The Evolution of Factor Shares: Evidence from Switzerland

Baldi, Guido and Pons, Martina

February 2019

The Evolution of Factor Shares: Evidence from Switzerland*

Guido Baldi [†] Martina Pons [‡]

February 2019

Abstract

While the labor share of income has decreased in most advanced economies since the 1980s, it has remained relatively stable in Switzerland. However, this does not imply that the capital share of income has also remained stable. Our results suggest that the share of imputed capital rental payments to income has decreased. Similar to other countries, Switzerland has seen an increase in the so-called factorless income share that cannot be readily attributed to capital and labor. The increase in factorless income may reflect a rise in economic rents, higher compensation for business risks, or increased compensation for unmeasured input factors, especially intangible capital. We find that the stable labor share in Switzerland cannot be traced back to high wage growth, but rather to subdued investment growth and a high growth rate of the labor force.

JEL classification: E01, E22, E23, E25
Keywords: Labor Share, Capital Share, Factorless Income, Return to Capital.

---

*Funding for this research was provided by The Sustainable Development at Universities Programme of the Swiss Academies of Arts and Sciences. The views expressed in this paper are those of the authors and not necessarily those of the Swiss Academies of Arts and Sciences or the institutions to which the authors are affiliated. All errors are our own.

†University of Bern, Department of Economics, Schanzeneckstr. 1, CH-3012 Bern, Switzerland; German Institute for Economic Research (DIW Berlin), D-10108 Berlin, Germany; reatch – research and technology in switzerland, Binzstrasse 12, 8045 Zürich, Switzerland; Global Labor Organization (GLO), Essen, Germany. Email: guido.a.baldi@gmail.com.

‡University of Bern, Department of Economics, Schanzeneckstr. 1, CH-3012 Bern, Switzerland; reatch – research and technology in switzerland, Binzstrasse 12, 8045 Zürich, Switzerland. Email: martina.pons@reatch.ch.

1 Introduction

In recent decades, the labor share of income - that is, the proportion of national income that is paid to workers - has been declining in many advanced economies (International Labour Organization, 2015). The decline of the labor share has often been interpreted as implying an increase in the capital share. Recent studies, however, find that the fall in the labor share has not been offset by an expansion in the capital share (see, for example, Karabarbounis and Neiman (2013) or Barkai (2016)). Barkai (2016) suggests that the decrease of both the capital share and labor share has been offset by an increase in a residual that may comprise compensations to other factor inputs. Karabarbounis and Neiman (2018) interpret this residual as factorless income. This factorless income may include unmeasured returns to intangible capital, risk compensation, or precautionary corporate savings in addition to profits.

We aim to provide estimates for the evolution of the Swiss capital and factorless income shares since the 1990s. Recent studies propose methodologies to compute income shares for capital in a narrow sense, and one for factorless income or capital in a broader sense (Barkai, 2016; Karabarbounis and Neiman, 2018). When calculating the capital share, the selection of the model and the assumptions used to calculate it are crucial since the methodology to estimate the required rate of return largely determines changes in the capital share. Barkai (2016) used market prices to compute the cost of capital, thus allowing for changes in the required rate of return. We follow this approach to derive the required rate of return and capital costs, which are then used to calculate the capital share of income and the share of the residual that may - as discussed above - include profits or an unmeasured compensation for intangible capital.

Our findings suggest that the Swiss capital and factorless income shares have substantially changed since the 1990s. The calculations show that imputed capital rental payments have fallen considerably. Since the capital stock has not increased enough to compensate for the drop in the required rate of return, the capital share has substantially decreased since 1991. This decline has been offset by an increase in the share of factorless income.

We then focus on the mechanisms that could explain the development of factor shares since the beginning of the 1990s. While the Swiss labor share has remained rather stable over the past several decades according to data and studies available (see, also Cho et al. (2017); OECD (2018)), this does not imply that Swiss workers have experienced higher wage growth than workers in other advanced economies. The constancy of the Swiss labor share rather reflects weak investment growth and a considerable increase in the Swiss labor force, which has resulted in a decline in the capital-to-output ratio.

The remainder of this paper is organized as follows. In section 2, we provide an overview of the current literature on the labor and capital shares and the impact of the changes in factor shares. In section 3, we present the model that is used to calculate the capital and factorless income shares. This is followed in section 4 by an overview and short analysis of the data for the Swiss economy. In section 5, the results of our computations of the required rate of return, capital share, and factorless income since the beginning of the 1990s are presented and discussed. Finally, section 6 contains the conclusions.

2 Literature Review

In most advanced economies, the labor share of income had remained remarkably constant until the 1980s. However, in the last few decades, a continuous decline has been observed by many authors (see, for example, Karabarbounis and Neiman (2013)).[1] At the same time, technological progress has had a strong impact on many economies; and this is giving rise to questions about the consequences and implications for the future (Brynjolfsson and McAfee, 2014).

In the literature, a variety of explanations and triggers for the fall in the labor share have been presented (see, for instance, Bentolila and Saint-Paul (2003); Elsby et al. (2013); Karabarbounis and Neiman (2013); Dorn et al. (2017); Dao et al. (2017)). These explanations include a decrease in the relative price of investment goods relative to consumption goods, globalization and international trade, increasing concentration and the rise of superstar firms,

[1] However, one should stress that there are various measurement issues related to the computation of the labor share. The use of alternative measures may considerably affect the strength of the decline in the labor share, and even the existence of a decline for some countries. For an overview, see, e.g., Cho et al. (2017).

an increase in market power, changes in the capital-output ratio, productivity growth outpacing wage growth, and changes in the bargaining power of employees.

