The Swiss Disease: Facts and Artefacts (*)

A Reply to Kehoe and Prescott

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Abstract

This paper investigates the claim made by Kehoe and Prescott (2002) that Switzerland and New Zealand experienced "great depressions" in the last two decades. We question the appropriateness of the measure used by Kehoe and Prescott (GDP per working-age person) and propose a more accurate measure to compare economic performance on a consistent basis, namely, GDP per hour worked which is also adjusted for terms of trade changes and investment in tangibles. Based on this yardstick, the difference in economic performance between the US and Switzerland turns out to be largely a statistical artefact and Kehoe and Prescott's conditions for a "great depression" are not satisfied.

Key words: Great depressions, Switzerland, labour productivity, national accounting standards, terms of trade adjustment, GDP per hours worked

JEL Codes: O40, O47, O57.

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I. Introduction

In a thought-provoking introductory paper to a special issue of this Journal (Review of Economic Dynamics, Vol. 5, No. 1) on the "Great Depressions of the 20th Century", Kehoe and Prescott argue that "great depressions" are not unique events from the remote past, but events that can occur rather frequently. According to Kehoe and Prescott, even two rich and well-governed market economies, New Zealand and Switzerland, experienced great depressions in the last two decades. While it is common in Switzerland to complain about mediocre economic performance and low economic growth rates, neither the general public, nor policy makers, nor academic economists would readily agree with the idea that they have just witnessed a "great depression" – at home. The first objection that comes to mind is that Switzerland fared extremely well with respect to unemployment in the last two decades. Hence, Kehoe and Prescott make a rather strong claim – the foundations of which will be thoroughly investigated here.

The organization of this paper is as follows. First, we will discuss Kehoe and Prescott's definition of a "great depression". Then, we will critically look at the underlying time series of labour productivity (Y/L) with respect to alternative specifications of the numerator (Y) and the denominator (L) for Switzerland and the US. It will be shown that if the necessary adjustments are made to Y and L, arising from (a) institutional differences with respect to the labour market, (b) terms of trade changes and (c) national income accounting standards, the impressive growth gap between the well-performing US and the poor-performing Switzerland closes. As a result, the observed large gap in economic growth between the US and Switzerland appears to be a statistical artefact due to systematic biases in measuring Y and L in the two countries.

II. Some Conceptual Remarks

Kehoe and Prescott (2002) follow a widespread practice used to quantify economic performance and refer to the growth rate of GDP in labour intensive form. Accordingly, the smaller the growth rate of per capita income (or labour productivity) of a country, the worse is its economic performance. Specifically, Kehoe and Prescott divide real GDP by the working age population, i.e. the number of persons aged between 15–64 years. This procedure is implicitly motivated by the idea that it is the number of persons of employable age which determines the potential output of an economy. Then, they discuss the notion of "trend output" with some theoretical reasoning about the factors that govern economic growth. They propose a "detrending" procedure which amounts to subtracting 2% from the annual growth rate of Y/L.¹ A "great depression" is then defined as a situation when (1) a country's "detrended" Y/L growth rate falls 20% below "trend", and (2) the drop amounts to at least 15% below trend during the ten initial years (Kehoe and Prescott, p. 9).

¹ This is somewhat motivated by the performance of the US economy during the 20th century (Kehoe and Prescott, p. 14). We might add that this is one of the "stylised facts" in the textbook version of traditional neo-classical growth theory (see e.g. Branson, 1979).

Instead of discussing the adequacy of this detrending procedure, we point to the fact that "detrending" is irrelevant for Kehoe and Prescott's criterion of a great depression. Since both their depression signal of -20% and the "detrending" factor of -2% are constant across time and space, one can drop the detrending step altogether and set a higher value for the depression signal and arrive at exactly the same results.² In any case, Kehoe and Prescott are to be credited for having highlighted the fact that Switzerland and New Zealand, though geographically as far away from one another as possible, share the unpleasant characteristic of having experienced extended periods of relatively low *Y/L* growth. Hence, in what follows, we shall not pursue the semantic question of whether we just witnessed a "great depression" in Switzerland, but rather focus on what stands behind the observed poor Swiss performance.

