpose of international comparisons because a common set of assumptions are behind OECD estimates for all member countries. At least within the OECD area, therefore, the OECD estimates present a sensible indication of relative productivity among member countries.

Accordingly, the OECD Productivity database provides MFP measures valuable for international comparisons, but the measures are not available for all member countries and for all years. In this paper I try to fill this gap by constructing a balanced panel of MFP estimates for 24 OECD member countries. The estimates of MFP growth in this panel are based on input and output data from various databases of the OECD, and the panel covers the period 1986-2011.

The next section briefly reviews how the growth rate of MFP determines the slope of the steady-state growth path and serves as the main determinant of long-term economic growth. Section 3 describes data used in estimation, followed by the report of the balanced panel of MFP estimates. Based on these estimates, Section 4 highlights some notable productivity trends in the OECD area. Section 5 concludes.

2. Multi-factor Productivity and Economic Growth

This section illustrates the role of MFP in economic growth using a standard neoclassical framework with a constant, exogenous saving rate that traces back to Solow (1956) and Swan (1956).[1] The aggregate production function is assumed to be described by the Cobb-Douglas function,

$$Y_t = A_t K_t^{\alpha} L_t^{1-\alpha} \qquad (1)$$

where Y is aggregate output, K is aggregate capital, and L is total employment. A>0 is the level of MFP and α is a constant with $0<\alpha<1$.

A number of assumptions are made for simplicity. First, the economy is closed and there are no government expenditures on goods and services. Hence, aggregate output is either consumed or invested in this economy. Investment is used to create new units of capital which depreciates at the constant rate $\delta>0$. In addition, a constant fraction of aggregate

[1] The framework used in this section directly comes from Lee (2009). For a more detailed exposition of the framework, see Barro and Sala-i-Martin (2004).

output is saved at the rate of s ($0 \leq s \leq 1$). Given that the amount saved equals the amount invested in a closed economy, the investment rate is also s in this economy. Finally, total employment grows at a constant, exogenous rate of $n \geq 0$.

Eq. (1) can be rewritten in intensive form as

$$y_t = A_t k_t^{\alpha} \tag{2}$$

where $y \equiv Y/L$ and $k \equiv K/L$

The steady state value of k for the given level of MFP, A_τ, is denoted as $\bar{k}_\tau$, and satisfies the condition

$$sA_\tau \bar{k}_\tau^{\alpha} = (n+\delta) \cdot \bar{k}_\tau \tag{3}$$

If k is below $\bar{k}_\tau$, k is expected to increase over time until it reaches $\bar{k}_\tau$. The growth rate of k at t along the transition is characterized by

$$\dot{k}_t/k_t = sA_\tau k_t^{-(1-\alpha)} - (n+\delta) \tag{4}$$

It is worth to note that the growth rate of k falls as k increases and it approaches 0 as k approaches $\bar{k}_\tau$. Using Eq. (3), the growth rate of k at t along the transition can also be expressed as

$$\dot{k}_t/k_t = (n+\delta) \cdot \left[\left(\frac{k_t}{\bar{k}_\tau}\right)^{\alpha-1} - 1\right] \tag{5}$$

Subsequently, the economy's growth rate of capital per worker at t depends on the distance between the t period level of capital per worker, k_t, and its steady-state level, $\bar{k}_\tau$. From Eq. (3), $\bar{k}_\tau$ in turn depends crucially on the level of MFP, A_τ. An improvement in MFP will raise the steady-state level of capital per worker when the economy's saving rate, depreciation rate, and employment growth rate remain constant. Hence, any changes in MFP are expected to have immediate effects on the growth rate of capital per worker.

Figure 1 illustrates the relationship between the economy's MFP and capital growth. Starting from capital per worker in period 0, k_0, with the level of MFP, A_0, the economy's growth rate of capital per worker is measured by *ac* with the steady-state level of capital per worker, $\bar{k}_0$. This positive growth in capital per worker will result in a higher level of capital per worker in a future period 1, say k_1. If the economy's MFP remains the same, then the growth rate of capital per worker in period 1 will be measured by *ab* with the steady-state level of capital per worker continuing to be $\bar{k}_0$. The new growth rate, *ab*, is lower than period 0's *ac* due to diminishing returns to capital. However, if there is an improvement in MFP from period 0 to period 1, the steady-state level of capital per worker will jump to a new level, $\bar{k}_1$, under the new level of MFP, A_1. It should be noted that period 1's growth rate of capital per worker, measured by (*ab* + *bd*), can be higher than period 0's growth rate, *ac*, with an improvement in MFP even when k_1 is larger than k_0.

[Insert Figure 1 Here]

In Figure 1, the steady-state level of capital per worker increases from $\bar{k}_0$ to $\bar{k}_1$ as the level of MFP grows from A_0 to A_1. Subsequently, it is clear that the growth rate of MFP determines the slope of the steady-state growth path. Furthermore, Figure 1 illustrates how a country may resist the gravity of diminishing returns to capital and achieve an accelerating pace of economic growth. MFP growth would shift the country's steady-state position further away and may expand the distance between the current and steady-state levels of capital per worker, thereby inducing faster growth even at a higher level of capital per worker. Therefore, MFP growth has not only long run implications for economic growth by altering the long run or steady-state level of capital per worker, but it also has immediate effects on the current pace of economic growth.

3. Multi-factor Productivity: Data and Estimation

A sample of 24 countries is chosen from OECD member countries. They include: Australia, Austria, Belgium, Canada, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Israel, Italy, Japan, Republic of Korea, the Netherlands, New Zealand, Norway, Portugal, Spain, Sweden, Switzerland, the United Kingdom (UK), and the United States (US). Germany represents unified Germany from 1991 and the whole of Germany before 1991. For the years up to 1990, the OECD estimates data for the whole of Germany based on data for West Germany. For each country, multi-factor productivity A is defined as

$$A = Y / [K^{\propto} L^{(1-\propto)}] \qquad (8)$$

where Y is constant price gross domestic product, K is productive capital stock measured in volume, and L is total hours worked. The coefficient $(1 - \propto)$ is the share of labor income.

Y is GDP adjusted in 2005 prices from the OECD Annual National Accounts database.[2] The variable is converted to an index with 2005 = 1, and reported in Table 1 for 24 sample countries over 1985-2011.

[Insert Table 1 Here]

[2] Data was extracted on Jan 17, 2013.

In the absence of directly observable flows of capital services, the flow of capital services is widely assumed to be proportional to the productive stock at the end of the previous period.[3] The productive capital stock for each type of asset is constructed using the perpetual inventory method. The construction begins with a time series of investment expenditure, and this investment expenditure series is deflated using producer price indices of investment goods to obtain constant-quality volume measures of vintage investment. Retirement patterns and age-efficiency patterns are also defined to account for, respectively, discarded assets and the loss of productive capacity of aging capital goods. The resulting productive capital stocks of different types of asset are weighted by their relative productivity in production to estimate a country's overall productive capital stock.[4] K is the overall productive capital stock from the OECD Economic Outlook database.[5] The OECD Economic Outlook database has gaps in data for the productive capital stock of Germany (1985-90), Greece (1985-94), and Ireland (1985-89) over the study period of 1985-2011. Subsequently, those missing observations were filled in by assuming the perpetual inventory model with a constant scrapping rate. To determine the constant scrapping rate for each of the three countries, annual scrapping rates were estimated using constant price non-residential fixed capital formation for the years in which data on productive capital stock are available, and then each country's first five-year average was calculated. The resulting scrapping rate was respectively 0.036 (Germany), 0.032 (Greece), and 0.086 (Ireland). Table 2 converts the productive capital stocks of 24 countries to indices with 2005 = 1.