Many of these possible drivers are related to technological change. According to Karabarbounis and Neiman (2013), technological progress has decreased the relative cost of capital leading to an increase in capital intensity. They find that economies experiencing a higher decrease in prices of investment goods were also affected by a more substantial contraction in the labor share. Furthermore, there is evidence that the decline is due to changes within sectors rather than shifts in the economic structure (see, for example, Rodriguez and Jayadev (2010); Karabarbounis and Neiman (2013)).

Elsby et al. (2013) note that the relative prices hypothesis cannot fully explain the decline in the labor share in the United States. They find that when the labor share faced the most substantial decline there was no acceleration in the growth rate of capital stock, but also that in the same period wages and labor productivity were stagnating. Furthermore, at the industry level, increased imports had adverse effects on the industry-level labor share.

The International Labour Organization (2015) focuses on the development of wages and labor productivity to explain the change in labor share. When labor productivity grows faster than wages, the labor share decreases. The International Labour Organization argues that this played a role in the declining labor share in several developed nations; however, this trend has not been observed across all industries.

In the context of technological change, the rise of so-called *superstar* firms has also been discussed in the literature (Dorn et al. (2017)). New technologies such as the Internet might have disproportionally fostered the emergence of these superstar firms and increased their market share, leading to higher concentration. Dorn et al. (2017) note that since these firms are bigger, more prosperous, and more productive, they will have a lower labor share; and conclude that the total labor share decreases as these firms expand.

Karabarbounis and Neiman (2013) provide another hypothesis that allows for changes in market power. They study the link between the capital and labor shares and conclude that when markups are constant, a decrease in the labor share will result in a one-to-one increase in the capital share. However, Karabarbounis and Neiman find that the capital share has not increased enough to compensate for the decline in the labor share, and in many countries, both the capital and labor share have decreased, thus, providing some evidence that markups might have increased.

Barkai (2016) presents similar results. He calculates the capital share for the United States using three different specifications of the required rate of return. He finds a 20 to 30 percent decline in capital share, which is even more substantial than the decrease in the labor share. He concludes that the only explanation for a simultaneous contraction in both the labor share and capital share would be an increase in markup since a decrease in the labor share brought by changes in relative prices, technology, and preferences would lead to a one-to-one increase in the capital share. More specifically, Barkai notes that changes in relative prices, technology or preferences cause the labor share to decrease (increase) and the capital share to increase (decrease) by the same proportion. By contrast, if the decline of the labor share is not entirely offset by an increase in the capital share, but mostly by an increase in the profit share (what we call more broadly factorless income share), then a combination of changes in preferences, production technology, or relative prices as well as competition might have caused the shift (Barkai, 2016).

How the labor share and capital share respond to an increase in factorless income depends on the elasticity of substitution between the two inputs; namely, to what extent capital can substitute labor. To give an illustration, under the assumption of a unitary elasticity of substitution, when the capital-to-output ratio increases, the rate of return to capital declines by the same amount, thus capital share remain constant (Piketty, 2017). If the elasticity of substitution is smaller (larger) than one, then the share of the factor that becomes more abundant will decrease (increase) (Romer, 2012). In other words, if the elasticity of substitution is smaller than one, an increase in the capital-to-output ratio causes the rate of return to capital to fall more strongly, which implies a decrease in the capital share (Piketty, 2017). However, Piketty (2017), argues that in the data, a relative increase in capital leads to a decrease in the la-

bor share, which would suggest an elasticity of substitution greater than one. However, most studies find an elasticity of substitution below one (Alvarez-Cuadrado et al., 2017), although there is still an intense debate and estimates range from largely smaller than unity (Antras, 2004; Klump et al., 2007), unity (Balistreri et al., 2003), to larger than one (Piketty, 2017; Karabarbounis and Neiman, 2013).
Changes in factor shares can have considerable welfare implications as they determine how income is divided among factors of production. Karabarbounis and Neiman (2013) explain that the repercussions are conditional on the root causes of the changes. They estimated the effect of different shocks in two distinct economies; one characterized by a Cobb-Douglas production function, and the other by a CES production function with an elasticity of substitution of 1.25. By construction, a decrease in the relative prices of investment goods has an effect on capital and labor shares only in the CES economy. Karabarbounis and Neiman illustrate that the labor share decreases at the expense of the capital share whereas consumption, investment, and GDP increase. Thus, overall there are substantial positive welfare effects. By contrast, an increase in markup decreases the labor and capital shares and leads to a rise in the factorless income share in both economies; consequently, consumption, investment, GDP, and welfare decrease (Karabarbounis and Neiman, 2013).

The International Labour Organization (2015) notes that a lower labor share, which implies lower labor costs, could allow for more productive investments, which could lead to higher employment rate. However, this outcome has not materialized. On the contrary, the so-called factorless income share - often interpreted as profits - has increased, and this shift has not led to higher investment rates. Possible explanations are an over-proportional expansion in profit in the financial and other sectors and the weak aggregate demand for productive investments (International Labour Organization, 2015).

Despite the possibility that the effect of the change in factor shares could eventually increase efficiency, not every individual will necessarily be better off. The consequences of the trend for the different segments of a society are more complex. According to Karabarbounis and Neiman (2013), if individuals are endowed with a different set of skills that have a different elasticity of substitution with capital, the decline in labor share could influence the income distribution. Furthermore, Piketty (2017) and the International Labour Organization (2015) note that if capital share increases, inequality is also likely to grow, as capital is over proportionately distributed at the top of society. Addionally, as a consequence of the contraction in the labor share, households could be excluded from the gains of economic growth, thus leading to a higher polarization of society (International Labour Organization, 2015). It is, therefore, crucial to understand the dynamic behind changes in factor shares to correctly assess possible consequences and, if necessary, intervene efficiently.

