ECONSTOR
Make Your Publications Visible.

A Service of

ZBW Leibniz-Informationszentrum Wirtschaft
Leibniz Information Centre for Economics

Meyer, Christoph; Zanetti, Attilio

Article

Unit Labour Costs, the Real Exchange Rate and Swiss Competitiveness

Aussenwirtschaft

Provided in Cooperation with:
University of St.Gallen, School of Economics and Political Science, Swiss Institute for International Economics and Applied Economics Research

Suggested Citation: Meyer, Christoph; Zanetti, Attilio (2008) : Unit Labour Costs, the Real Exchange Rate and Swiss Competitiveness, Aussenwirtschaft, ISSN 0004-8216, Universität St.Gallen, Schweizerisches Institut für Aussenwirtschaft und Angewandte Wirtschaftsforschung (SIAW-HSG), St.Gallen, Vol. 63, Iss. 1, pp. 43-68

This Version is available at:
https://hdl.handle.net/10419/231142

Standard-Nutzungsbedingungen:

Die Dokumente auf EconStor dürfen zu eigenen wissenschaftlichen Zwecken und zum Privatgebrauch gespeichert und kopiert werden.

Sie dürfen die Dokumente nicht für öffentliche oder kommerzielle Zwecke vervielfältigen, öffentlich ausstellen, öffentlich zugänglich machen, vertreiben oder anderweitig nutzen.

Sofern die Verfasser die Dokumente unter Open-Content-Lizenzen (insbesondere CC-Lizenzen) zur Verfügung gestellt haben sollten, gelten abweichend von diesen Nutzungsbedingungen die in der dort genannten Lizenz gewährten Nutzungsrechte.

Terms of use:

Documents in EconStor may be saved and copied for your personal and scholarly purposes.

You are not to copy documents for public or commercial purposes, to exhibit the documents publicly, to make them publicly available on the internet, or to distribute or otherwise use the documents in public.

If the documents have been made available under an Open Content Licence (especially Creative Commons Licences), you may exercise further usage rights as specified in the indicated licence.

WWW.ECONSTOR.EU

Mitglied der Leibniz-Gemeinschaft

Unit Labour Costs, the Real Exchange Rate and Swiss Competitiveness
Meyer, Christoph;Zanetti, Attilio
Aussenwirtschaft; Mar 2008; 63, 1; ABI/INFORM Collection
pg. 43

Aussenwirtschaft, 63. Jahrgang (2008), Heft I, Zürich: Rüegger, S. 43–68

Unit Labour Costs, the Real Exchange Rate and Swiss Competitiveness

Christoph Meyer and Attilio Zanetti*
Swiss National Bank / Swiss National Bank and University of Basel

Real exchange rates are a major short-run determinant of any country's capacity to compete. In this paper, we compute a unit-labour-costs-based real exchange rate for Switzerland for the period 1980:1–2006:4. We use manufacturing sector data on wages and labour productivity in Switzerland and twelve of its major trade partners and present detailed findings on relative labour costs and relative productivity trends. Our main findings are that, measured in these terms, the Swiss real exchange rate depreciated by some 9% in the period under analysis and that this improvement in competitiveness is essentially due to Swiss wage moderation. At a bilateral level, results highlight diverging trends: a significant gain of competitiveness is observed vis-à-vis Germany, Italy, the UK, Spain, Australia and Japan while a loss occurred with respect to the US, France, Belgium and Sweden.

JEL classification: F10, F31, J30
Keywords: real exchange rate, unit labour costs, manufacturing productivity, competitiveness

1 Introduction

Economists and policy makers often refer to the notion of competitiveness when trying to gauge past performances and future perspectives of any economy. The concept started to enter the political and academic debate in the early 1980s. Meanwhile, although some contributions openly question its relevance (KRUGMAN 1994 and 1996), a large number of influential research institutes and international authorities regularly investigate this issue.

Definitions of competitiveness and of its relevant determinants vary across studies.[1] As far as the short term is concerned, there is, however, a broad consensus regarding the role of exchange rates and, more specifically, of real exchange rates. With this respect, a well-established indicator of competitiveness is relative unit labour costs. The latter can indeed be seen as a form of real exchange rate in which labour costs indexes replace the consumer price index (CPI).

* We thank JÜRG BÄRLOCHER, MATTHIAS LUTZ as well as KEVIN ROSS at the IMF and CLAUDE GIORNO and RICHARD MCKENZIE at the OECD for their valuable feedback. The views expressed in this paper are those of the authors and do not necessarily reflect those of the Swiss National Bank.

1 See DURAND and GIORNO (1987), MARSH and TOKARICK (1996), BOLTHO (1996), TURNER and GOLUB (1997), DURAND et al. (1998), DEUTSCHE BUNDESBANK (1998), KOEHLER-TOEGLHOFER (1999), HALL and JONES (1999), VAN ARK et al. (2005).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

In this paper, we compute a new trade-weighted unit-labour-costs-based real exchange rate for Switzerland over the period 1980–2006. Previous work on this issue has been done by BÄRLOCHER (1994) and by ARVANITIS et al. (2000 and 2005). These studies, however, refer to a limited time span and rely on annual data. BÄRLOCHER's estimate takes six trading partners into account, and concludes that Swiss relative unit labour costs increased by some 10.5% over the period 1985–1994. ARVANITIS and his co-authors investigate the period 1990–2001, identifying a 10% decrease of the Swiss relative unit labour cost as compared with ten trading partners. Estimates are made available also by the IMF in its International Financial Statistics as well as in the World Economic Outlook.

Our work improves previous analysis by taking newer information into account, such as the recently published time series on value added in the manufacturing sector, an estimated time series on hours worked and sector specific wages.[2] It also extends the period under review (1980–2006), hence providing a view of long-run trends, and generates quarterly observations.

Our results – using data on wages and labour productivity in the manufacturing sector in Switzerland and in twelve of its major trading partners – suggest that, measured in these terms, the Swiss real exchange rate depreciated by some 9% between 1980 and 2006. Accordingly, the cost competitiveness of Swiss exports has improved, despite a 40% appreciation of the nominal exchange rate. Data show that this development is essentially due to Swiss wage moderation. More specifically, Swiss manufacturing firms improved their competitiveness by withholding part of the labour productivity gains. At a bilateral level, our results highlight diverging trends: a significant improvement in relative unit labour costs is observed vis-à-vis Germany, Italy, the UK, Spain, Australia and Japan while a loss of competitiveness occurred with respect to the US, France, Belgium and Sweden.

If we look at the subsamples that we share with other studies, our findings appear to be roughly comparable to those of ARVANITIS et al. (2005)[3], whereas they diverge more substantially from those presented in BÄRLOCHER (1994) and more recently in IMF (2006a and 2006b). In particular,

2 The OECD and IMF estimates of Swiss relative unit labour costs are based on economy-wide wages as a proxy for the manufacturing sector wages. This choice introduces an upward bias into their relative unit labour costs estimates.

3 Although results are similar concerning the development of relative unit labour costs over the period 1990–2001, the determinants behave differently. ARVANITIS et al. (2005) present a much more favourable trend in relative labour productivity than we do. In their data, this effect is offset by a less moderated dynamics of relative nominal labour costs.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

the latter point to an appreciation of the Swiss unit-labour-costs-based real exchange rate by more than 60% between 1980 and 2006. Generally speaking, discrepancies between our results and those of the latter studies can be explained by the innovations introduced by our data set.

The paper is organised as follows: Section 2 describes strengths and weaknesses of different exchange rate measures as competitiveness indicators. Section 3 introduces the methodology adopted to compute our relative unit-labour-costs-based exchange rate for Switzerland. Section 4 presents the results while section 5 contains some concluding remarks. An annex describes our data set.

2 Exchange Rates as a Measure of Competitiveness

There are several ways of looking at exchange rates as a measure of competitiveness. Although they apparently address the same issue, different measures actually deliver quite different information.