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[3] For example, see Schreyer (2003), p. 166.

[4] For a more formal presentation of the construction, see OECD (2001), Annex 4.

[5] Data was extracted from OECD Economic Outlook No. 92 on May 20, 2013. The OECD also provides other types of internationally comparable capital stock data. Schreyer, et al. (2011) discusses the issues associated with different types of capital stock data available at the OECD.

[Insert Table 2 Here]

L is "total hours actually worked" from the OECD Productivity database. The measure covers total employment comprising wage and salary earners as well as the self-employed (including contributing family members), and it is corrected for paid holidays, sick leave and annual leave.[6] During 1985-2011, there are missing values of *L* for Austria (1985-94) and Portugal (1985) that were filled in using the estimated growth rate of *L*. To estimate the growth rate of total hours worked (*L*), it was assumed to be the sum of the growth rates of total employment measured by the number of persons (*TE*) and average hours worked per person (*AH*). While the OECD Productivity database provides data on *TE* for all years during 1985-2011, data on *AH* at the level of the total economy is not available from the OECD for Austria (1985-94) and Portugal (1985). In estimation, therefore, the growth rates of *AH* for manufacturing wage earners in Austria and *AH* for total employees in Portugal were used instead. These data on *AH* were from ILO (International Labour Office) LABORSTA Internet. Table 3 presents the values of *L* that have been converted to indices with 2005 = 1.

[Insert Table 3 Here]

Based on Eq. (8), the multi-factor productivity index with 2005 = 1 was calculated using the values of *Y*, *K* and *L* reported in Tables 1 through 3. The coefficient $(1 - \propto)$ is the average share of labor income from 2005-2008 (Table 4).[7] The calculated MFP indices are reported in Table 5. Finally, Table 6 presents the balanced panel of the growth rates of MFP for 24 OECD countries over 1986-2011.

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[6] See OECD (2001), Chapter 4 for details. OECD (2003) provides a summary of various issues associated with the measurement of total hours worked.

[7] Data on the share of labor income was extracted from OECD.Stat (Unit labour Costs – Annual Indicators) on May 24, 2013.

[Insert Table 4 Here]

[Insert Table 5 Here]

[Insert Table 6 Here]

4. Productivity Growth Trends in OECD

Based on the estimates of MFP growth rates presented in the previous section, this section outlines some notable productivity growth trends in the OECD area over the past 25 years. We start with dividing our study period 1986-2011 into five sub-periods, each half-decade-long, and calculating the average growth rates of MFP for each sub-period. The results, reported in Table 7, clearly show erratic variation in the pace of OECD-wide productivity growth over time. For example, OECD countries as a whole were found to achieve the highest pace of MFP growth in the second half of the 1990s, but this strong productivity growth sharply decelerated – cut by more than 40 percent – in the subsequent sub-period. In fact, productivity slowdown was extensive all over the OECD area during 2001-2005; Iceland, Israel, Japan and Sweden were the only countries in our sample of 24 countries that didn't experience a slowdown in MFP growth in this sub-period.

[Insert Table 7 Here]

The pace of OECD productivity growth that had already become visibly sluggish during 2001-2005 was found to slow even further down in the following sub-period. The average growth rate in fact came to be negative – representing productivity deterioration – in many countries during 2006-2011. It is very likely that this sharp slowdown was at least partly due to cyclical effects since the period includes the worldwide great recession following the global financial crisis of 2007-2008. Against this backdrop, it is worth to take note of the productivity trend in Korea because the country managed to accelerate the average growth rate of MFP during 2006-2011 in contrast with most other OECD countries, thereby keeping up its productivity growth at a much higher level vis-à-vis other OECD countries.

The productivity growth trend for three major economies – the United States, the Eurozone, and Japan – is presented in Figure 2. The Eurozone includes: Austria, Belgium, Finland, France, Germany, Greece, Ireland, Italy, the Netherlands, Portugal, and Spain. The growth rate of MFP in the Eurozone is constructed using a real GDP weighted average of MFP growth rates in 11 member countries. The trend for the Eurozone is shown for our entire study period of 1986-2011 even though the euro was officially introduced only in 1999.

[Insert Figure 2 Here]

Figure 2 indicates that productivity growth in the United States was relatively weak, often trailing behind that of the Eurozone and Japan, until it accelerated to a much higher pace during the second half of the 1990s that also coincided with the period of exploding Information and Communication Technology (ICT) investment. As this investment boom collapsed in 2000, MFP growth in the United States somewhat slowed down compared with the robust growth in the previous boom period. Nonetheless, U.S. productivity growth remained to be relatively strong and consistently outpace productivity growth in the Eurozone and Japan at least until 2005.

Turning to the Eurozone, it is clear from Figure 2 that the common currency area has been generally lagging behind the United States as well as Japan in promoting productivity growth since its start in 1999. Prior to the official launching of the Eurozone, however, its current member countries as a whole managed to consistently reap a relatively high pace of MFP growth, surpassing the U.S. rate of MFP growth in most years throughout the late 1980s and the 1990s. It should be noted that Eurozone countries carried out structural reform to meet the euro convergence criteria in the areas of budget deficit, public debt, inflation and interest rates. Those reform measures were likely to help potential member countries to improve their multi-factor productivity during their preparation to join the Eurozone.

Finally, Figure 2 illustrates that Japan followed a much more erratic path of productivity growth than the United States and the Eurozone. After showing particularly strong growth in the second half of the 1980s, Japan's MFP growth began to sharply slow down as the country suffered the bursting of the asset bubble and subsequently entered the so-called lost decade. Throughout the 1990s, Japan's MFP growth was found to be close to virtual stagnation on average, and consistently behind productivity growth in the U.S. and the Eurozone. However, there was a brief recovery of productivity growth in the country over the period 2003-2007 with Japan's MFP growth rate consistently higher than that of the Eurozone during the time. Following the global financial crisis of 2007-2008, a sharp downturn followed by a sharp rebound in productivity growth was common for all three major economies as shown in Figure 2, but Japan's path exhibited far greater variation than the paths taken by the other two economies.

5. Concluding Remarks

This paper offers the balanced panel of the estimates of annual MFP growth rates for 24 OECD countries over 1986-2011. These estimates are expected to supplement the OECD estimates of MFP growth that are available in the OECD Productivity database but often have missing observations. For the purpose of international comparisons, the estimates presented in this paper hold clear advantages over most other estimates involving a single country or a small number of countries. Since a common set of assumptions are behind the estimates for all 24 countries, the growth rates of MFP estimated in this study provide a sensible indication of relative productivity among the 24 countries considered.

Based on the estimates of MFP growth, a number of notable trends in productivity growth have been identified for the entire OECD area as well as three major economies – the United States, the Eurozone and Japan – within the area. These trends are also shown to be accompanied by some meaningful economic developments. Their examples include the rise and collapse of the ICT investment boom, the launching of the Eurozone, and the great recession following the global financial crisis of 2007-2008. The formal analysis of a link between these developments and productivity growth can be a topic for further study.