3 The Model

This section discusses the model used to derive the capital and factorless income share. The derivation heavily draws from Barkai (2016). To calculate the capital share, a specification for the required rate of return is needed.[2] Like Barkai (2016), we use the following specification for the required rate of return on capital, which assumes that capital investment is financed by borrowing.

$$R_s = i^D - \mathbb{E}[\pi_s] + \delta_s \tag{1}$$

Where R_s is the required rate of return on capital of type s, i^D is the cost of debt borrowing in the financial market, $\mathbb{E}[\pi_s]$ is the expected inflation rate on capital of type s, and δ_s is the depreciation rate on the specific capital type. Capital costs of the capital of type s, E_s, are equal to the required rate of return on assets of type s, R_s, multiplied by the quantity of capital of type s, K_s, and the price of capital of type s, P_s^K

$$E_s = R_s P_s^K K_s \tag{2}$$

where $P_s^K K_s$ is the capital stock of type s at current prices. Aggregate capital costs, E, are the sum of all capital costs over all different types of capital.

$$E = \sum_s R_s P_s^K K_s \tag{3}$$

The aggregate required rate of return, R, is computed as a weighted average of the required rate of return on capital for all the different types of assets.

$$R = \sum_s \frac{P_s^K K_s}{\sum_j P_j^K K_j} R_s \tag{4}$$

[2] *The required rate of return is defined as the minimum rate of return on investment necessary to make it acceptable to a business (Hashimzade et al., 2017).*

By inserting equation (6) in (5) capital costs can be written as

$$E = \sum_s R_s P_s^K K_s = \sum_s \frac{P_s^K K_s}{\sum_j P_j^K K_j} R_s \cdot \sum_s P_s^K K_s \tag{5}$$

The capital share, S_K, is defined as the share of total capital costs, $\sum_s R_s P_s^K K_s$, in nominal gross value added, $P^Y Y$.

$$S^K = \frac{\sum_s R_s P_s^K K_s}{P^Y Y} \tag{6}$$

Similarly, labor share, S_L, is the share of total labor costs in nominal gross value added, $P^Y Y$.

$$S^L = \frac{wL}{P^Y Y} \tag{7}$$

Where w is the wage level, and L is the labor input.
Gross value added is defined as the value of gross output less intermediate input (Rognlie, 2016). By making similar assumptions as Barkai (2016) we specify the nominal gross value added in year t as

$$P_t^Y Y_t = w_t L_t + R_t P_{t-1} K_t + \Pi_t \tag{8}$$

where $w_t L_t$ is the labor expenditure in year t, $R_t P_{t-1} K_t$ is the nominal capital cost in year t, and Π_t is nominal factorless income. Diving equation (8) by the gross value added, $P_t^Y Y_t$, gives

$$1 = S_t^L + S_t^K + S_t^\Pi \tag{9}$$

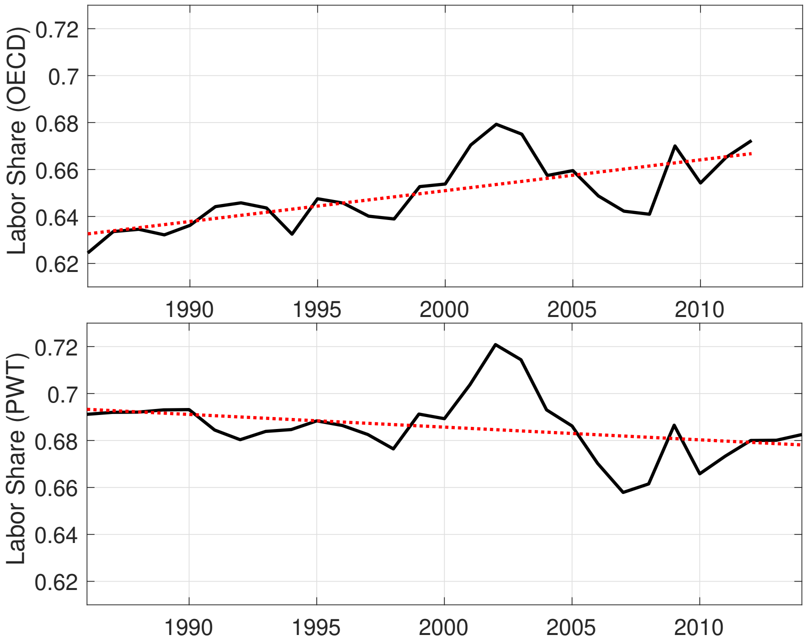
where S_t^Π is the factorless income share in year t. Thus, it must hold that the sum of the capital, labor and factorless income shares equals one. Similarly to Barkai (2016) the capital and factorless income shares in gross value added are calculated without considering taxes on production and import as well as subsidies. Thus, once the capital share has been calculated, the factorless income share is computed as a residual, namely everything that is neither allocated to capital nor to labor.

4 Data

Two different time series containing labor share are used. The Penn World Table (henceforward PWT) provides different specifications some of which also include mixed-income.[3] We chose the specification that splits mixed-income

[3]Mixed Income is defined as the total earnings of self-employed (Inklaar and Timmer, 2013). For more information see Feenstra et al. (2017) and Inklaar and Timmer (2013).

Figure 1: Labor Share (Source: See Section 4 and Appendix A.)