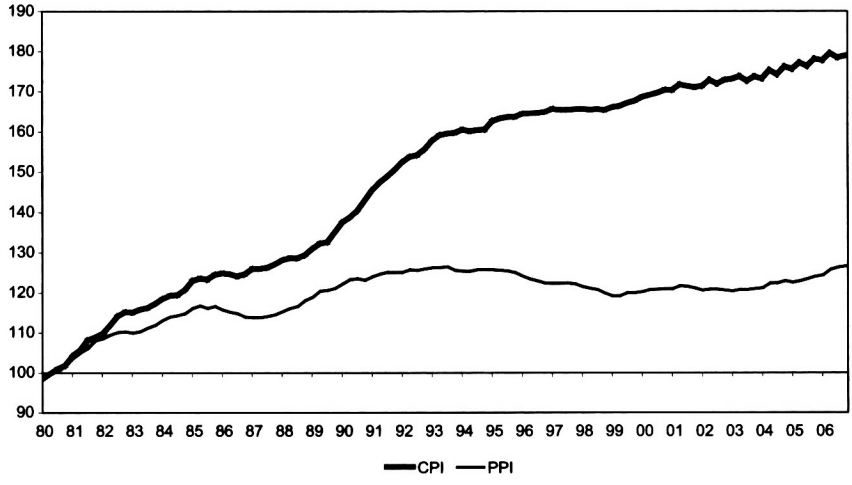
One indicator used is represented by the nominal effective (that is, trade-weighted) exchange rate. Other things being equal, a nominal depreciation of any country's currency leads, in the short run at least, to a decrease in the relative price of its products as compared with foreign ones, favouring exports and hampering imports (HINZE 1998). The massive exchange rate depreciations experienced by the East Asian emerging market currencies in 1997 is a prominent example. Potential competitiveness gains derived from nominal exchange rate depreciations are, however, often eroded by an increase in domestic inflation. Hence, focusing on nominal exchange rates disregards the fact that prices of tradables do not necessarily evolve in the same manner in the reference country and in its competitor countries.

A common way to circumvent these shortcomings is to compute a real effective exchange rate based on relative CPI developments *(CPI–REER)*. This competitiveness measure basically makes it possible to determine the extent to which fluctuations in the nominal exchange rate are in line with headline inflation differentials. Its main advantage is that it can be made readily available, as exchange rate and CPI data are released at frequent intervals. Indeed, the OECD (2007) publishes monthly updates of CPI-based real effective exchange rates for its member countries. The SNB (2007) computes such an exchange rate (vis-à-vis Switzerland's 24 main trading partners) on a monthly basis as well.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

The use of a *CPI–REER*, however, has several shortcomings. They are all linked with the implicit hypothesis that the relative price of domestic tradable goods as compared with foreign tradables evolves in a parallel manner to the relative CPIs. First, in all countries CPIs include a large number of goods and services which are not exposed to international competition. Second, CPI components and their weighting differ from country to country. Rents, for example, account for 28.4% of the US average consumer basket; in Switzerland their share is 18.7%; in Italy no more than 2.7%. Third, from a competitiveness perspective, what matters are the prices at which products are traded across borders. The use of consumer prices as a proxy for trade prices implies that the mark-up at the consumer level is assumed to be constant over time. In practice, however, firms at the producer or wholesale level are often ready to reduce their profit margin in order to maintain or acquire market positions. By depicting the developments of the Swiss CPI and PPI since 1980, Figure 1 provides an insight regarding the relevance of these different issues: CPI and PPI prices follow quite different patterns over time.

Figure 1: Swiss CPI and PPI (1980 = 100)



Real effective exchange rates based on average export unit value indices *(UV-REER)* take part of these drawbacks into account, as the information they consider refers precisely to goods that are explicitly involved in observed trade flows (see AIGINGER 1997). However, unit values do not refer to a fixed basket of products but rather to the average price of goods which are traded during a given period. Movements in unit values can, therefore, be driven

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

by shifts in the composition of trade flows. Suppose, for instance, that during a given quarter, the share of luxury watches in total Swiss watch exports increases. The unit value index of watch exports (that is, the average watch price) will go up. It would, however, be wrong to conclude that the subsequent rise in the *UV–REER* signals a loss of competitiveness by the Swiss watch industry.

In order to avoid these different measurement problems, studies often refer to indices of relative production costs, generally proxied by labour costs. In particular, trade weighted relative unit labour costs *(ULC–REER)* in the manufacturing sector are by far the best-established indicator of international competitiveness (BOLTHO 1996 and NEARY 2006). Although in some countries (including Switzerland) services represent a sizable and expanding share of the tradable sector, the manufacturing industry still produces most internationally traded goods. In addition, manufacturing data are easier to collect and compare across countries.

3 Computing Trade-Weighted Relative Unit Labour Costs

We now look at the formal definition of our *ULC–REER* measure. In any country *i*, the unit labour cost *(ULC)* is defined as the total labour cost *(TLC)* which firms pay for the labour input involved in the production of one unit of value added *(VA)*. Provided that the necessary data are available, *ULC* can be computed for any specific industry or sector *j*, as well as for the whole economy, as

$$(1)\quad ULC_{i,j} = \frac{TLC_{i,j}}{VA_{i,j}}.$$

Dividing both terms of this ratio by a measure of labour input, we obtain *ULC* expressed in terms of the ratio between labour compensation per unit of labour and labour productivity. The labour input is generally measured in terms of hours worked ($H_{i,j}$), so that the outcome is not biased by changes in the weekly or annual work duration per employee, which can occur at a different pace across countries or sectors.[4] Ratio (1) can be transformed as

$$(2)\quad ULC_{i,j} = \frac{TLC_{i,j} / H_{i,j}}{VA_{i,j} / H_{i,j}} = \frac{HLC_{i,j}}{HLP_{i,j}},$$

4 The recommendation to use hours worked as a measure of labour input when computing labour productivity figures is contained, for example, in OECD (2001).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

where, for any country *i* and sector *j*, $HLC_{i,j}$ is the hourly labour cost, that is, the gross nominal hourly wage; $HLP_{i,j}$ is hourly labour productivity. *ULC* go up when the gross nominal hourly wage rises faster than the corresponding hourly labour productivity.

From now on, we will focus exclusively on the manufacturing sector. We thus drop the *j* subscript in our formulas. Relative *ULC (RULC)* between Switzerland *(i = CH)* and a second country *(i ≠ CH)* expressed in CHF are defined as

$$(3)\quad RULC_{CH,i} = \frac{\frac{HW_{CH}}{HLP_{CH}}}{\frac{HWi}{HLPi}} \cdot e_{i,CH} = \frac{HW_{CH}}{HW_i} \cdot \frac{HLP_i}{HLP_{CH}} \cdot e_{i,CH},$$

where *HW* represent hourly wages and $e_{i,CH}$ is the nominal exchange rate in CHF per unit of country *i*'s currency. This definition of the relative *ULC* suggests that there are three ways to improve any country's competitiveness: *i)* reducing its labour costs relative to those of its trading partners, *ii)* raising labour productivity faster than its competitors or *iii)* devaluating its currency in nominal terms. Also, from (3), it is readily apparent that relative unit labour costs are a form of real exchange rate in which labour costs are used as deflators.

When the computation of Swiss relative unit labour costs is extended to a series of competitors, a weighting scheme must be defined. The solution we adopted is a double-weighting procedure, which is also used by the US Bureau of Labour Statistics, the IMF and the OECD. This procedure is meant to reflect, on the one hand, the relative importance of the different markets in which Swiss exporters operate and, on the other hand, Swiss competitors' shares in each of those markets. It leads to a so-called measure of competitiveness among exporters, as for each specific market it only takes foreign supply into account, that is, excluding the weight and development in *ULC* of domestic suppliers (LEPRON and SCHREIER 1998).