Kehoe and Prescott start their "great depression" calculations from 1973. Deviating from this, we concentrate on the period from 1980 onwards. This limitation is due to two facts. First, prior to 1980 no official "System of National Accounts (SNA)" figures exist and hence GDP numbers for the time before 1980 are not compatible to the newer SNA (SNA 1968 or SNA 1993) standards. In particular, no backcasting efforts have been made and the figures found in some databases are simply linked to the old income-based GDP estimations. In the 1980–1989 period, GDP in Switzerland was calculated by using the expenditure approach, and from 1990 onwards by both production and expenditure methods. Second, Switzerland faced a severe recession between 1974 and 1977, which might have observationally led to the finding of a "great depression". This "great depression", however, was brought about by a negative shock to the labour supply in Switzerland. In particular, because of the lack of compulsory unemployment insurance, the income determined GDP drop of 6.4% (at 1970 prices) was accompanied by an emigration leading to a 2.2% reduction of the total population from 1974 to 1977. These emigrants were largely seasonal workers or others without rights to apply for residence permits for their spouses, children or other close relatives and dependents. This population group had a participation rate close to unity, and the increasing of migrants before 1973 boosts Kehoe and Prescott's growth figures in this period. Unemployment insurance was made compulsory 1978 and immigration laws gradually allowed family reunification and nowadays they conform approximately to international standards. These two factors, e.g., incompatibility of GDP data over time and the legal changes affecting the supply of labour, make a comparison of the Swiss economic performance to other countries dubious for the pre-1980 period. Hence, we focus on the post-1980 period in our analyses.

² Although the "detrending" does not affect the analysis at all, it certainly adds some dramatic flavour to the "great depression" story. Without this peculiar "detrending", Kehoe and Prescott's argument would just be that some countries have experienced lower *Y/L* growth rates than others, which is interesting enough, but not quite as alarming as the detection of a 20% drop of $(Y/L)_t = (Y/L)_t e^{-t \cdot 2\%}$.

III. Pitfalls in measuring labour productivity (Y/L)

A. (Mis-) Measurement of labour input

The number of working age persons in an economy plays an essential role in determining potential output. However, for a direct comparison of labour productivity figures – measured by dividing output (GDP) by the working age population – the rates of change of (a) employment; (b) participation rates; (c) the relation between full-time and part-time employment; and (d) average hours worked per year and per employee; should be roughly equal across countries. In reality, however, these requirements are rarely met.

More formally, the relevant relationships in this context can be stated as follows:

LH	= LE x H _M	(1)
LH	$= \lambda LF (1 - u) x [\alpha H_P + (1 - \alpha)H_F] + (\lambda_R x RL x H_R)$	(2)

where,

LH	: total number hours worked in the economy,
LE	: number of persons employed,
λ	: labour force participation rate,
LF	: potential labour force
u	: unemployment rate,
H_{M}	: mean number of total hours worked per year and per person employed, or
	$H_{M} = \alpha H_{P} + (1 - \alpha)H_{F} + (\lambda_{R} \times RL \times H_{R})$
α	: share of part-time employment,
$H_{\rm F}$: mean number of full-time hours worked per year and per person employed,
H _P	: mean number of part-time hours worked per year and per person employed,
λ_R	: participation rate of people aged above 65 in paid economic activities,
RL	: Size of the population above 65 years of age (retirees)
H _R	: mean number of hours worked per year by people aged above 65.

A comparison of the developments in the components of equations (1) and (2) in the US and in Switzerland illustrates that:

- in the US, working-age population (LF) increased more or less continuously between 1980 and 2000. In Switzerland, however, it grew strongly up to 1991, but remained roughly unchanged in the following years;
- in the US, actual employment (LE) rose by 33% between 1980 and 2000, whereas the increase in Switzerland was only 24%;
- the unemployment rate (u), on the other hand, decreased in the majority of years in the US, but in Switzerland it increased almost over the entire period (especially in the years 1991 to 1994).

Nevertheless, the standardised unemployment rate (as published by the OECD) remained smaller in Switzerland than in the US in 2000;

- the participation rate (λ) in Switzerland was generally higher than in the US. Also, the rate of increase of the participation rate in Switzerland in the years under consideration was stronger than in the US;
- the share of part-time employment (α) in total employment was higher in Switzerland than in the US in 1980. Since then, there was a further substantial rise in the share of part-time employment in Switzerland, whereas the share of part time employment diminished slightly in the US;
- during the period from 1991-2000, the participation rate of elderly people (65 years and older) in the US rose from 11.5% to 12.8%, while in Switzerland it fell from 14.5% to 9.5%. Hence, dividing real GDP by the number of working age persons with an upper limit of 65 years, as done by Kehoe and Prescott, can be misleading.