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Table 1. Gross Domestic Product (in 2005 prices, 2005 = 1)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUS	0.510	0.524	0.553	0.575	0.596	0.594	0.596	0.621	0.646	0.672	0.699	0.726	0.759	0.796	0.827	0.843	0.875	0.903	0.941	0.971	1	1.038	1.077	1.092	1.117	1.140	1.166
AUT	0.608	0.622	0.630	0.651	0.677	0.706	0.730	0.745	0.749	0.767	0.788	0.807	0.826	0.857	0.888	0.920	0.928	0.944	0.952	0.977	1	1.037	1.075	1.091	1.049	1.071	1.100
BEL	0.637	0.649	0.664	0.695	0.719	0.742	0.755	0.767	0.759	0.784	0.803	0.814	0.844	0.861	0.891	0.924	0.931	0.944	0.952	0.983	1	1.027	1.056	1.067	1.037	1.062	1.081
CAN	0.574	0.588	0.613	0.643	0.660	0.661	0.648	0.653	0.669	0.701	0.720	0.732	0.763	0.794	0.838	0.882	0.898	0.924	0.941	0.971	1	1.028	1.051	1.058	1.029	1.062	1.087
DEN	0.677	0.710	0.713	0.712	0.716	0.727	0.737	0.751	0.750	0.792	0.816	0.839	0.866	0.885	0.908	0.940	0.946	0.951	0.954	0.976	1	1.034	1.050	1.042	0.983	0.999	1.010
FIN	0.607	0.623	0.645	0.678	0.713	0.716	0.673	0.650	0.645	0.668	0.695	0.719	0.764	0.802	0.834	0.878	0.898	0.915	0.933	0.972	1	1.044	1.100	1.103	1.009	1.042	1.071
FRA	0.649	0.663	0.679	0.711	0.741	0.760	0.768	0.779	0.774	0.791	0.808	0.816	0.834	0.862	0.891	0.923	0.940	0.949	0.958	0.982	1	1.025	1.048	1.047	1.014	1.031	1.049
DEU	0.681	0.697	0.706	0.733	0.761	0.801	0.842	0.858	0.850	0.871	0.885	0.892	0.908	0.925	0.942	0.971	0.985	0.986	0.982	0.993	1	1.037	1.071	1.083	1.027	1.070	1.102
GRE	0.612	0.615	0.601	0.627	0.651	0.651	0.671	0.676	0.665	0.678	0.692	0.709	0.735	0.759	0.785	0.820	0.855	0.884	0.937	0.978	1	1.055	1.092	1.090	1.056	1.004	0.932
ISL	0.540	0.574	0.623	0.622	0.624	0.631	0.629	0.608	0.616	0.638	0.639	0.670	0.703	0.747	0.778	0.811	0.843	0.844	0.865	0.933	1	1.047	1.110	1.123	1.049	1.007	1.033
IRL	0.304	0.303	0.317	0.334	0.353	0.383	0.390	0.403	0.414	0.438	0.480	0.525	0.585	0.637	0.707	0.783	0.825	0.871	0.905	0.944	1	1.054	1.111	1.088	1.029	1.021	1.035
ISR	0.411	0.428	0.459	0.472	0.475	0.509	0.549	0.591	0.616	0.662	0.705	0.744	0.767	0.800	0.826	0.898	0.896	0.895	0.909	0.953	1	1.058	1.120	1.166	1.179	1.238	1.295
ITA	0.696	0.716	0.739	0.770	0.796	0.812	0.825	0.831	0.824	0.842	0.866	0.876	0.893	0.906	0.919	0.952	0.970	0.974	0.974	0.991	1	1.022	1.039	1.027	0.971	0.988	0.993
JPN	0.660	0.679	0.707	0.757	0.798	0.842	0.870	0.878	0.879	0.887	0.904	0.927	0.942	0.923	0.922	0.942	0.946	0.948	0.964	0.987	1	1.017	1.039	1.028	0.972	1.015	1.007
KOR	0.260	0.292	0.327	0.366	0.390	0.426	0.468	0.495	0.526	0.572	0.623	0.668	0.707	0.666	0.738	0.803	0.835	0.894	0.919	0.962	1	1.052	1.105	1.131	1.135	1.206	1.250
NLD	0.582	0.598	0.609	0.630	0.658	0.686	0.702	0.714	0.723	0.745	0.768	0.794	0.828	0.861	0.901	0.937	0.955	0.955	0.959	0.980	1	1.034	1.074	1.094	1.054	1.071	1.082
NZL	0.591	0.603	0.606	0.615	0.616	0.617	0.610	0.617	0.655	0.689	0.717	0.739	0.761	0.769	0.810	0.829	0.858	0.900	0.935	0.969	1	1.022	1.051	1.040	1.048	1.058	1.064
NOR	0.573	0.596	0.607	0.606	0.612	0.623	0.643	0.665	0.684	0.718	0.749	0.787	0.829	0.851	0.869	0.897	0.915	0.929	0.938	0.975	1	1.023	1.050	1.051	1.034	1.039	1.051
PRT	0.544	0.566	0.602	0.647	0.689	0.716	0.748	0.756	0.740	0.748	0.780	0.808	0.844	0.887	0.923	0.960	0.979	0.986	0.977	0.992	1	1.014	1.038	1.038	1.008	1.028	1.012
ESP	0.519	0.536	0.565	0.594	0.623	0.646	0.663	0.669	0.662	0.678	0.697	0.713	0.741	0.774	0.811	0.852	0.883	0.907	0.935	0.965	1	1.041	1.077	1.087	1.046	1.043	1.047
SWE	0.628	0.646	0.668	0.686	0.705	0.712	0.704	0.696	0.681	0.709	0.737	0.748	0.769	0.801	0.838	0.876	0.887	0.909	0.930	0.969	1	1.043	1.078	1.071	1.017	1.084	1.124
CHE	0.727	0.741	0.753	0.777	0.811	0.841	0.833	0.833	0.832	0.842	0.846	0.850	0.868	0.891	0.904	0.937	0.949	0.951	0.951	0.974	1	1.038	1.077	1.101	1.079	1.112	1.134
GBR	0.559	0.581	0.608	0.638	0.653	0.658	0.646	0.652	0.672	0.703	0.725	0.747	0.776	0.804	0.829	0.864	0.889	0.911	0.945	0.973	1	1.026	1.063	1.053	1.011	1.029	1.039
USA	0.541	0.559	0.577	0.601	0.622	0.634	0.632	0.654	0.672	0.700	0.718	0.745	0.779	0.813	0.853	0.889	0.898	0.914	0.938	0.970	1	1.027	1.046	1.042	1.010	1.034	1.053

Note: AUS, Australia; AUT, Austria; BEL, Belgium; CAN, Canada; DEN, Denmark; FIN, Finland; FRA, France; DEU, Germany; GRE, Greece; ISL, Iceland; IRL, Ireland; ISR, Israel; ITA, Italy; JPN, Japan; KOR, Korea; NLD, Netherlands; NZL, New Zealand, NOR, Norway; PRT, Portugal; ESP, Spain; SWE, Sweden; CHE, Switzerland; GBR, United Kingdom; USA, United States.