According to this concept, the weighting factor $\omega_{CH,i}$ for any country $i \neq CH$ as a competitor of Swiss exports is computed as follows:

$$(4)\quad \omega_{CH,i} = \sum_k \left(\frac{S_i^k}{1 - S_{CH}^k} \cdot V_{CH}^k \right)$$

where

$$(5)\quad S_i^k = X_i^k / \sum_{i \neq k} X_i^k$$

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

$$(6)\quad S_{CH}^{k} = X_{CH}^{k} / \sum_{i \neq k} X_{i}^{k}$$

$$(7)\quad V_{CH}^{k} = X_{CH}^{k} / \sum_{k \neq CH} X_{CH}^{k}$$

$$(8)\quad \sum_{i \neq CH} \omega_{CH,i} = 1$$

with $i = 1,2,\ldots,12$ competitor countries (and $CH \varepsilon i$), $k = 1,2,\ldots,11$ export markets (note that $CH \neq k$). X_{CH}^{k} and Y_{i}^{k} are the Swiss and country i's nominal goods exports to market k (expressed in a unique currency). S_{i}^{k} is country i's market share in market k. S_{k}^{k} equals zero, as the market share of country k in its own market is not taken into account. $1 - S_{CH}^{k}$ is a normalisation factor, such that in each market k, the total share of Switzerland's competitors adds up to 100%. V_{CH}^{k} measures the importance of market k in total Swiss exports. Finally, the weight of any country i in competition with Swiss exports, $\omega_{CH,i}$ is then obtained by computing the sum of these factors over all k markets. Market shares can undergo important changes over time. Weights should therefore be recalculated on a regular basis in order to reflect developments in market positions.

Swiss trade weighted relative unit labour costs ($ULC - REER_{CH}$) are then obtained by dividing Swiss ULC by the weighted average of all foreign countries ULC expressed in Swiss francs.

$$(9)\quad ULC - REER_{CH} = \frac{ULC_{CH}}{\prod_{i \neq CH} \left(e_{i,CH} \cdot ULC_{i}\right)^{\omega_{CH,i}}}$$

where $e_{i,CH}$ corresponds to the relevant nominal exchange rate while ULC_i stands for country i's nominal unit labour costs in the manufacturing sector. As for formula (3), developments of Swiss relative unit labour costs as computed with (9) will actually reflect changes in three factors: the trade-weighted nominal exchange rate, the trade-weighted relative compensation per hour and the trade-weighted relative productivity. For the purpose of analysis, it is therefore convenient to split $ULC - REER_{CH}$ into these three components. The following formula provides the decomposition:

$$(10)\quad ULC - REER_{CH} = \frac{1}{\prod_{i \neq CH} \left(e_{i,CH}\right)^{\omega_{CH,i}}} \cdot \frac{HLC_{CH}}{\prod_{i \neq CH} \left(HLC_{i}\right)^{\omega_{CH,i}}} \cdot \frac{\left(HLP_{CH}\right)^{-1}}{\prod_{i \neq CH} \left(HLP_{i}\right)^{-\omega_{CH,i}}}$$

Data used in the calculations are described in the annex. We now move on to the results.

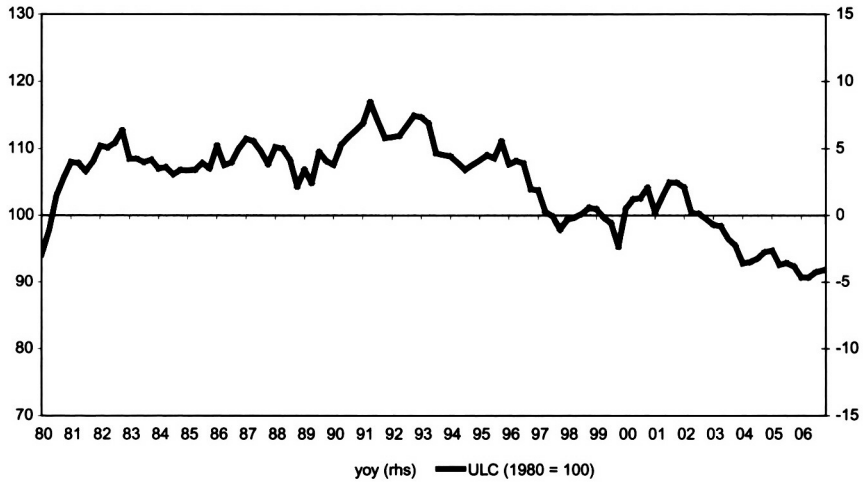
Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

4 Results

Data restrictions are the main factor which limited the selection of the trading partners considered for our computations. Our unit-labour-costs-based real exchange rate takes twelve trading partners into account: Germany, France, Italy, the UK, the US, Japan, the Netherlands, Belgium, Australia, Spain, Sweden and South Korea. All series are presented in form of indexes (annual average 1980 = 100).

We first start by looking at *ULC* developments in the Swiss manufacturing sector. Figure 2 shows their dynamics over the period 1980:1-2006:4. *ULC* increased sharply in the first three years of our sample. They then remained roughly constant for more than ten years. In the fourth quarter 1995, they were approximately at the same level as at the end of 1982, that is, some 10% above the average 1980 value. Between 1996 and 1998 and later between 2002 and 2003, *ULC* experienced two periods of significant decline. All in all, *ULC* diminished by some 20% and eventually came to lie 8% below their 1980 level.

Figure 2: Swiss manufacturing sector: unit labour costs (level and growth yoy)

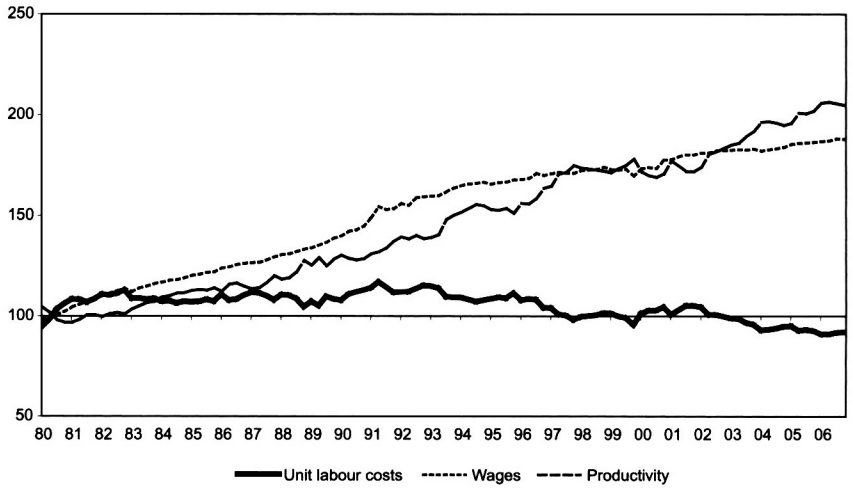


This implies that Swiss labour productivity grew faster than gross nominal wages. Figure 3 depicts the level of these two components of *ULC*. It appears that the sharp increase in Swiss *ULC* at the beginning of the 1980s was the result, on the one hand, of rising wages and, on the other, of shrinking

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

labour productivity. Between 1983 and 1996, nominal wages and labour productivity started growing at a similar pace again. It was not until 1996–98 that an acceleration in labour productivity growth brought about a downward correction of *ULC*.

Figure 3: Swiss manufacturing sector: unit labour costs and their components (1980 = 100)



Before turning to the outcome for trade-weighted relative unit labour costs, let us consider the time varying weights reported in Figure 4. Roughly speaking, the figure highlights three groups of competitors. First, Australia, Korea, Spain and Sweden can be seen as small competitors: their weights have evolved in the 2% to 5% range. It is interesting to note that, while the importance of Sweden and Australia has remained almost constant, the weights of Spain and Korea have followed a gradual upward trend between 1980 and 2006: from 2% to 5% for Spain and from 2% to 4% in the case of Korea. Second, most countries are concentrated in the 8% to 13% range. However, within this range, shifts in the relative importance of Switzerland's competitors are not unusual. Third, Germany is by far the most relevant competitor for Swiss exports. Its weight has most of the time evolved above the 15% mark. After a period of decline between 1987 and 2000, it has picked up again since the beginning of the new century, rising above 18% at the end of our sample.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Figure 4: Weighting factors for the 12 BLS countries