Obviously, during the last two decades the components of expressions (1) and (2), developed differently in the US and Switzerland in. As a result, in the US the total mean number of hours worked per year and employee (H_M) increased slightly, while it fell by as much as 13% in Switzerland. This is illustrated in Graph 1.

<Graph 1>

In sum, a comparison of labour productivity between Switzerland and the US by dividing GDP by the working-age population yields a biased result since the underlying *ceteris paribus* assumptions are not met. In general, this casts doubts on the validity of using unadjusted *Y/L* measures in comparing labour productivity across countries.

Comparing the output per working age person, Kehoe and Prescott argue that in the US from 1980 to 2000, labour productivity rose by almost 60% in the US, whereas in Switzerland, the respective increase was less than 10%, and the difference in the growth rates of output per working age person between the two countries per year amounts to 1.2%.

As we have explained above, comparing the GDP per hour worked instead of the output per working age population across countries, allows for the labour force dynamics to develop differently. When measuring the economic performances of Switzerland and the US on the basis of this criterion, the differences in the respective growth rates diminish considerably. Between 1980 and 2000, for instance, GDP per working hour rose by 35% in the US, whereas the increase in the same period was 23% in Switzerland. A difference between the economic performances of the two countries still remains, but it is far smaller than what Kehoe and Prescott suggest. More importantly, based on these figures, Kehoe and Prescott's conditions for a depression are not met with respect to Switzerland. Graph 2 shows that the development of GDP per hour worked was roughly the same in the US and Switzerland between 1980 and 1990, and again after 1997.³

<Graph 2>

B. Inadequate measurement of GDP

The productivity measure we review in this paper is real GDP per labour input. Therefore, the outcome depends on the accuracy of the measures of both labour input and output produced. In this section, we take a closer look at the output side. The focus will be on dynamics rather than levels which implies that conversion from one unit of measurement to another is less of an issue.

(i) Adjusting the Real GDP for Terms of Trade Changes

Even in the case of an open economy, where real value added does not increase over time, an increase in overall wealth can be observed if, due to trade with foreign countries, more import goods can be acquired by paying with the same amount of domestic products. Naturally, the potential for these terms-of-trade (ToT) effect is bigger, the larger the share of exports and imports in GDP. As Kohli (2002) argues, this might be of particular importance in the case of Switzerland.⁴

It could even be argued that in the absence of market power, terms-of-trade changes will mainly be brought about by variations in relative quality differences between domestic and foreign products. Quality can only be poorly estimated and it is therefore likely to be underestimated in the national accounts. Therefore, ToT changes can be regarded an approximation of neglected income growth arising from unobservable improvements in quality.

In Graph 3, we use data from Heston, Summers, and Aten's (2002) "Penn World Tables (PWT)" to compare the developments in the terms-of-trade in the US and in Switzerland. Switzerland experienced an increase in the ToT which results in an accumulated difference of 8.25 percent over 20 years. Hence, for Switzerland, an adjustment for ToT effects is produces an upward correction of the real GDP growth. In comparison, the ToT effect is negligible for the US.

<Graph 3>

(ii) Calculating GDP under different National Accounting Standards

To measure the level of economic activity, the concept of gross domestic product is widely used. This concept, which sums up the gross value added of all economic sectors in the production process, dates back to the middle of the last century. In this concept, intermediate input is subtracted

³ The differences in the years 1991 to 1996 were mainly the consequences of a fairly restrictive Swiss fiscal and monetary stance during that time.

⁴ The same applies to New Zealand, see Kohli (2003).

from the output value, thereby avoiding double-counting of production. On the other hand, the depreciation on investment goods used in the production process is not deducted. The calculation of gross value added – and hence gross domestic product – is done within the so-called production account within the system of national accounts.