Table 2. Productive Capital Stock (in volume, 2005 = 1)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUS	0.587	0.603	0.620	0.640	0.659	0.673	0.682	0.691	0.701	0.715	0.730	0.748	0.768	0.788	0.808	0.825	0.844	0.869	0.902	0.945	1	1.049	1.109	1.176	1.237	1.302	1.375
AUT	0.656	0.668	0.681	0.695	0.711	0.730	0.752	0.771	0.788	0.806	0.821	0.836	0.851	0.867	0.884	0.906	0.927	0.943	0.963	0.982	1	1.018	1.037	1.055	1.066	1.079	1.095
BEL	0.707	0.716	0.727	0.743	0.762	0.786	0.806	0.824	0.841	0.855	0.868	0.881	0.896	0.911	0.925	0.940	0.953	0.963	0.970	0.984	1	1.016	1.036	1.058	1.073	1.086	1.103
CAN	0.464	0.486	0.510	0.538	0.567	0.593	0.617	0.637	0.655	0.675	0.695	0.715	0.741	0.768	0.799	0.830	0.862	0.891	0.923	0.958	1	1.047	1.095	1.143	1.176	1.221	1.270
DEN	0.611	0.633	0.654	0.674	0.695	0.714	0.731	0.745	0.756	0.768	0.784	0.800	0.819	0.842	0.862	0.885	0.907	0.928	0.946	0.970	1	1.028	1.055	1.083	1.099	1.113	1.126
FIN	0.666	0.690	0.715	0.745	0.781	0.812	0.831	0.841	0.843	0.842	0.847	0.856	0.868	0.883	0.898	0.914	0.934	0.950	0.965	0.982	1	1.019	1.048	1.079	1.098	1.113	1.131
FRA	0.689	0.702	0.715	0.730	0.748	0.766	0.784	0.800	0.813	0.824	0.835	0.846	0.856	0.869	0.886	0.906	0.927	0.944	0.961	0.980	1	1.021	1.046	1.071	1.088	1.106	1.125
DEU	0.647	0.656	0.667	0.678	0.691	0.706	0.807	0.830	0.848	0.864	0.880	0.893	0.906	0.920	0.936	0.954	0.969	0.978	0.985	0.992	1	1.013	1.028	1.044	1.047	1.052	1.062
GRE	0.619	0.623	0.621	0.619	0.617	0.621	0.627	0.634	0.640	0.645	0.650	0.666	0.682	0.704	0.735	0.774	0.816	0.860	0.909	0.960	1	1.036	1.120	1.195	1.257	1.301	1.324
ISL	0.472	0.489	0.511	0.534	0.552	0.570	0.590	0.603	0.611	0.617	0.625	0.641	0.663	0.706	0.745	0.791	0.828	0.851	0.880	0.923	1	1.110	1.185	1.238	1.236	1.234	1.237
IRL	0.353	0.409	0.453	0.487	0.512	0.530	0.543	0.554	0.563	0.573	0.588	0.609	0.636	0.672	0.717	0.764	0.808	0.853	0.895	0.943	1	1.059	1.133	1.201	1.243	1.266	1.273
ISR	0.361	0.372	0.387	0.401	0.413	0.429	0.450	0.476	0.514	0.558	0.602	0.652	0.700	0.744	0.789	0.829	0.875	0.911	0.943	0.971	1	1.037	1.086	1.138	1.183	1.233	1.299
ITA	0.616	0.634	0.652	0.673	0.695	0.718	0.740	0.759	0.771	0.782	0.797	0.812	0.827	0.845	0.864	0.886	0.909	0.934	0.956	0.978	1	1.023	1.048	1.068	1.077	1.088	1.098
JPN	0.518	0.541	0.565	0.593	0.625	0.661	0.697	0.731	0.763	0.792	0.820	0.845	0.871	0.894	0.916	0.936	0.952	0.966	0.977	0.988	1	1.009	1.018	1.026	1.030	1.035	1.039
KOR	0.184	0.203	0.227	0.254	0.286	0.324	0.368	0.410	0.453	0.504	0.564	0.627	0.683	0.707	0.740	0.787	0.829	0.873	0.916	0.958	1	1.045	1.094	1.136	1.173	1.220	1.264
NLD	0.676	0.692	0.707	0.725	0.742	0.759	0.777	0.793	0.806	0.818	0.831	0.847	0.864	0.884	0.907	0.929	0.948	0.963	0.976	0.988	1	1.016	1.043	1.071	1.088	1.100	1.114
NZL	0.625	0.641	0.658	0.672	0.687	0.698	0.701	0.704	0.712	0.725	0.743	0.762	0.779	0.794	0.812	0.832	0.855	0.880	0.913	0.953	1	1.044	1.093	1.134	1.159	1.190	1.221
NOR	0.640	0.658	0.677	0.694	0.704	0.712	0.720	0.727	0.733	0.741	0.754	0.772	0.795	0.823	0.851	0.875	0.899	0.925	0.947	0.970	1	1.038	1.089	1.144	1.183	1.217	1.251
PRT	0.513	0.510	0.512	0.524	0.538	0.556	0.577	0.600	0.617	0.637	0.658	0.682	0.714	0.752	0.794	0.838	0.880	0.916	0.945	0.976	1	1.025	1.055	1.087	1.111	1.130	1.140
ESP	0.397	0.410	0.426	0.447	0.472	0.500	0.529	0.556	0.578	0.600	0.625	0.649	0.676	0.708	0.744	0.783	0.823	0.863	0.906	0.950	1	1.055	1.116	1.174	1.218	1.257	1.291
SWE	0.635	0.653	0.673	0.694	0.720	0.745	0.762	0.773	0.778	0.789	0.805	0.822	0.838	0.857	0.880	0.905	0.927	0.945	0.961	0.978	1	1.027	1.059	1.092	1.107	1.126	1.150
CHE	0.601	0.619	0.638	0.660	0.684	0.710	0.735	0.754	0.769	0.787	0.807	0.826	0.844	0.866	0.888	0.911	0.931	0.949	0.964	0.981	1	1.023	1.049	1.075	1.093	1.116	1.140
GBR	0.559	0.568	0.580	0.596	0.615	0.636	0.654	0.671	0.688	0.704	0.722	0.741	0.762	0.792	0.821	0.852	0.881	0.910	0.938	0.967	1	1.037	1.082	1.127	1.161	1.193	1.220
USA	0.575	0.595	0.613	0.632	0.651	0.669	0.684	0.698	0.712	0.727	0.745	0.764	0.787	0.813	0.843	0.877	0.907	0.930	0.952	0.975	1	1.028	1.059	1.087	1.102	1.121	1.141

Note: AUS, Australia; AUT, Austria; BEL, Belgium; CAN, Canada; DEN, Denmark; FIN, Finland; FRA, France; DEU, Germany; GRE, Greece; ISL, Iceland; IRL, Ireland; ISR, Israel; ITA, Italy; JPN, Japan; KOR, Korea; NLD, Netherlands; NZL, New Zealand, NOR, Norway; PRT, Portugal; ESP, Spain; SWE, Sweden; CHE, Switzerland; GBR, United Kingdom; USA, United States.