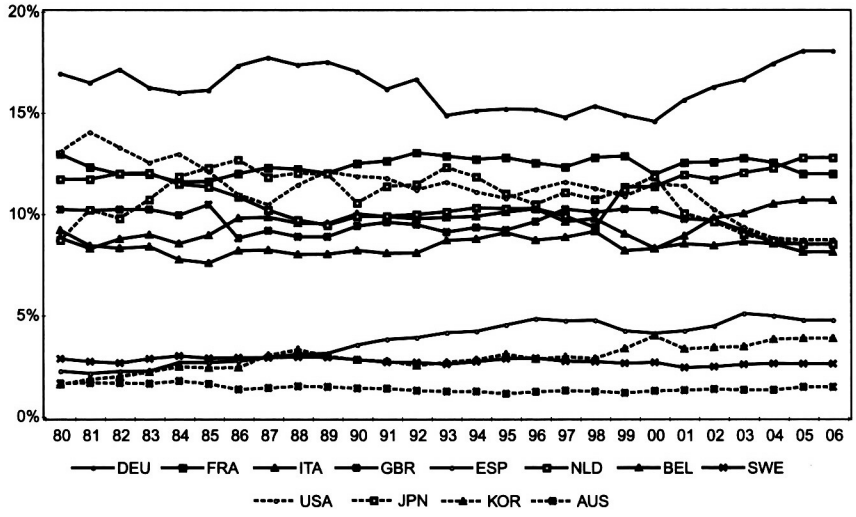
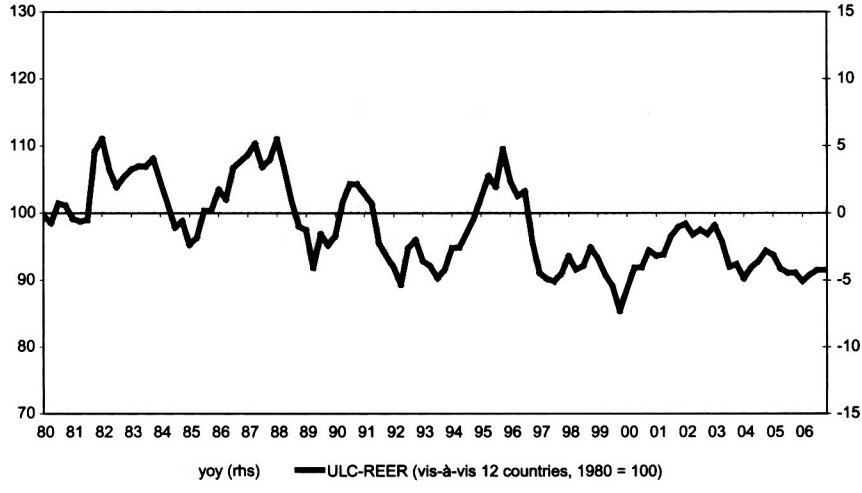


Figure 5: Trade-weighted relative unit labour costs of the Swiss manufacturing sector (level and growth yoy)



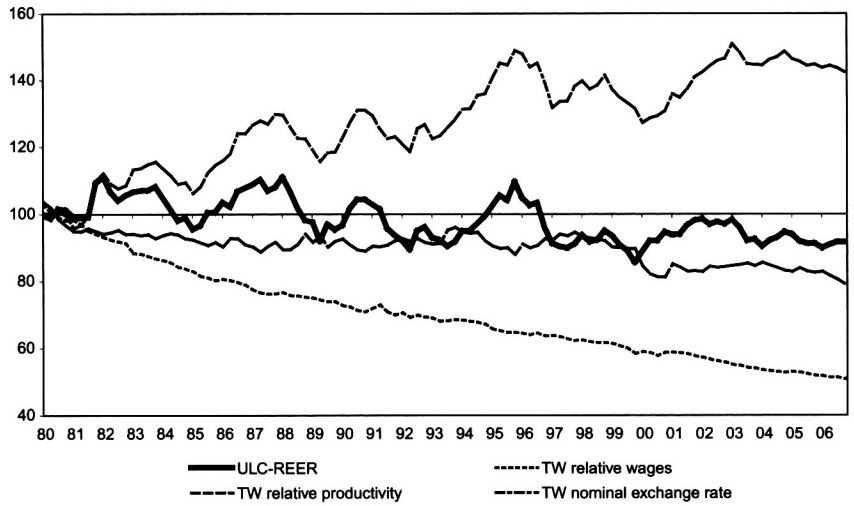
We can now shift our focus to the $ULC-REER_{CH}$ of Figure 5. Over the whole period 1980–1995, the $ULC-REER_{CH}$ has experienced continuous – and sometimes pronounced – fluctuations. Apart from this, no trend is observable. Between the end of 1995 and 1999 instead, $ULC-REER_{CH}$ followed a weakening trend. This depreciation was only partially corrected

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

thereafter. As a consequence, $ULC-REER_{CH}$ were 9% lower in 2006 than in 1980. This corresponds to an average depreciation of 0.3% p.a. As we have seen, however, most of the decline occurred in the period 1995–1999.

Figure 6 splits the developments in the $ULC-REER_{CH}$ into three components, as in formula (10). Labour productivity growth in the manufacturing sector has been weaker in Switzerland than abroad.[5] As a consequence, at the end of our sample, Swiss labour productivity was some 20% lower than in 1980, relative to the (trade-weighted) average of the selected trading partners. During the same time span, the (trade-weighted) nominal exchange rate followed a clear appreciation trend. In 2006, the CHF was some 40% stronger than at the beginning of our sample. Figure 7 shows that the appreciation of the external value of the CHF was broadly based. The only exception is provided by the CHF/JPY exchange rate.

Figure 6: Trade-weighted relative unit labour costs of the Swiss manufacturing sector and their components



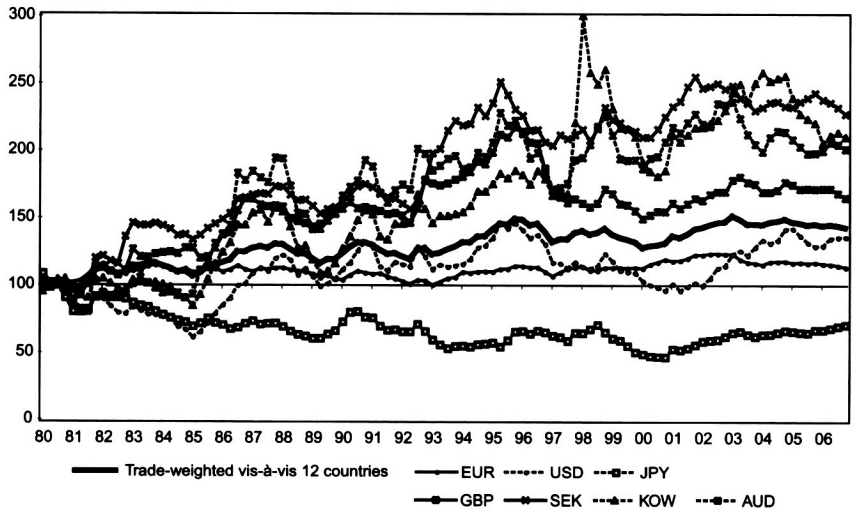
Returning to Figure 6, we note that the unfavourable developments of the nominal exchange rate and relative labour productivity were more than compensated by the smooth downward trend of relative nominal labour costs. The latter declined by 2.5% p.a.; in 2006, they were around 50% lower than in 1980. Note that this does not mean that nominal wages in the Swiss

5 A similar point was made by BRUNETTI and ZÜRCHER (2002) for the Swiss economy as a whole.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

manufacturing sector have shrunk over time. It rather reflects the fact that they have increased at a much slower pace in Switzerland than abroad.