To allow for comparison between countries, there exist international standards for national income accounting, which are periodically revised. Today, the System of National Accounts of the International Monetary Fund from 1993 (SNA 1993) is widely used. The European System of Accounts of 1995 (ESA 1995), is the corresponding European version. However, the PWT data on some countries are based on the old standard, i.e. the SNA 1968 (or ESA 1978). Interestingly, one of these countries is New Zealand, and the other one is Switzerland – i.e. the countries at the heart of Kehoe and Prescott's analyses. Switzerland adopted the ESA 1995 only at the end of 2003, while New Zealand switched to the SNA 1993 standard earlier, but the PWT data are based on the SNA 1968. Thus, the current per capita output comparisons between the US and Switzerland and US and New Zealand are not made on the basis of the same national accounting systems.

The SNA 1993 includes a new investment category, investment in intangibles. Under the old system (SNA 1968), expenditures for software and other intangible investment goods were treated as intermediate input, and hence subtracted from the output value when calculating value added. Therefore, the GDP under SNA 1993 will at least be equal to and normally higher than its SNA 1968 counterpart.

The influence of investment in intangibles in the SNA 1993 is not necessarily limited to the level of GDP. If the relation of investment in intangibles to GDP does not remain constant, the nominal growth rates will also differ. Moreover, if the price movement of intangible goods deviates from the general price level change, the real growth rate will also be affected. Finally, the change to chain indices and the annual re-basing of the price and volume indices will produce different results, if the price change differs between growing and shrinking economic sectors.

As an example, let us examine how US real GDP growth figures were affected after the US adopted the SNA 1993 standard. As Graph 4 illustrates, average real growth rate between 1980 and 1997 was quantified 0.31% higher on average as a result of the change from SNA 1968 to SNA 1993.

<Graph 4>

Combining the effect of the SNA revision on US GDP, the effect of terms of trade changes, and measuring productivity on a GDP per hour worked basis, the revised – and in our view: the more adequate – growth rate of Y/L for the 1980–1997 period actually turns out to be *higher* in Switzer-land than in the US. This is shown in Graph 5.

IV. Conclusions

Overall, we find that the difference in the economic performances of the US and Switzerland is less pronounced than suggested by Kehoe and Prescott. The large difference in performance calculated by using data from databases such as the Penn World Tables, is mainly a statistical artefact due to problems in measuring labour input and, indeed, GDP itself. Once allowances are made to adjust input and output measures for institutional differences and changes, the labour productivity differential between the US and Switzerland is negligible – if anything, during the period for which comparable data are available, the increase in real GDP produced per hours worked was higher in Switzerland than in the US. Finally, with our more adequate data, Switzerland does not meet Kehoe and Prescott's conditions for a "great depression".⁵

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 $^{^{5}}$ In a related paper (Abrahamsen *et al.*, 2003), we explore cross-country comparative economic performance by using data from the latest Penn World Tables. Specifically, we employ a balanced panel data set on 94 countries with multiple observations through time covering the period 1960-2000. We regress the growth rate of output per labour unit on its presumed determinants which are derived from an extended version of the neo-classical aggregate production function. This set-up allows for the inclusion of country-specific "fixed effects", which quantify the deviation of a country's performance from its predicted value after taking account of the explicit determinants of economic growth. As in Kehoe and Prescott (2002), we refer to the US as the country against which to evaluate all other countries' performances. In this framework, a straightforward definition of a "great depression" would be a significantly negative fixed effect with respect to the benchmark country – the US. Consequently, a depression is not identified by means of an arbitrarily chosen level of a country's labour productivity growth rate, but as a statistically significant deviation from a country's predicted growth potential, where the empirical estimate of the total factor productivity growth rate in the US (not captured by the explicit regressors) is fixed to be the norm. Using this approach to define a "great depression", we do not find any evidence that Switzerland or New Zealand grew significantly below potential. This result is striking because it has been obtained by using the same database (without any adjustments) employed by Kehoe and Prescott.

APPENDIX: Data

In addition to the Heston, Summers, and Aten (2002)'s Penn World Tables 6.1, we have drawn on the following data:

Employment and hours worked: University of Groningen and The Conference Board, GGDC Total Economy Database, 2002, http://www.eco.rug.nl/ggdc.

Unemployment rate: World bank database.

Hours worked: University of Groningen and The Conference Board, GGDC Total Economy Database, 2002, http://www.eco.rug.nl/ggdc.

GDP: Swiss Statistical Institute (BFS).





Graph 1: Mean number of hours worked per year and per person employed

Graph 2: GDP per Working Age Person (15–64) versus GDP per Hour Worked





Graph 3: Terms of Trade Developments (Px/Pm) in the US and Switzerland