Table 3. Total Hours Actually Worked (in annual hours, 2005 = 1)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUS	0.709	0.725	0.751	0.783	0.808	0.792	0.783	0.782	0.802	0.837	0.856	0.861	0.873	0.883	0.913	0.915	0.913	0.938	0.955	0.978	1	1.029	1.060	1.071	1.072	1.106	1.122
AUT	0.856	0.860	0.861	0.869	0.882	0.900	0.914	0.920	0.916	0.918	0.919	0.926	0.933	0.943	0.960	0.972	0.979	0.979	0.984	0.988	1	1.017	1.036	1.058	1.048	1.055	1.074
BEL	0.924	0.918	0.917	0.928	0.937	0.955	0.937	0.923	0.892	0.888	0.917	0.904	0.918	0.941	0.955	0.952	0.986	0.986	0.982	0.976	1	1.012	1.025	1.048	1.034	1.042	1.074
CAN	0.741	0.764	0.793	0.822	0.840	0.842	0.817	0.808	0.817	0.836	0.848	0.865	0.877	0.895	0.920	0.938	0.941	0.954	0.966	0.991	1	1.015	1.035	1.047	1.010	1.034	1.051
DEN	0.971	0.996	0.979	0.961	0.946	0.937	0.928	0.929	0.915	0.907	0.917	0.922	0.945	0.969	0.984	0.999	1.011	1.007	0.994	0.990	1	1.025	1.043	1.061	1.019	0.997	0.995
FIN	1.079	1.063	1.072	1.088	1.096	1.071	0.998	0.930	0.876	0.873	0.889	0.901	0.930	0.942	0.967	0.980	0.983	0.988	0.984	0.991	1	1.014	1.035	1.051	1.013	1.016	1.029
FRA	0.945	0.947	0.962	0.977	0.985	0.992	0.987	0.982	0.963	0.961	0.956	0.962	0.963	0.972	0.988	0.989	0.998	0.978	0.977	0.997	1	0.996	1.018	1.028	1.001	1.004	1.007
DEU	1.020	1.027	1.028	1.039	1.043	1.060	1.077	1.071	1.046	1.043	1.036	1.023	1.018	1.025	1.035	1.038	1.029	1.015	1.002	1.005	1	1.001	1.016	1.028	1.001	1.024	1.038
GRE	0.876	0.874	0.856	0.865	0.886	0.888	0.880	0.905	0.921	0.923	0.924	0.910	0.890	0.926	0.946	0.951	0.952	0.968	0.977	0.990	1	1.004	1.006	1.020	0.990	0.982	0.923
ISL	0.840	0.863	0.911	0.887	0.874	0.860	0.860	0.867	0.853	0.853	0.887	0.901	0.891	0.918	0.980	1.007	1.003	0.969	0.969	0.973	1	1.044	1.078	1.089	0.976	0.966	0.993
IRL	0.676	0.684	0.682	0.684	0.687	0.713	0.700	0.687	0.688	0.710	0.742	0.771	0.793	0.823	0.862	0.898	0.923	0.929	0.931	0.961	1	1.038	1.068	1.036	0.916	0.880	0.864
ISR	0.519	0.526	0.541	0.547	0.557	0.568	0.597	0.647	0.678	0.739	0.796	0.839	0.868	0.889	0.920	0.959	0.955	0.966	0.964	0.970	1	1.026	1.083	1.129	1.137	1.170	1.207
ITA	0.909	0.920	0.931	0.943	0.942	0.951	0.965	0.960	0.934	0.916	0.915	0.927	0.925	0.943	0.951	0.962	0.972	0.982	0.994	0.998	1	1.017	1.031	1.026	0.992	0.987	0.989
JPN	1.110	1.118	1.122	1.133	1.137	1.134	1.139	1.133	1.102	1.099	1.095	1.100	1.092	1.066	1.033	1.033	1.018	1.000	1.001	1.000	1	1.009	1.014	1.002	0.954	0.961	0.915
KOR	0.803	0.840	0.877	0.890	0.892	0.901	0.922	0.932	0.950	0.974	1.005	1.023	1.019	0.922	0.941	0.988	1.003	1.016	0.998	1.004	1	1.011	1.006	0.985	0.976	0.970	0.943
NLD	0.775	0.786	0.792	0.804	0.823	0.845	0.856	0.872	0.869	0.880	0.906	0.929	0.952	0.969	0.992	1.013	1.026	1.020	1.010	0.999	1	1.016	1.039	1.058	1.044	1.039	1.040
NZL	0.795	0.790	0.795	0.767	0.741	0.738	0.718	0.723	0.760	0.790	0.824	0.847	0.846	0.841	0.860	0.872	0.889	0.918	0.940	0.980	1	1.011	1.017	1.015	0.996	1.015	1.034
NOR	0.941	0.969	0.971	0.968	0.938	0.925	0.914	0.919	0.923	0.935	0.943	0.959	0.984	1.008	1.016	1.009	0.995	0.988	0.967	0.986	1	1.032	1.080	1.117	1.098	1.107	1.125
PRT	0.935	0.921	0.954	0.977	1.008	1.064	1.005	0.951	0.935	0.938	0.961	0.952	0.958	0.978	0.999	0.993	1.014	1.019	0.998	1.010	1	1.008	0.991	1.006	0.965	0.948	0.917
ESP	0.656	0.677	0.702	0.725	0.744	0.763	0.769	0.755	0.730	0.717	0.721	0.732	0.758	0.793	0.830	0.871	0.903	0.924	0.945	0.971	1	1.032	1.054	1.055	0.991	0.969	0.960
SWE	0.972	0.976	0.991	1.017	1.031	1.038	1.014	0.980	0.939	0.952	0.970	0.970	0.960	0.976	1.001	1.012	1.018	1.004	0.990	0.998	1	1.013	1.045	1.057	1.027	1.059	1.083
CHE	0.819	0.833	0.853	0.875	0.891	0.914	0.988	0.979	0.969	0.974	0.962	0.946	0.939	0.956	0.977	0.983	0.977	0.971	0.975	0.996	1	1.015	1.035	1.054	1.055	1.072	1.072
GBR	0.899	0.907	0.919	0.971	0.989	0.986	0.958	0.917	0.905	0.917	0.929	0.937	0.954	0.961	0.969	0.971	0.982	0.977	0.980	0.991	1	1.007	1.019	1.015	0.994	0.997	0.984
USA	0.777	0.786	0.807	0.831	0.854	0.856	0.844	0.844	0.864	0.891	0.913	0.924	0.951	0.972	0.991	1.004	0.992	0.979	0.974	0.985	1	1.018	1.025	1.014	0.958	0.958	0.973

Note: AUS, Australia; AUT, Austria; BEL, Belgium; CAN, Canada; DEN, Denmark; FIN, Finland; FRA, France; DEU, Germany; GRE, Greece; ISL, Iceland; IRL, Ireland; ISR, Israel; ITA, Italy; JPN, Japan; KOR, Korea; NLD, Netherlands; NZL, New Zealand, NOR, Norway; PRT, Portugal; ESP, Spain; SWE, Sweden; CHE, Switzerland; GBR, United Kingdom; USA, United States.

Table 4. Average Share of Labor Income (2005-2008)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUS	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425	0.425
AUT	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338	0.338
BEL	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326
CAN	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397	0.397
DEN	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306	0.306
FIN	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370	0.370
FRA	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328	0.328
DEU	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334	0.334
GRE	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361	0.361
ISL	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309	0.309
IRL	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405	0.405
ISR	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373	0.373
ITA	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331	0.331
JPN	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400	0.400
KOR	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231	0.231
NLD	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333	0.333
NZL	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501	0.501
NOR	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483	0.483
PRT	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326	0.326
ESP	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367	0.367
SWE	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343	0.343
CHE	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351	0.351
GBR	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311	0.311
USA	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348	0.348

Note: AUS, Australia; AUT, Austria; BEL, Belgium; CAN, Canada; DEN, Denmark; FIN, Finland; FRA, France; DEU, Germany; GRE, Greece; ISL, Iceland; IRL, Ireland; ISR, Israel; ITA, Italy; JPN, Japan; KOR, Korea; NLD, Netherlands; NZL, New Zealand, NOR, Norway; PRT, Portugal; ESP, Spain; SWE, Sweden; CHE, Switzerland; GBR, United Kingdom; USA, United States.