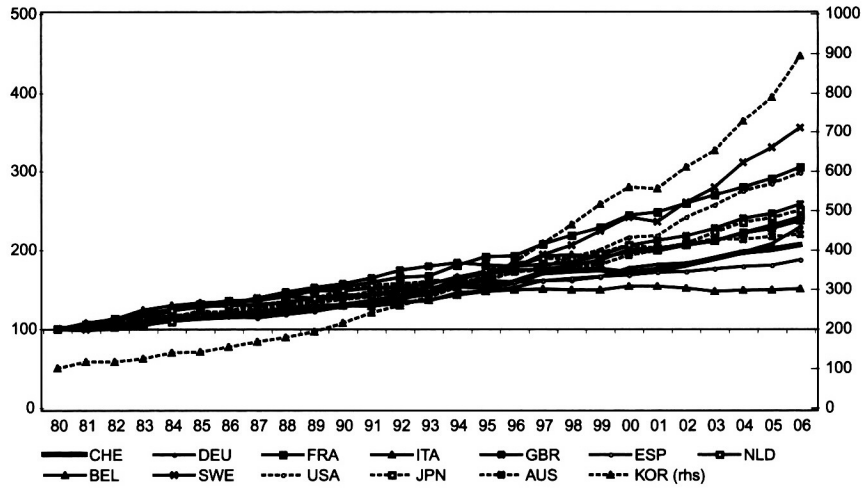
Figure 7: Indices of nominal exchange rates (1980 = 100)



Hence, the competitiveness of the Swiss manufacturing sector does not seem to rest on a permanent technological leadership. Over the last twenty-six years, only Italy and Spain display a weaker productivity performance. Germany and Australia produced results similar to those of Switzerland. The eight remaining countries have recorded significantly higher labour productivity growth. The corresponding data are reported in Figure 8.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

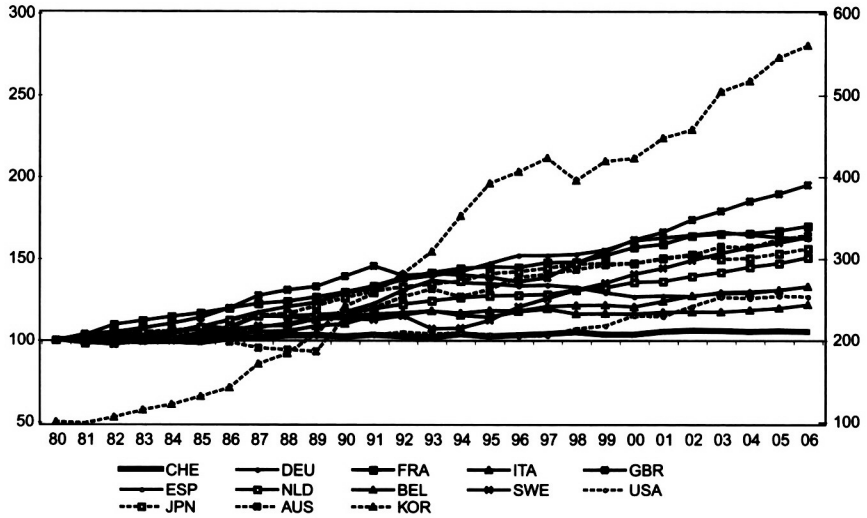
Figure 8: Productivity indices in manufacturing (1980 = 100)



Wage moderation is thus the key explanation for the decline in the Swiss $ULC–REER_{CH}$. One could argue that this might be due to CPI inflation differential across countries: nominal wage growth has been slower than abroad because Swiss CPI inflation is lower. The joint observation of Figures 8 and 9 shows that there is more than that. On the one hand, as we have already seen, Swiss labour productivity evolved below average but nonetheless remained close to the developments observed in several other countries. On the other hand, the Swiss manufacturing sector has seen lower real wage increases than in any of the other countries considered for our computation. In other words, our results suggest that the decline in the $ULC–REER_{CH}$ is essentially explained by the fact that real wages in the Swiss manufacturing industry grew more moderately than labour productivity. This explains, in turn, the moderation of nominal wage developments.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Figure 9: Indices of real wages (1980 = 100)



Figures 10–21 in our annex show the behaviour of the bilateral $RULC_{CH,i}$. There are quite substantial differences across countries. Swiss *ULC* declined significantly vis-à-vis the German, Italian, British, Spanish, Australian and Japanese *ULC*. The decline is significant but less pronounced relative to the Dutch, Australian and Korean *ULC*. They increased vis-à-vis the French, US and Belgian and even more so relative to Swedish *ULC*, particularly due to the sharp appreciation of the CHF/SEK exchange rate between 1992 and 1995.

5 Concluding remarks

Relative unit labour costs are a widely used measure of short-term competitiveness. Like any other indicator of their kind, they are not free of shortcomings and certainly cannot claim to address all relevant aspects of the competitiveness issue. They must therefore be seen as one piece of information in a wider context. Compared with other competitiveness indicators, however, relative unit labour costs have the advantage of being reasonably well-defined.

Over the period 1980:1–2006:4, our relative unit labour costs series for Switzerland displays a 9% decline, leading to a corresponding improvement in the country's competitiveness position. This result differs from that implied

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

by the standard, CPI-based, measure of the Swiss real exchange. The latter actually appreciated by some 10% during the period under review. Our results also differ from previous estimates of Swiss trade-weighted relative unit labour costs, particularly those in BÄRLOCHER (1994) and more recently in IMF (2006a and 2006b). We claim that discrepancies are essentially due to the improvements in the quality of the data we use.

Between 1980 and 1995, the labour-costs-based real exchange rate exhibited large fluctuations around a stationary level. Subsequently, it depreciated. A breakdown signals that the downward movement was essentially driven by a decline in relative nominal wages. This phenomenon more than offsets the negative influence of an appreciating nominal exchange rate and of below-average labour productivity growth. In turn, the decline in relative wages is explained by an increase in real wages in Swiss manufacturing, which was less rapid than the domestic labour productivity gains. In other words, Swiss manufacturing firms seem to have exploited productivity gains to favour cuts in their (relative) final-product prices.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

References

AIGINGER, KARL (1997), The Use of Unit Values to Discriminate between Price and Quality Competition, *Cambridge Journal of Economics,* 21(5), pp. 571–92.

ANDRIST, FELIX (1989), Entwicklung der Arbeitsproduktivitäten der Schweiz 1975–1988, *Geld, Währung und Konjunktur,* Quartalsheft der Schweizerischen Nationalbank, pp. 155–163.

ARVANITIS, SPYROS, HEINZ HOLLENSTEIN and DAVID MARMET (2005), *Internationale Wettbewerbsfähigkeit: Wo steht der Standort Schweiz?,* KOF/ETH, Zürich.

ARVANITIS, SPYROS and DAVID MARMET (2000), *Die preisliche Wettbewerbsfähigkeit der schweizerischen Wirtschaftszweige,* Strukturberichterstattung Nr. 1. Staatsekretariat für Wirtschaft, Bern.

BÄRLOCHER, JUERG (1994), Lohnstückkosten in der Industrie – Ein internationaler Vergleich, *Konjunktur,* Monatsbericht der Konjunkturforschungsstelle der ETH Zürich, 57(7/8), pp. 13–23.

BOLTHO, ANDREA (1996), The assessment: International competitiveness, *Oxford Review of Economic Policy,* 12(3), pp. 1–16.

BRUECK, TILMAN, UHLENDORFF ARNE and MATTE WOWERIES (2004), Lohnkosten im internationalen Vergleich, *Wochenbericht,* DIW, Berlin.

BRUNETTI, AYMO and BORIS A. ZUERCHER (2002), *Das tiefe Wachstum der Schweizer Arbeitsproduktivität,* Diskussionspapier Seco, Nr. 4.

BUREAU OF LABOR STATISTICS (2006), Internet: http://stats.bls.gov/fls/flsbkgrd.htm (as of 20 December 2006).

CHOW, GREGORY, and AN-IOH LIN (1971), Best Linear Unbiased Interpolation, Distribution and Extrapolation of Time Series by Related Series, *The Review of Economics and Statistics,* 53(4), pp. 372–375.

DEUTSCHE BUNDESBANK (1998), Zur Indikatorqualität unterschiedlicher Konzepte des realen Aussenwerts der D-Mark, *Monatsbericht,* November, pp. 41–55.

DURAND, MARTINE and CLAUDE GIORNO (1987), Indicators of International Competitiveness: Conceptual Aspects and Evaluation, *OECD Economic Studies,* No 9, Autumn, pp. 147–182.