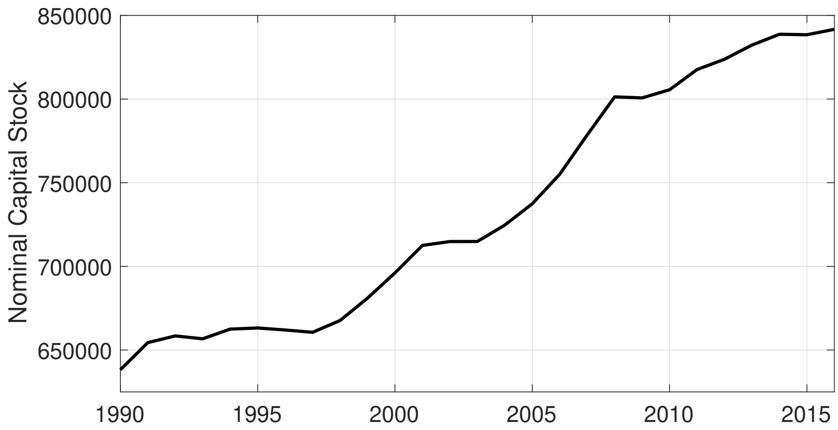


between capital and labor in the same fraction as the economy as a whole. Thus, the labor share is calculated as the share of labor compensation, including part of mixed-income, in GDP at current national prices. The second series containing the labor share is taken from the OECD and is computed by diving labor costs by nominal GDP. The series of OECD include yearly data from 1986 until 2012, although the first four observations are estimated, and the series of the PWT covers the period 1986-2014 where data for the years 1986-1994, and 2013-2014 are estimated. Since we calculate the factor income shares in gross value added, we rescaled the labor share series.

As it is possible to see in Figure 1, the two series exhibit some differences. The specification of the PWT is slightly higher; however, the series converge over time. The labor share of the OECD tends to increase slightly while the one of the PWT had been decreasing marginally. Overall, it can be seen that the labor share in gross value added remained quite stable over time.

Data on the nominal and real net non-financial capital stock are taken from the Federal Statistical Office (henceforward FSO). These series includes yearly data on the net non-financial capital stock, including residential buildings in

Figure 2: Nominal Capital Stock in million CHF (Source: See Section 4 and Appendix A.)



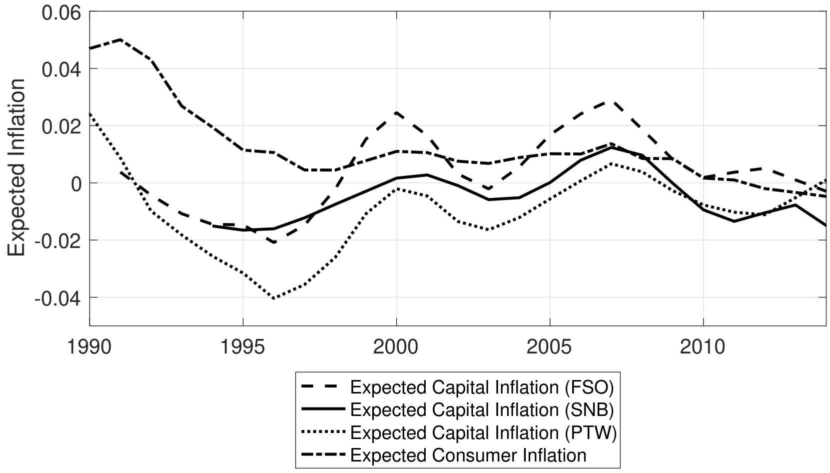
million of CHF from 1990 to 2016 as well as the relative capital stock for nine different types of capital.[4] Rudolf and Zurlinden (2009) provide the share of residential buildings in capital stock, which we used to remove residential buildings from the net non-financial capital stock. The development of nominal capital stock (excluding residential buildings) is illustrated in Figure 2. The capital stock has been growing quite steadily with some exceptions during economic downturns, during which, it stagnated.

The Consumer Price Index is taken from the FSO, while real and nominal GDP, as well as the GDP deflator, come from the State Secretariat for Economic Affairs (henceforward SECO), and gross value added from the Statistic Division of the United Nations.

Unfortunately, we were not able to find a series for the investment deflator since 1990. For this reason and given the critical role played by capital inflation in the model, we use three different specifications. For the first specification, a price index of capital stock is constructed for the period 1990-2016 by dividing nominal by real capital stock using the capital data of the FSO. For the second one, we took the price index for capital goods from the producer and import prices statistic of the Swiss National Bank

[4] The different types of capital are buildings, civil engineering, transport equipment, other machinery and equipment (incl. Weapons systems), computer, electronic and optical products, electrical machinery and apparatus n.e.c, products of agriculture, forestry, fisheries and aquaculture, research and development, and computer and related services.

Figure 3: Expected Inflation (Source: See Section 4 and Appendix A.)



(henceforward SNB). This statistic is available only from May 1993, and since we are working with yearly data, and the series are already short, inflation for 1993 is kept as the average of the available months. For the third specification, an asset-specific investment deflator is combined with the share of that asset in total investment; both taken from the capital detail of the PWT. These series are used to create an asset specific inflation rates, and then aggregate capital inflation is formed by taking the weighted average based on the composition of capital formation. In this way, it was possible to build capital inflation for the period 1990-2014.

Following Barkai (2016), we construct expected inflation as the three-year moving average of the inflation rates. Inflation is computed as the log-difference of the respective price indices.[5]

Figure 3 shows the three different specifications of expected capital inflation as well as expected CPI inflation. The specification calculated using the data from the PTW and the one calculated with the capital stock of the FSO seem to move in parallel for most of the time, while the one retrieved from the SNB is smoother. Additionally, it is possible to notice that at the end of the sample, the series move in different directions. Overall, it can be seen that expected capital inflation fluctuate more than expected consumer

[5]Note that the second and third capital price indices are calculated on investment while the first one is calculated on capital stock.