Table 5. Multi-factor Productivity (2005 = 1)

	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUS	0.780	0.781	0.799	0.800	0.804	0.803	0.808	0.836	0.853	0.858	0.873	0.895	0.918	0.946	0.954	0.962	0.991	0.995	1.009	1.007	1	1.000	0.997	0.980	0.981	0.962	0.953
AUT	0.777	0.788	0.793	0.808	0.825	0.842	0.854	0.860	0.861	0.873	0.891	0.902	0.913	0.935	0.951	0.969	0.966	0.976	0.975	0.991	1	1.019	1.038	1.032	0.995	1.007	1.017
BEL	0.753	0.766	0.781	0.805	0.821	0.827	0.847	0.862	0.868	0.894	0.891	0.908	0.927	0.925	0.943	0.974	0.955	0.965	0.973	1.004	1	1.013	1.027	1.014	0.991	1.006	0.998
CAN	0.933	0.921	0.921	0.926	0.919	0.902	0.886	0.888	0.893	0.912	0.919	0.913	0.930	0.943	0.963	0.987	0.987	0.995	0.993	0.992	1	1.001	0.993	0.976	0.959	0.961	0.960
DEN	0.804	0.820	0.823	0.826	0.831	0.844	0.854	0.865	0.870	0.919	0.934	0.951	0.957	0.953	0.960	0.976	0.967	0.968	0.975	0.992	1	1.008	1.003	0.976	0.943	0.969	0.977
FIN	0.672	0.688	0.698	0.717	0.737	0.741	0.722	0.725	0.746	0.775	0.795	0.813	0.843	0.872	0.886	0.920	0.931	0.939	0.954	0.984	1	1.028	1.058	1.040	0.966	0.992	1.005
FRA	0.761	0.773	0.778	0.800	0.823	0.834	0.839	0.849	0.850	0.866	0.883	0.885	0.900	0.920	0.934	0.961	0.966	0.982	0.985	0.991	1	1.020	1.021	1.006	0.986	0.995	1.004
DEU	0.778	0.788	0.794	0.813	0.837	0.865	0.861	0.873	0.872	0.889	0.902	0.912	0.927	0.935	0.941	0.962	0.977	0.983	0.985	0.993	1	1.032	1.050	1.047	1.011	1.035	1.054
GRE	0.792	0.795	0.789	0.818	0.837	0.834	0.862	0.849	0.823	0.836	0.851	0.872	0.908	0.905	0.909	0.929	0.949	0.953	0.984	0.999	1	1.039	1.045	1.009	0.979	0.923	0.887
ISL	0.768	0.792	0.817	0.820	0.823	0.833	0.822	0.785	0.801	0.827	0.803	0.826	0.864	0.883	0.864	0.868	0.892	0.907	0.919	0.975	1	0.984	1.000	0.991	0.999	0.967	0.972
IRL	0.585	0.546	0.549	0.560	0.579	0.605	0.618	0.641	0.653	0.673	0.711	0.749	0.807	0.840	0.884	0.931	0.943	0.971	0.988	0.990	1	1.007	1.016	0.989	0.992	1.001	1.024
ISR	0.907	0.926	0.961	0.969	0.953	0.996	1.021	1.025	1.007	0.994	0.984	0.973	0.957	0.962	0.951	0.988	0.969	0.947	0.950	0.983	1	1.027	1.034	1.030	1.022	1.038	1.044
ITA	0.871	0.881	0.893	0.913	0.935	0.937	0.933	0.936	0.940	0.969	0.991	0.988	1.001	0.996	0.997	1.017	1.020	1.009	0.993	0.999	1	1.003	1.003	0.988	0.952	0.970	0.969
JPN	0.805	0.812	0.829	0.866	0.891	0.921	0.930	0.923	0.924	0.919	0.927	0.937	0.945	0.929	0.936	0.949	0.954	0.962	0.973	0.992	1	1.008	1.023	1.017	0.987	1.025	1.046
KOR	0.454	0.482	0.510	0.549	0.569	0.599	0.627	0.642	0.657	0.684	0.709	0.731	0.761	0.768	0.828	0.856	0.870	0.912	0.940	0.968	1	1.033	1.078	1.111	1.114	1.180	1.239
NLD	0.785	0.793	0.799	0.811	0.828	0.841	0.848	0.846	0.853	0.867	0.872	0.882	0.898	0.916	0.936	0.951	0.955	0.955	0.960	0.984	1	1.017	1.033	1.030	0.996	1.012	1.016
NZL	0.838	0.847	0.837	0.857	0.863	0.860	0.860	0.865	0.891	0.910	0.917	0.921	0.937	0.942	0.969	0.974	0.984	1.001	1.010	1.002	1	0.995	0.998	0.970	0.975	0.963	0.947
NOR	0.733	0.741	0.743	0.735	0.749	0.765	0.789	0.811	0.828	0.860	0.884	0.911	0.935	0.931	0.931	0.952	0.966	0.970	0.979	0.996	1	0.988	0.969	0.930	0.908	0.896	0.888
PRT	0.707	0.745	0.773	0.812	0.839	0.832	0.892	0.924	0.906	0.904	0.918	0.946	0.970	0.988	0.996	1.021	1.011	1.002	0.996	0.994	1	1.001	1.027	1.007	0.998	1.023	1.028
ESP	0.950	0.951	0.967	0.979	0.989	0.989	0.989	0.991	0.988	1.010	1.018	1.019	1.019	1.017	1.017	1.017	1.012	1.007	1.005	1.002	1	1.000	1.001	0.990	0.979	0.978	0.979
SWE	0.748	0.759	0.770	0.769	0.773	0.769	0.766	0.770	0.774	0.794	0.809	0.817	0.839	0.858	0.875	0.899	0.899	0.924	0.949	0.978	1	1.025	1.027	1.002	0.965	1.002	1.016
CHE	0.990	0.987	0.977	0.981	0.999	1.005	0.936	0.933	0.931	0.932	0.936	0.943	0.959	0.965	0.957	0.979	0.988	0.987	0.979	0.983	1	1.019	1.036	1.037	1.011	1.023	1.035
GBR	0.720	0.741	0.763	0.765	0.765	0.765	0.759	0.783	0.809	0.831	0.844	0.858	0.872	0.888	0.901	0.927	0.937	0.953	0.978	0.989	1	1.010	1.024	1.004	0.969	0.977	0.987
USA	0.773	0.784	0.787	0.795	0.801	0.807	0.806	0.827	0.832	0.843	0.844	0.861	0.874	0.890	0.910	0.927	0.934	0.951	0.970	0.988	1	1.005	1.009	1.003	1.004	1.022	1.024

Note: AUS, Australia; AUT, Austria; BEL, Belgium; CAN, Canada; DEN, Denmark; FIN, Finland; FRA, France; DEU, Germany; GRE, Greece; ISL, Iceland; IRL, Ireland; ISR, Israel; ITA, Italy; JPN, Japan; KOR, Korea; NLD, Netherlands; NZL, New Zealand, NOR, Norway; PRT, Portugal; ESP, Spain; SWE, Sweden; CHE, Switzerland; GBR, United Kingdom; USA, United States.