DURAND, MARTINE, CHRISTOPHE MADASCHI and FLAVIA TERRIBILE (1998), Trends in OECD Countries International Competitiveness: The Influence of Emerging Market Economies, *OECD Economics Department Working Papers,* No. 195, Internet: http://www.oecd.org/dataoecd/34/47/1864948.pdf (as of 20 December 2006).

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

HALL, ROBERT E. and CHARLES I. JONES (1999), Why do some countries produce so much more output per worker than others?, *Quarterly Journal of Economics,* 114 (1), pp. 83–116.

HINZE, JUERG (1998), *Problematik internationaler Arbeitskostenvergleiche,* Wirtschaftsdienst HWWA, Hamburg.

IMF (2006a), *International Financial Statistics,* Washington D.C.

IMF (2006b), *World Economic Outlook,* Washington D.C.

KOEHLER-TOEGLHOFER, WALPURGA (1999), Berechnung effektiver Wechselkursindizes als Indikatoren der Wettbewerbsfähigkeit, *Österreichische Nationalbank Berichte und Studien,* Vol. 1, pp. 104–127.

KRUGMAN, PAUL (1996), Making Sense of the Competitiveness Debate, *Oxford Review of Economic Policy,* 12(3), pp. 17-25.

Krugman, Paul (1994), Competitiveness: A Dangerous Obsession, *Foreign Affairs,* 73(2), pp. 28-44.

LEPRON, KARIN and PAUL SCHREYER (1998), *Relative Trade-Weighted Unit Labour Costs by Industry,* STI Working Papers, No.1, OECD, Paris.

MARSH, IAN W. and STEPHEN P. TOKARICK (1996), An Assessment of Three Measures of Competitiveness, *Weltwirtschaftliches Archiv,* 132(4), pp 719–734.

NEARY, J. PETER (2006), Measuring Competitiveness, *IMF Working Paper,* No. 06/209.

OECD (2001), *Measuring Productivity – OECD Manual,* Paris.

OECD (2007), *Main Economic Indicators,* March, Paris.

SWISS NATIONAL BANK (2007), *Monthly Statistical Bulletin,* No. 82.

TURNER, ANTHONY G. and STEPHEN S. GOLUB (1997), Towards a System of Multilateral Unit Labor Cost-Based Competitiveness Indicators for Advanced, Developing and Transition Countries, *IMF Working Papers,* No. 151, Washington D.C..

VAN ARK, BART, EDWIN STUIVENWOLD and GERARD YPMA (2005), *Unit Labour Costs, Productivity and International Competitiveness,* University of Groningen, Research Memorandum, N. 80.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Annex: figures

Figure 10: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Germany

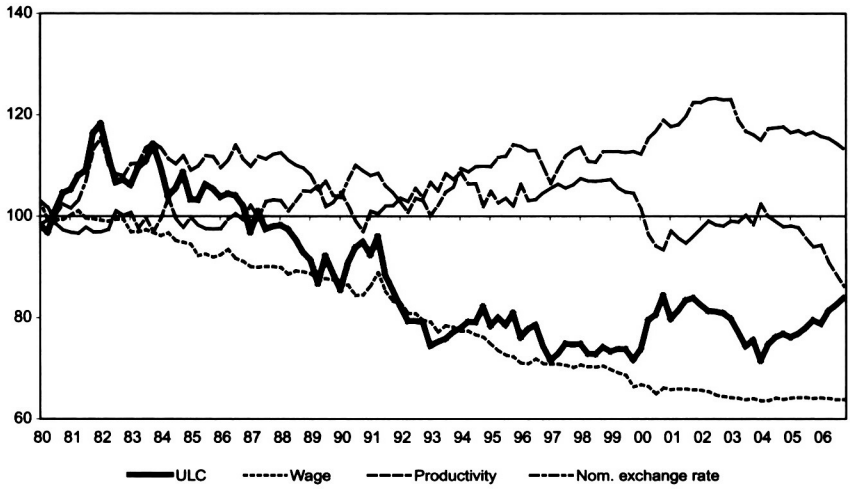
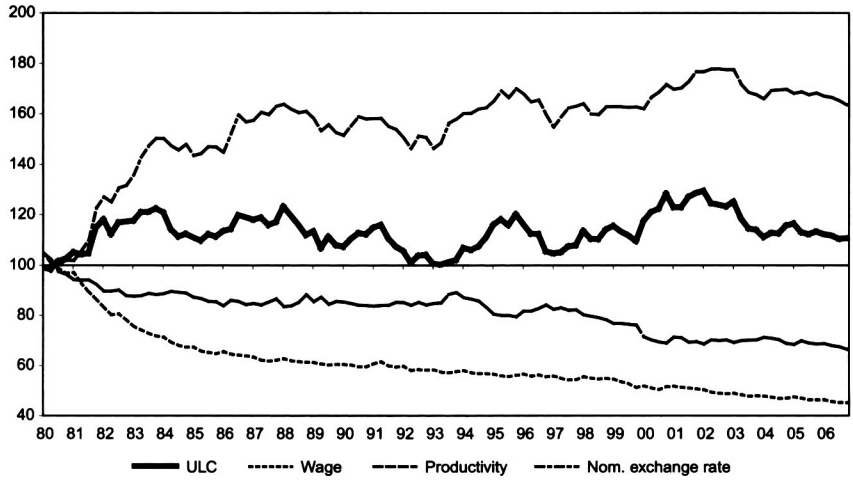


Figure 11: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to France



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Figure 12: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Italy

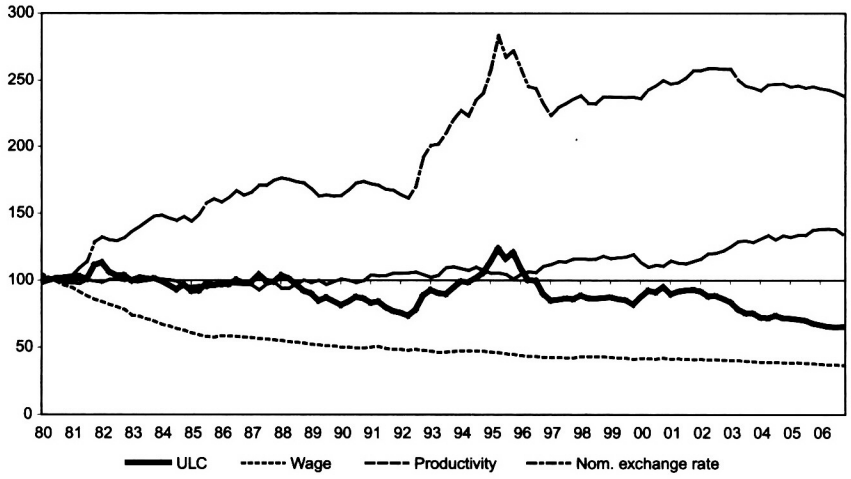
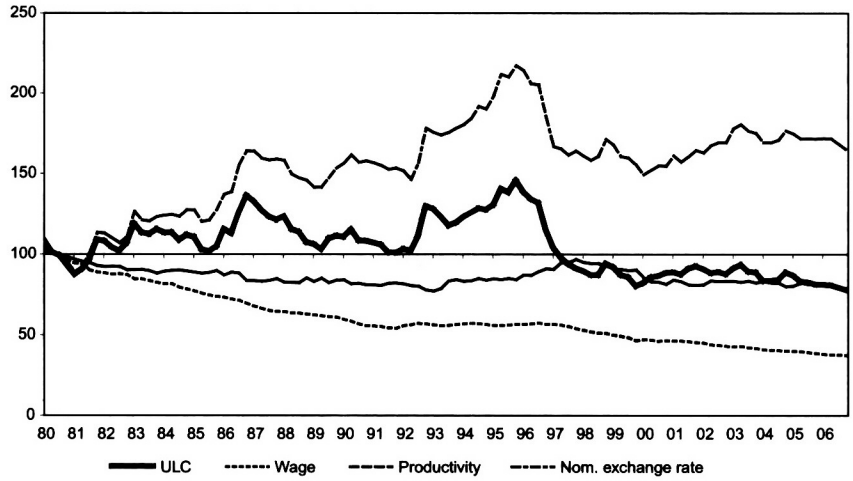