Figure 4: Depreciation Rate (Source: See Section 4 and Appendix A.)

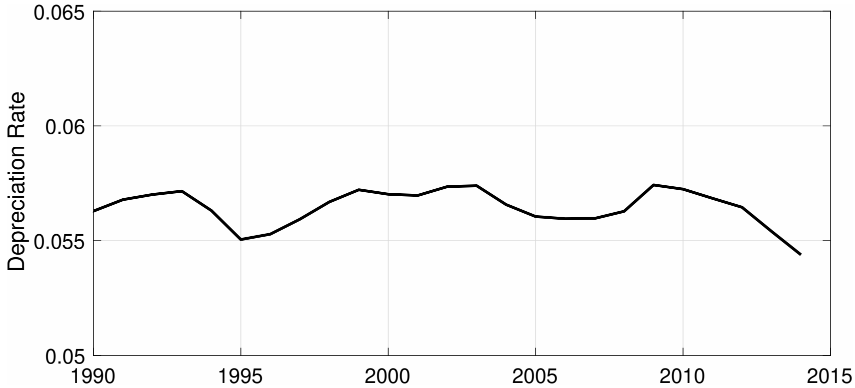
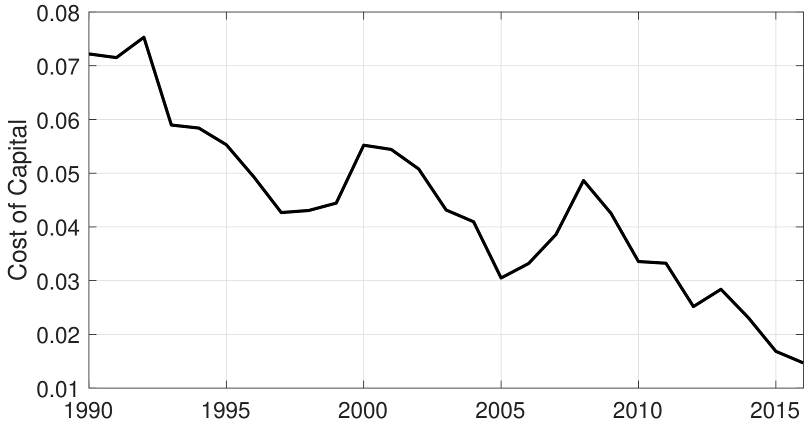


Figure 5: Cost of Capital (Source: See Section 4 and Appendix A, own calculations.)



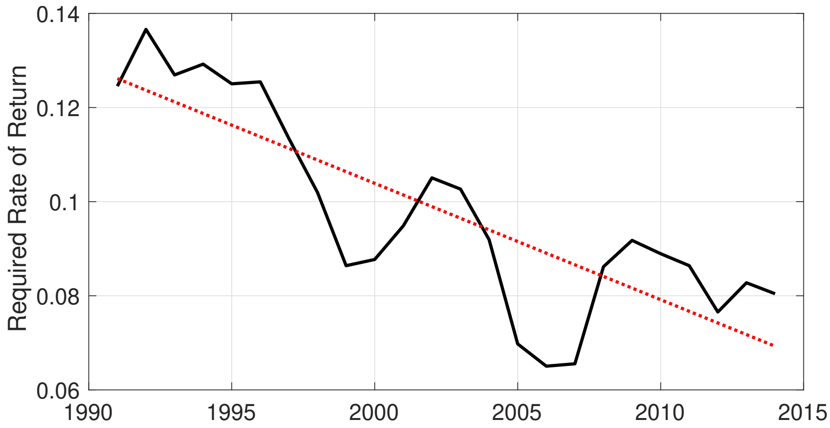
The cost of capital is defined as the yield on Moody's Aaa corporate bond portfolio minus the US risk free rate plus the Swiss risk free rate.

inflation. Moreover, it is important to notice that expected capital inflation was negative for many years in the mid-1990s.

The depreciation rate of the capital stock is taken from the PWT. As shown in Figure 4, the depreciation rate remained quite stable over over the decades.

Barkai (2016) defined the debt costs of capital as the yield on Moody's Aaa corporate bond portfolio. Since we are calculating the capital share for Switzerland, it would be more appropriate to use the yield on a Swiss corporate bond portfolio. Unfortunately, we were not able to find a suitable series; thus we construct the debt cost of capital by subtracting the risk free rate of the United

Figure 6: Required Rate of Return (Source: See Section 4 and Appendix A, own calculations.)



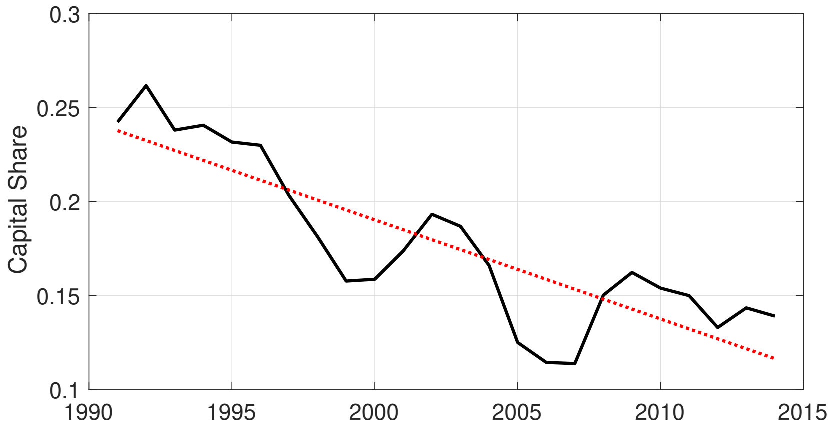
States and adding the Swiss one to the yield on Moody's Aaa corporate bond portfolio. As shown in Figure 5 the cost of capital has been decreasing sharply since 1990. Data on the yield of Moody's Aaa corporate bonds as well as US 10 years Treasury and Swiss 10 year government bonds are taken from the FRED Federal Reserve Bank of St. Louis. Other series relevant for the analysis and discussion of the results such as data on productivity, employment in full-time equivalent as well as wage growth are taken from the FSO. A detailed overview of the sources of the data is available in Appendix A, Table 2.