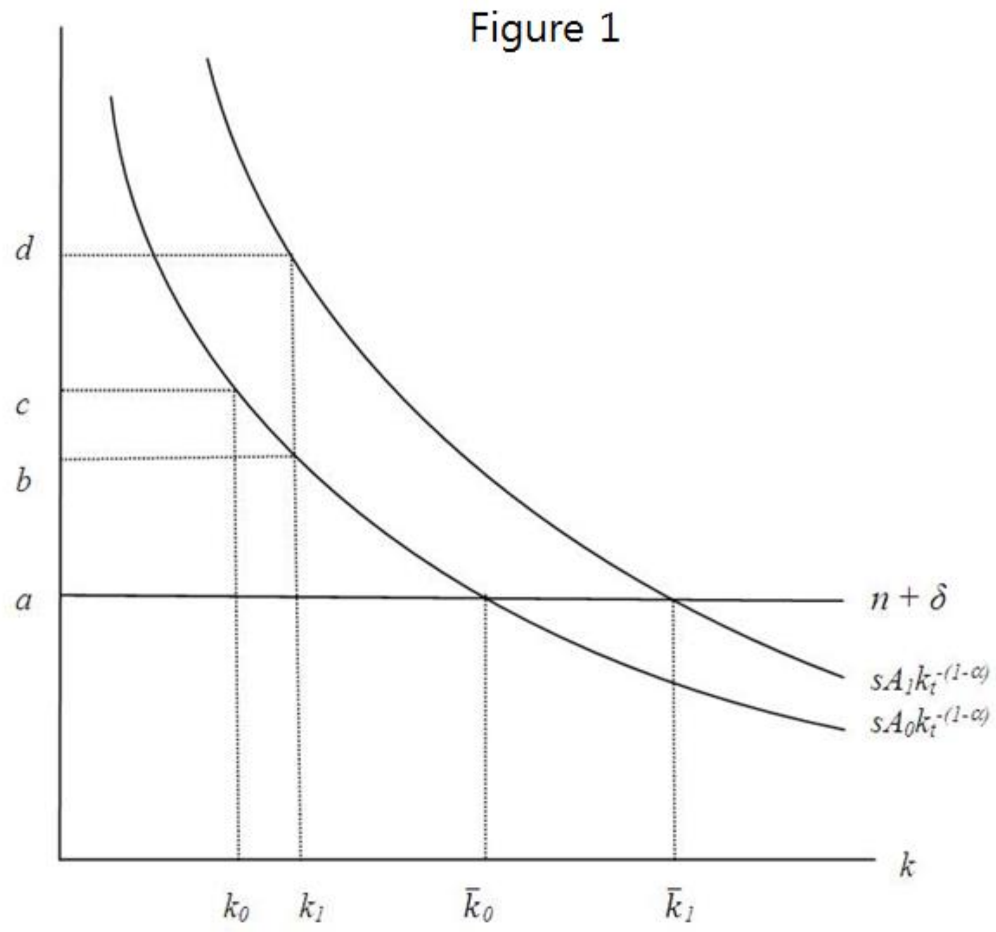
Table 6. Growth Rate of Multi-factor Productivity (in percent)

	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
AUS	0.14	2.31	0.13	0.47	-0.05	0.48	3.61	1.95	0.63	1.72	2.51	2.56	3.10	0.79	0.89	3.04	0.34	1.41	-0.16	-0.70	0.03	-0.36	-1.69	0.07	-1.91	-0.91
AUT	1.38	0.62	1.95	2.07	2.03	1.43	0.77	0.04	1.48	1.97	1.34	1.21	2.39	1.66	1.94	-0.37	1.09	-0.17	1.66	0.93	1.91	1.82	-0.55	-3.57	1.22	1.01
BEL	1.77	1.91	3.18	1.90	0.81	2.32	1.85	0.71	2.95	-0.32	1.88	2.13	-0.25	1.95	3.34	-1.95	1.00	0.82	3.25	-0.44	1.33	1.36	-1.24	-2.35	1.53	-0.76
CAN	-1.25	0.01	0.55	-0.81	-1.74	-1.82	0.27	0.57	2.12	0.76	-0.68	1.88	1.37	2.16	2.45	0.05	0.80	-0.28	-0.01	0.76	0.06	-0.80	-1.65	-1.79	0.26	-0.18
DEN	1.97	0.45	0.28	0.72	1.46	1.21	1.29	0.55	5.64	1.68	1.80	0.67	-0.42	0.72	1.66	-0.89	0.06	0.71	1.82	0.76	0.79	-0.44	-2.72	-3.43	2.74	0.85
FIN	2.26	1.54	2.71	2.82	0.50	-2.58	0.42	2.96	3.88	2.55	2.29	3.61	3.52	1.57	3.80	1.26	0.86	1.65	3.04	1.64	2.77	2.94	-1.72	-7.07	2.67	1.30
FRA	1.52	0.69	2.86	2.82	1.36	0.55	1.17	0.18	1.89	1.98	0.18	1.70	2.25	1.55	2.83	0.49	1.69	0.36	0.53	0.95	2.05	0.01	-1.47	-1.96	0.92	0.90
DEU	1.30	0.84	2.39	2.98	3.33	-0.51	1.35	-0.11	1.95	1.56	1.10	1.61	0.83	0.64	2.21	1.63	0.62	0.21	0.73	0.75	3.22	1.70	-0.22	-3.49	2.43	1.77
GRE	0.41	-0.82	3.72	2.29	-0.36	3.35	-1.48	-3.04	1.54	1.78	2.52	4.12	-0.34	0.45	2.23	2.16	0.41	3.26	1.46	0.15	3.87	0.58	-3.40	-3.04	-5.64	-3.94
ISL	3.11	3.17	0.35	0.36	1.27	-1.28	-4.57	2.01	3.32	-2.94	2.88	4.63	2.13	-2.12	0.50	2.68	1.70	1.39	6.01	2.61	-1.61	1.58	-0.82	0.77	-3.25	0.54
IRL	-6.78	0.52	2.02	3.46	4.53	2.13	3.71	1.92	3.01	5.69	5.35	7.76	4.00	5.28	5.33	1.28	2.95	1.72	0.27	0.99	0.73	0.84	-2.61	0.30	0.91	2.26
ISR	2.11	3.79	0.86	-1.70	4.51	2.58	0.32	-1.77	-1.25	-1.04	-1.04	-1.65	0.44	-1.08	3.91	-1.94	-2.27	0.31	3.41	1.78	2.73	0.61	-0.31	-0.81	1.56	0.60
ITA	1.16	1.36	2.25	2.41	0.22	-0.46	0.32	0.46	3.03	2.32	-0.38	1.38	-0.50	0.12	2.00	0.31	-1.12	-1.59	0.64	0.07	0.26	0.00	-1.46	-3.59	1.82	-0.04
JPN	0.67	2.10	4.47	2.94	3.38	0.96	-0.76	0.08	-0.48	0.81	1.07	0.83	-1.61	0.74	1.40	0.50	0.80	1.17	1.97	0.80	0.78	1.53	-0.62	-2.89	3.85	2.01
KOR	5.99	5.89	7.59	3.64	5.40	4.64	2.29	2.46	4.02	3.64	3.21	4.00	0.98	7.86	3.35	1.61	4.81	3.07	3.03	3.26	3.26	4.41	3.00	0.29	5.92	5.03
NLD	1.05	0.73	1.53	2.03	1.56	0.80	-0.20	0.88	1.65	0.55	1.10	1.90	1.91	2.18	1.70	0.39	-0.02	0.52	2.54	1.58	1.74	1.50	-0.26	-3.34	1.62	0.46
NZL	1.11	-1.20	2.31	0.80	-0.43	0.00	0.57	3.07	2.17	0.67	0.43	1.82	0.46	2.88	0.51	1.08	1.75	0.81	-0.71	-0.24	-0.51	0.27	-2.79	0.58	-1.31	-1.66
NOR	1.06	0.30	-1.14	1.89	2.14	3.17	2.79	2.11	3.83	2.83	3.04	2.57	-0.36	-0.01	2.27	1.40	0.49	0.94	1.78	0.32	-1.17	-1.99	-3.99	-2.35	-1.29	-0.93
PRT	5.47	3.75	5.01	3.32	-0.87	7.19	3.63	-1.91	-0.21	1.49	3.10	2.49	1.89	0.82	2.48	-1.00	-0.87	-0.58	-0.26	0.65	0.07	2.61	-1.97	-0.89	2.59	0.41
ESP	0.10	1.70	1.18	1.09	-0.01	-0.06	0.25	-0.28	2.15	0.80	0.10	0.07	-0.20	-0.06	-0.02	-0.46	-0.54	-0.17	-0.26	-0.22	0.04	0.04	-1.08	-1.16	-0.03	0.03
SWE	1.55	1.43	-0.14	0.57	-0.58	-0.38	0.58	0.49	2.57	1.93	0.91	2.70	2.35	1.97	2.74	0.01	2.75	2.70	3.08	2.22	2.46	0.20	-2.43	-3.63	3.78	1.46
CHE	-0.33	-1.01	0.37	1.84	0.64	-6.93	-0.31	-0.17	0.11	0.42	0.75	1.71	0.63	-0.84	2.28	0.94	-0.10	-0.82	0.41	1.73	1.93	1.63	0.12	-2.54	1.21	1.17
GBR	2.94	2.93	0.29	-0.06	0.02	-0.72	3.15	3.23	2.82	1.52	1.65	1.69	1.80	1.43	2.91	1.02	1.75	2.58	1.21	1.07	0.99	1.44	-1.99	-3.47	0.77	1.07
USA	1.43	0.30	1.06	0.70	0.77	-0.09	2.65	0.63	1.29	0.11	2.03	1.51	1.79	2.25	1.89	0.74	1.80	2.07	1.87	1.16	0.47	0.43	-0.56	0.07	1.78	0.16