Figure 13: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Great Britain



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Figure 14: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Spain

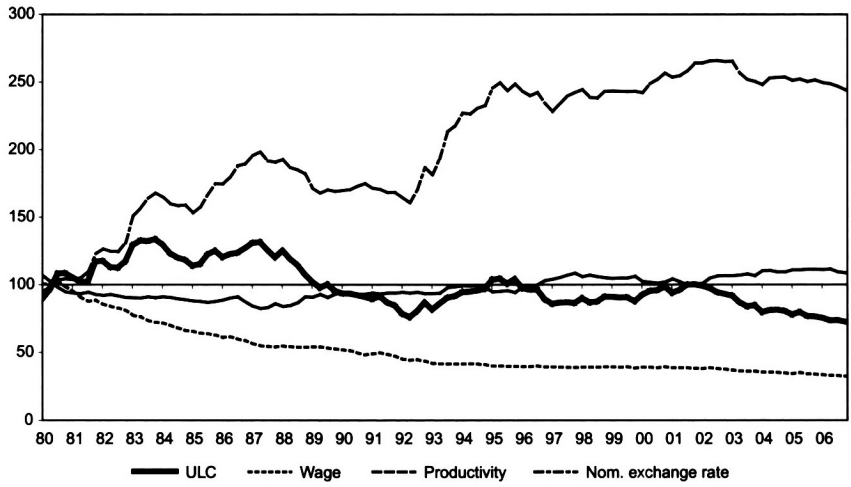
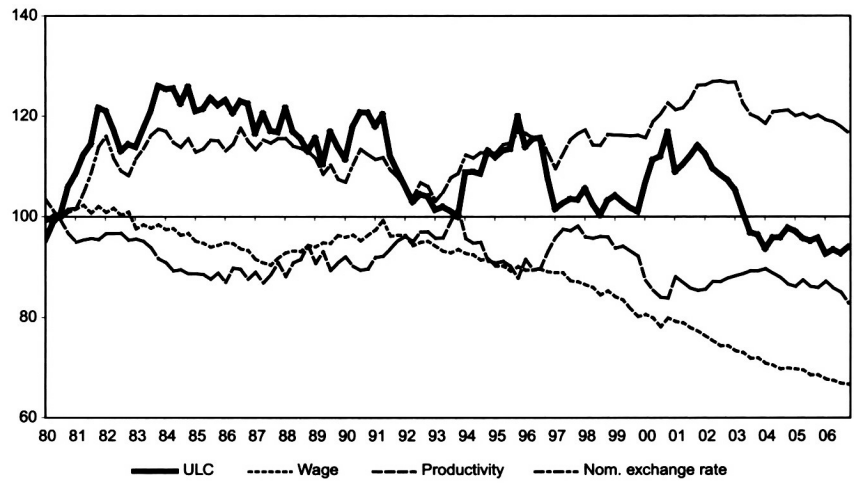


Figure 15: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Netherlands



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Figure 16: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Belgium

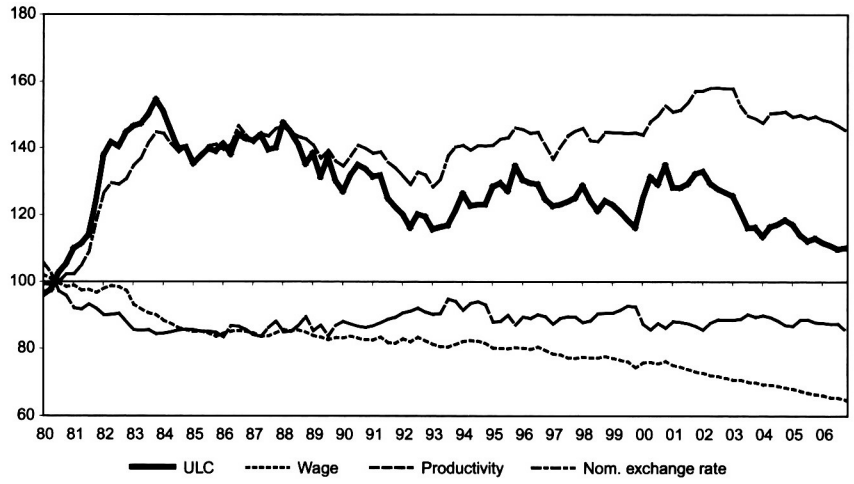
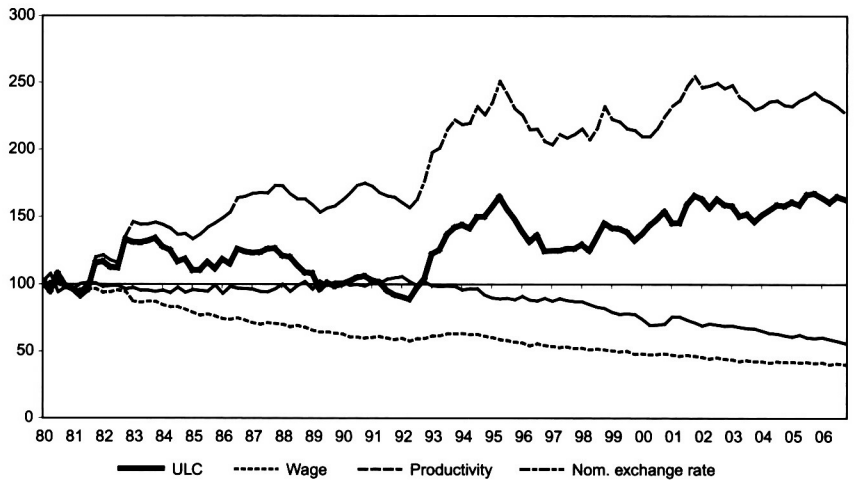


Figure 17: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Sweden



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Figure 18: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to the USA

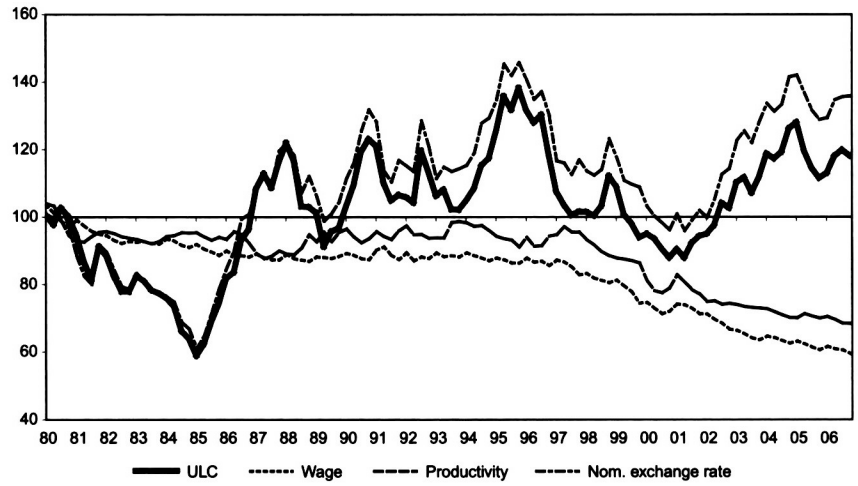
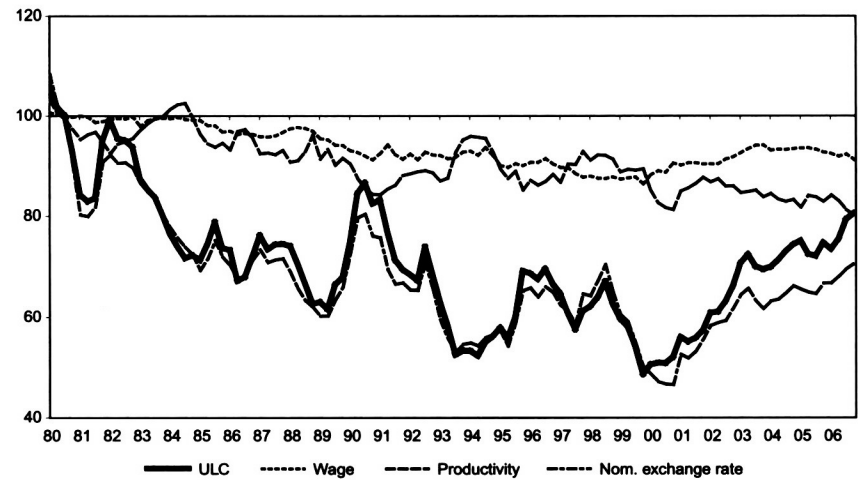