5 Results

This section presents the results of the specification calculated using expected capital inflation of the FSO. Using the other specifications leads to similar findings, and all results, as well as explanations of all specifications, are presented in the appendix, Table 3 and 4. The results are approximated by a linear time trend, derived from an OLS regression of the estimated series on time. The estimated changes are calculated on the fitted values. For instance, the percentage point change is defined as $\hat{Y}_t - \hat{Y}_1$ and the percentage change is defined as $\frac{\hat{Y}_t - \hat{Y}_1}{\hat{Y}_1}$, where Y_t is the last observation of variable Y and Y_1 is the first one.

Figure 6 shows the calculated required rate of return from 1991 to 2014. The required rate of return contracted by 5.69 percentage points (45.10 percent).

Figure 7: Capital Share (Source: See Section 4 and Appendix A, own calculations.)

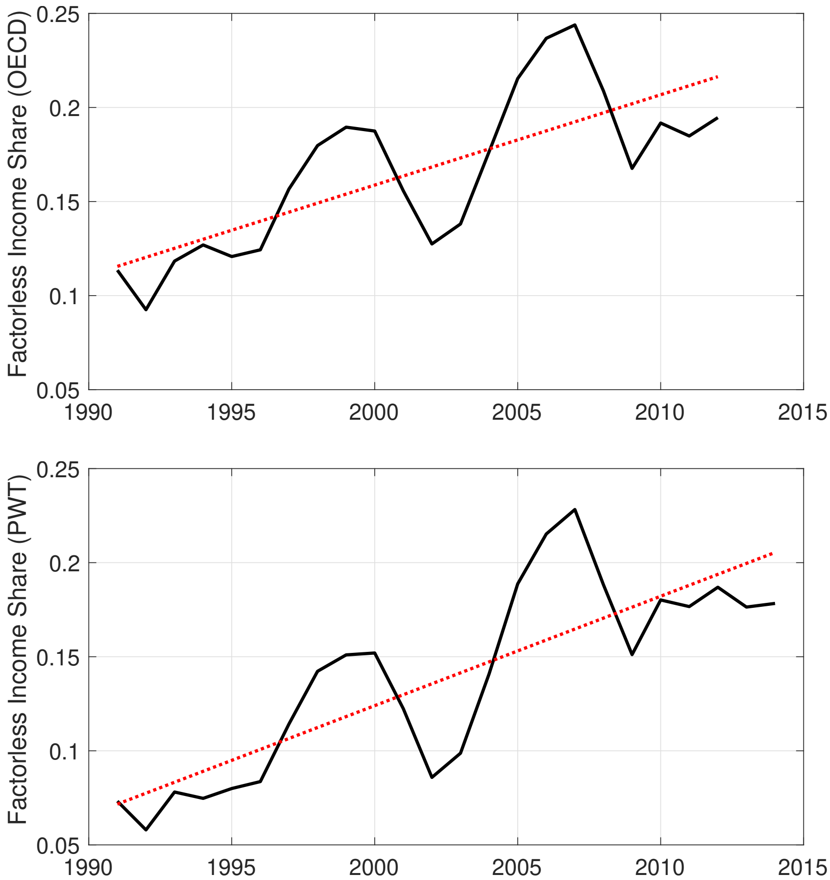


During this period, the average expected capital inflation was low, on average 0.38 percent. Given that the depreciation rate remained quite stable, and that the cost of capital i^D decreased sharply, the required rate of return diminished. Of the three variables used to calculate the required rate of return, the substantial decrease in the cost of capital is what drove down the required rate of return.

Figure 7 shows the evolution of the capital share from 1991 to 2014. The fitted capital share dropped by 12.12 percentage points (51.0 percent), which means that the capital stock in Switzerland has not increased enough to compensate for the sharp decline in the required rate of return.

Given that the labor share remained constant, and that the capital share and capital costs decreased, factorless incomes must have expanded. As illustrated in Figure 8, the factorless income share derived from our model has substantially increased over the past decades. With the labor share of the OECD, the increment of the factorless income share was 9.60 percentage points (87.27 percent) between 1991 and 2012, while with the labor share data from the PTW the increase was of approximately 13.38 percentage points (186.69 percent) from 1991 to 2014. These results are similar to those that Barkai (2016) found for the United States. In Figure 8, it is possible to see a marked shock during the financial crisis when the factorless income share dramatically contracted. For the capital and labor shares, the opposite is

Figure 8: Factorless Income Share (Source: See Section 4 and Appendix A, own calculations.)