Note: AUS, Australia; AUT, Austria; BEL, Belgium; CAN, Canada; DEN, Denmark; FIN, Finland; FRA, France; DEU, Germany; GRE, Greece; ISL, Iceland; IRL, Ireland; ISR, Israel; ITA, Italy; JPN, Japan; KOR, Korea; NLD, Netherlands; NZL, New Zealand, NOR, Norway; PRT, Portugal; ESP, Spain; SWE, Sweden; CHE, Switzerland; GBR, United Kingdom; USA, United States.

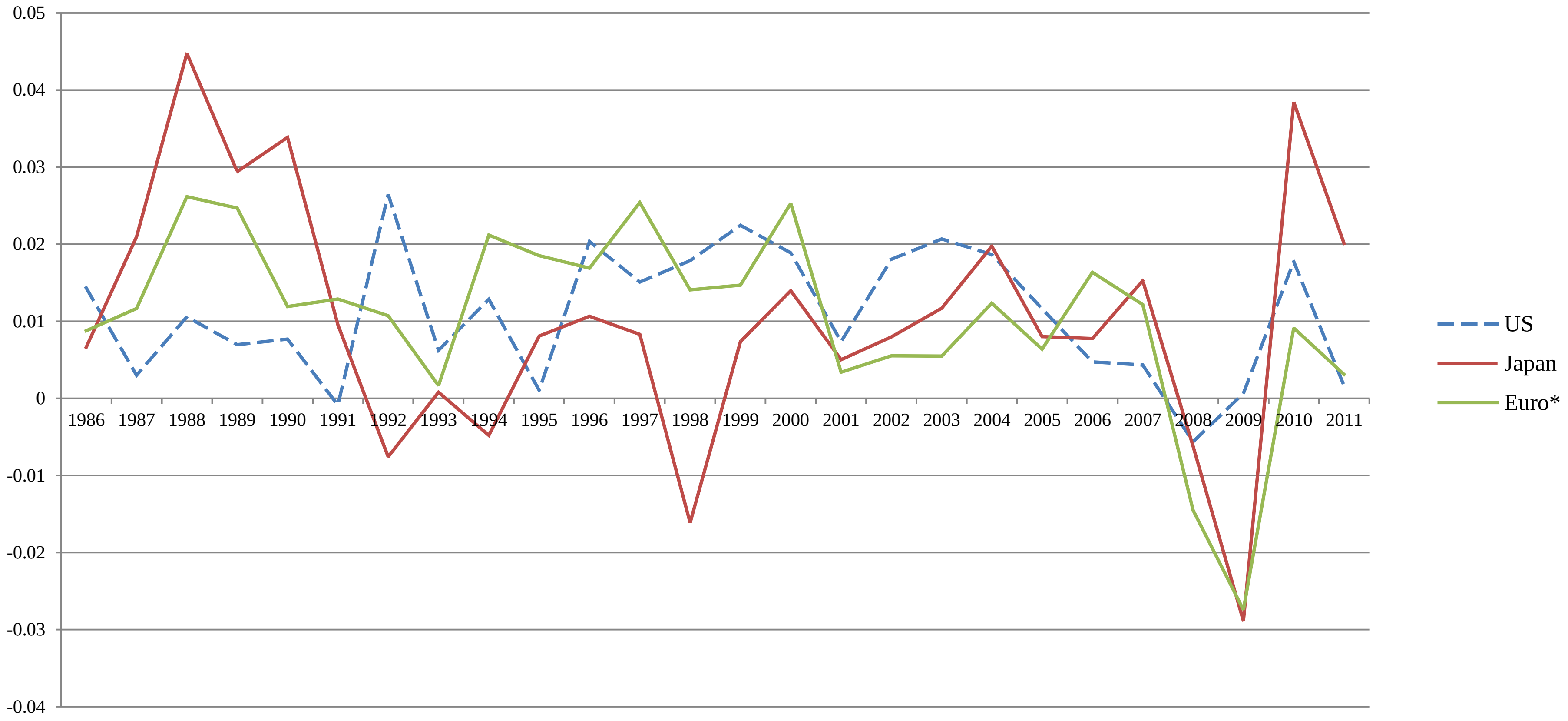
Table 7. Growth Rate of Multi-factor Productivity: Sub-period Average (in percent)

	1986-1990	1991-1995	1996-2000	2001-2005	2006-2011
Australia	0.60	1.68	1.97	0.79	-0.79
Austria	1.60	1.14	1.71	0.63	0.31
Belgium	1.91	1.50	1.81	0.54	-0.02
Canada	-0.65	0.38	1.44	0.26	-0.68
Denmark	0.98	2.07	0.89	0.49	-0.37
Finland	1.97	1.45	2.96	1.69	0.15
France	1.85	1.15	1.70	0.80	0.07
Germany	2.17	0.85	1.28	0.79	0.90
Greece	1.05	0.43	1.79	1.48	-1.93
Iceland	1.65	-0.69	1.60	2.88	-0.46
Ireland	0.75	3.29	5.54	1.44	0.41
Israel	1.91	-0.23	0.12	0.26	0.73
Italy	1.48	1.13	0.52	-0.34	-0.50
Japan	2.71	0.12	0.48	1.05	0.77
Korea	5.70	3.41	3.88	3.16	3.65
Netherlands	1.38	0.74	1.76	1.00	0.29
New Zealand	0.52	1.29	1.22	0.54	-0.90
Norway	0.85	2.95	1.50	0.99	-1.95
Portugal	3.34	2.04	2.15	-0.41	0.47
Spain	0.81	0.57	-0.02	-0.33	-0.36
Sweden	0.57	1.04	2.13	2.15	0.31
Switzerland	0.30	-1.38	0.91	0.43	0.59
United Kingdom	1.22	2.00	1.90	1.53	-0.20
United States	0.85	0.92	1.89	1.53	0.39
Average	1.51	1.14	1.70	0.98	0.07



Source: Lee (2009), Figure 1

Figure 2



* Real GDP weighted average of MFP growth rates of Eurozone countries.