Figure 19: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Japan



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Figure 20: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Korea (South)

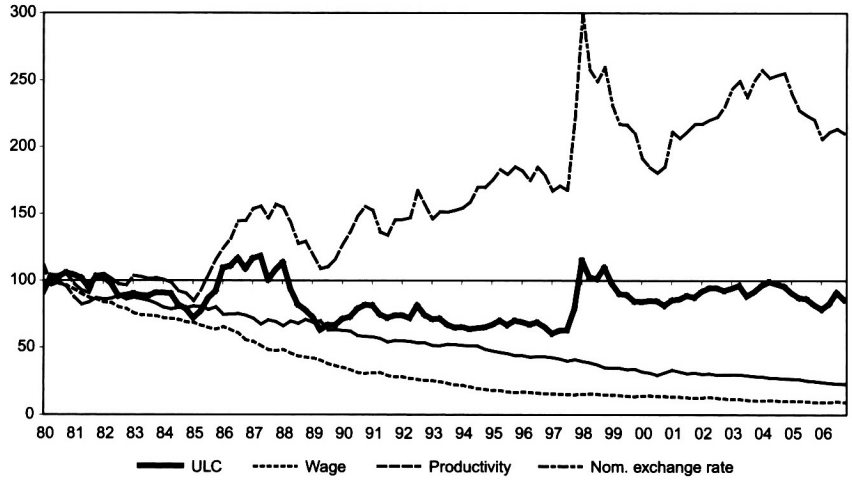
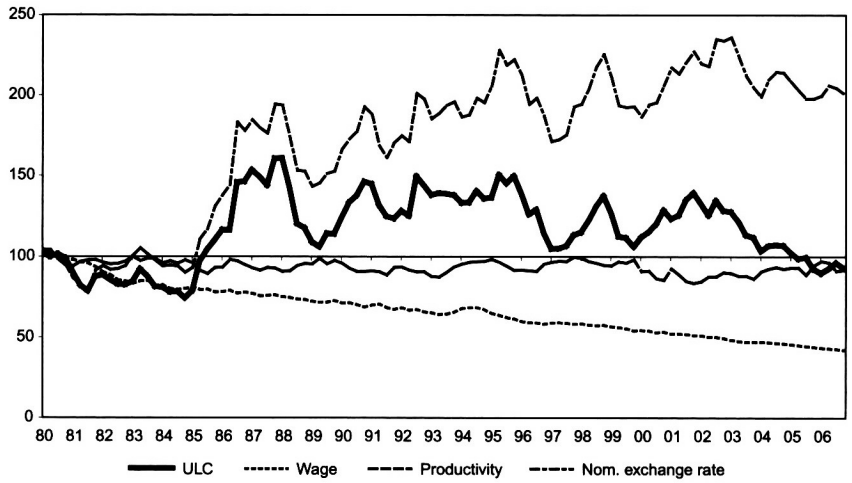


Figure 21: Unit labour costs of the Swiss manufacturing sector and their components (1980 = 100), relative to Australia



Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Annex: Data

Hereafter we present our data sources. As far as Swiss data are concerned, it is worth pointing out that the quality of our data set improves after 1991, particularly with respect to hours worked. With the introduction of a new labour force survey, the Swiss Federal Statistical Office (SFSO) has been able to produce annual estimates of the amount of hours worked in the different industries.

Swiss Data

Value added
Swiss real value added in the manufacturing sector is estimated by the Seco (State Secretariat for Economic Affairs) on a quarterly basis. Data currently cover the period 1981:1–2006:4 and were released in March 2006 for the first time. For the year 1980, only an annual figure is available. We obtained four quarterly figures by applying the CHOW-LIN procedure[6] using industrial production as a related series.

Hours worked
Hours worked in the industrial sector are available within the Annual Statistics on Labour Volumes (SFSO, *Arbeitsvolumenstatistik*) for the period 1991–2005. We used the series on actual hours worked, that is, the standard working time plus overtime minus absences. Higher frequency data were obtained by applying the CHOW-LIN procedure using a series on hours worked in the whole economy as related series. The SNB currently disposes of such a series for the period 1975:1–2007:3.

For the period before 1991, we used figures on annual hours worked per person stemming from the 1980 and 1990 Swiss population surveys. These data were corrected for changes in the average number of days of holiday leave and military service according to ANDRIST (1989) and were then linearly interpolated. The total number of hours worked in the manufacturing sector is obtained by multiplying the latter data by the SFSO employment figures.

Wages
Annual data concerning wage developments in the manufacturing sector are available at the SFSO for the period 1980–2006 (wage index). We ob-

6 See CHOW and LIN 1971.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

tained quarterly figures by applying the CHOW-LIN procedure. Nominal hourly wages in the whole economy were used as the quarterly reference series. Note that we corrected all quarterly data entries in the years in which changes in the legal social insurance contributions occurred. It must also be stressed that this wage index does not take one-off payments – such as bonus remunerations – into account. Consequently, it must be considered as a pure price or cost index rather than a labour income measure.

Foreign data

The choice of the trading partners to include in our computation resulted from the best possible combination of two guiding principles: comprehensiveness and data quality. We started by selecting all countries which, in 2006, represented 1% or more of Swiss goods exports. Nineteen countries meet this criterion. Quality, however, turned out to be a more binding criterion. Data had to be widely comparable in terms of their definition. In particular, for a correct comparison of labour productivity, data on hours worked in the manufacturing sector were needed. After evaluating different alternatives, we chose to operate with a database of the US Bureau of Labour Statistics (BLS 2006). We were eventually left with a list of twelve countries: Germany, France, Italy, the UK, the US, Japan, Sweden, the Netherlands, Belgium, Spain, Australia and South Korea. Together these markets account for 68% of Swiss goods exports.

The BLS database contains annual data on wages, hours worked, value added and labour productivity in the manufacturing sector for all these (and four additional) countries. For some countries, the time series go back to 1950. However, only annual values are provided. As we were aiming to construct a quarterly series, annual figures were transformed into quarterly observations by applying the CHOW-LIN procedure. Manufacturing production was used as a related series for manufacturing value added; similarly, manufacturing employment was used for hours worked and the hourly compensation in the whole economy for wages. Related series are taken from the OECD MEI database.

Weighting scheme

For the computation of the weighting factors, we used annual data on nominal export flows across all relevant countries from the IMF's Direction of

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Trade Statistics. All data are denominated in a common currency, the US dollar.

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.

Autoren – Authors

Prof. Dr. oec. Heinz Hauser
SIAW
Universität St.Gallen
Bodanstrasse 8
CH-9000 St.Gallen
heinz.hauser@unisg.ch

Claudia Franziska Brühwiler, M.A. HSG
Kulturwissenschaftliche Abteilung KWA-HSG
Universität St. Gallen
Gatterstrasse 1
CH-9010 St. Gallen
claudia-franziska.bruehwiler@unisg.ch

Lic. rer. pol. Christoph Meyer
Swiss National Bank
Boersenstrasse 15
Postfach
CH-8022 Zurich
christoph.meyer@snb.ch

Dr. Attilio Zanetti
Swiss National Bank
Boersenstrasse 15
Postfach
CH-8022 Zurich
attilio.zanetti@snb.ch

Dipl. Kulturwirt Jörg Husar
Stiftung Wissenschaft und Politik
Ludwigkirchplatz 3–4
D-10719 Berlin
Joerg.Husar@swp-berlin.org

Dr. des. Stormy Mildner (M.Sc.)
Stiftung Wissenschaft und Politik
Ludwigkirchplatz 3–4
D-10719 Berlin
Stormy-Annika.Mildner@swp-berlin.org

Reproduced with permission of the copyright owner. Further reproduction prohibited without permission.