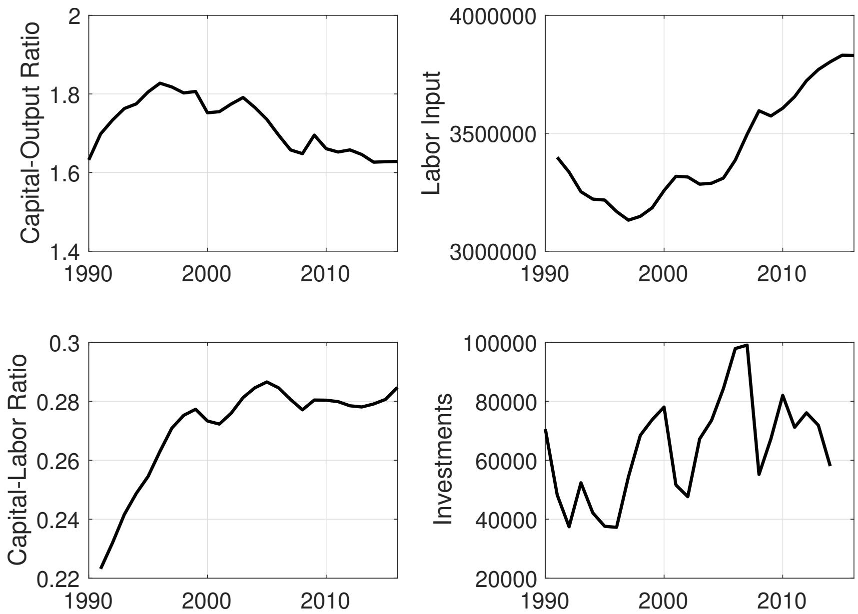


true. The labor and capital shares tend to expand during recessions, while factorless incomes as a share of gross value added are squeezed.

What might explain our results? As illustrated in Figure 9, the capital-to-labor ratio expanded rapidly between 1991 and 1998, but has remained stable since then.[6] While labor input has considerably increased (mainly because of high immigration), capital investment has remained subdued. In the wake of these developments, the capital-to-output ratio even decreased during the period under consideration. Thus, the Swiss economy experienced a period of weak capital deepening. A shift from labor to capital is not visible even though the relative price of investment has decreased in the past decades (Figure 10). Weak investment has contributed to low labor

[6]Labor input is defined as labor in full-time equivalent. Note that labor input for the year 1991 is calculated as the average of the last two quarters.

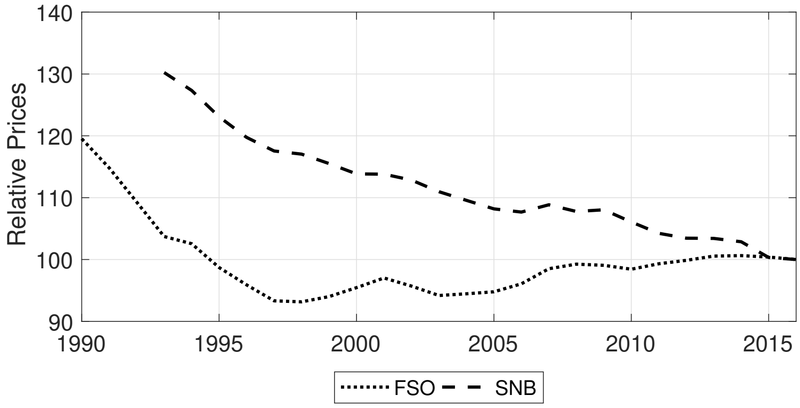
Figure 9: The Evolution of Capital and Labor (Source: See Section 4 and Appendix A.)



productivity growth in Switzerland, which has been even lower than in many other advanced economies (OECD (2017)). According to data from the Federal Statistical Office, average yearly labor productivity growth between 1996 and 2015 was only one percent. Interestingly, real wage growth has been even lower at 0.6 percent. Potential explanations for these developments are the subdued capital deepening and a lack of competition, in particular in the services sector. For instance, the findings of Föllmi et al. (2018) and OECD (2017) imply that a higher degree of competition in the services sector might increase productivity. In addition, trade openness can be expected to increase labor productivity through different channels; namely know-how diffusion, specialization, and capital deepening. According to Föllmi et al., the Swiss services sector is characterized by above OECD average trade restrictions and regulatory impediments to competition. Furthermore, the strong presence of the state in some sectors also affects productivity.

There are, interestingly, two sectors that stand out in terms of productivity growth. Between 1996 and 2015 average productivity growth in the chemical and pharmaceutical sectors was 4.3 and 5.7 percent, respectively. According to BAK Basel Economics (2015), productivity in the pharmaceutical industry in

Figure 10: Relative Prices (Source: See Section 4 and Appendix A.)



Base year: 2016 = 100. Relative prices are defined as the ratio of investment prices relative to consumer prices.

2014 was 4 times higher than in the economy as a whole. High innovation and investment, especially in research and development, as well as high efficiency are the reasons for this performance. In the absence of this performance of the pharmaceutical and chemical sectors, one might have seen a decline in the Swiss capital-to-labor ratio.

Overall, our findings suggest that the constancy of the Swiss labor share should not be explained by factors such as the high skill level of the labor force or high labor productivity, but by both weak aggregate investment growth and increases in the labor force. A decrease in competition could potentially explain relatively weak labor productivity growth, subdued investments, and the increase in the factorless income share (in particular, profits).

6 Conclusion

We used the model of Barkai (2016) to calculate the capital and factorless income shares of Switzerland. Similarly to Barkai (2016), we find a sharp decline in the required rate of return. The capital stock in Switzerland did not grow enough to compensate for the drop and caused the capital share to fall significantly. Given the constancy of the labor share, a contraction in the capital share led to an increase in the factorless income share. Our findings suggests that the constancy of the Swiss labor share is not the consequence of high wage growth but rather the results of weak investment growth combined with high immigration and the resulting rapid population growth in the 2000s.

References

Alvarez-Cuadrado, Francisco, Ngo Van Long, and Markus Poschke, "Capital-Labor Substitution, Structural Change and the Labor Income Share," *Journal of Economic Dynamics and Control*, 2017, *87* (C), 206–231.

Antras, Pol, "Is the US Aggregate Production Function Cobb-Douglas? New Estimates of the Elasticity of Substitution," *Contributions in Macroeconomics*, 2004, *4* (1), 1–36.

BAK Basel Economics, "Bedeutung der Pharmaindustrie für die Schweiz," *Eine Studie von BAK BASEL und Polynomics im Auftrag von Interpharma*, 2015.

Balistreri, Edward J, Christine A McDaniel, and Eina Vivian Wong, "An Estimation of US Industry-Level Capital–Labor Substitution Elasticities: Support for Cobb–Douglas," *The North American Journal of Economics and Finance*, 2003, *14* (3), 343–356.

Barkai, Simcha, "Declining Labor and Capital Shares," *mimeo*, 2016.

Bentolila, Samuel and Gilles Saint-Paul, "Explaining Movements in the Labor Share," *Contributions in Macroeconomics*, 2003, *3* (1), 1–33.

Brynjolfsson, Erik and Andrew McAfee, *The Second Machine Age: Work, Progress, and Prosperity in a Time of Brilliant Technologies*, New York: W. W. Norton & Company, 2014.

Cho, Taehyoung, Soobin Hwang, and Paul Schreyer, "Has the Labour Share Declined?: It Depends," Technical Report, OECD Publishing 2017.

Dao, Mai Chi, Mitali Das, Zsoka Koczan, and Weicheng Lian, "Why Is Labor Receiving a Smaller Share of Global Income? Theory and Empirical Evidence," IMF Working Paper No. 17/169 17/169, International Monetary Fund July 2017.

Dorn, David, Lawrence F. Katz, Christina Patterson, and John Van Reenen, "Concentrating on the Fall of the Labor Share," *American Economic Review*, 2017, *107* (5), 180–85.

Elsby, Michael WL, Bart Hobijn, and Ayşegül Şahin, "The Decline of the US Labor Share," *Brookings Papers on Economic Activity*, 2013, *2013* (2), 1–63.

Feenstra, Robert C., Robert Inklaar, and Marcel P. Timmer, "User Guide to PWT 9.0 Data Files," *Groningen Growth and Development Centre*, 2017.

Föllmi, Reto, Angela Fuest, Philipp an de Meulen, Martin Micheli, Torsten Schmidt, and Lina Zwick, "Openness and Productivity of the Swiss Economy," *Swiss Journal of Economics and Statistics*, 2018, *154* (1), 17.

Hashimzade, Nigar, Gareth Myles, and John Black, *A Dictionary of Economics*, 5 ed., Oxford University Press, 2017.

Inklaar, Robert and Marcel Timmer, "Capital, Labor and TFP in PWT8. 0," *University of Groningen (unpublished)*, 2013.

International Labour Organization, Organisation for Economic Co-operation and Development, "The Labour Share in G20 Economies," *Report prepared for the G20 Employment Working Group Antalya, Turkey, 26-27 February 2015*, 2015.

Karabarbounis, Loukas and Brent Neiman, "The Global Decline of the Labor Share," *The Quarterly Journal of Economics*, 2013, *129* (1), 61–103.

_ and _ , "Accounting for Factorless Income," in "NBER Macroeconomics Annual 2018, volume 33" NBER Chapters, National Bureau of Economic Research, Inc, 2018.

Klump, Rainer, Peter McAdam, and Alpo Willman, "Factor Substitution and Factor-Augmenting Technical Progress in the United States: a normalized Supply-Side System Approach," *The Review of Economics and Statistics*, 2007, *89* (1), 183–192.

OECD, *OECD Economic Surveys: Switzerland 2017* -, Paris: OECD Publishing, 2017.

_ , "Unit Labour Costs - Annual Indicators: Labour Income Share Ratios," February 2018.

Piketty, Thomas, *Capital in the Twenty-First Century* -, Cambridge, Massachusetts: Harvard University Press, 2017.

Rodriguez, Francisco and Arjun Jayadev, "The Declining Labor Share of Income," *Journal of Globalization and Development*, 2010, *3* (2), 1–18.

Rognlie, Matthew, "Deciphering the Fall and Rise in the Net Capital Share: Accumulation or Scarcity?," *Brookings papers on economic activity*, 2016, *2015* (1), 1–69.

Romer, David, *Advanced Macroeconomics*, fourth edition ed., McGraw-Hill Irwin, 2012.

Rudolf, Barbara and Mathias Zurlinden, "Measuring Capital Stocks and Capital Services in Switzerland," *Swiss Journal of Economics and Statistics*, 2009, *145* (1), 61–105.

A Data

Table 1: Data

Variable	Source
Consumer Price Index	FSO (Prices)
Capital Stock (Nominal)	FSO (National Economy)
Capital Stock (Real)	FSO (National Economy)
Depreciation Rate	Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" American Economic Review, 105(10), 3150-3182
Employment (full-time equivalent)	FSO (Industry and Services, Business and Employment)
GDP Deflator	SECO (GDP quarterly estimates)
GDP (Nominal)	SECO (GDP quarterly estimates)
GDP (Real)	SECO (GDP quarterly estimates)
Gross Value Added	United Nations Statistics Division (National Accounts Estimates of Main Aggregates)
Investment deflator	Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" American Economic Review (Capital Detail and National Accounts data) Swiss National Bank (Producer and Import Prices Statistics)
Labor Share	Feenstra, Robert C., Robert Inklaar and Marcel P. Timmer (2015), "The Next Generation of the Penn World Table" American Economic Review, 105(10), 3150-3182 (Labor Detail) OECD (Unit Labor Costs)
Productivity Growth	FSO (National Economy)
Risk Free Rate CH	FRED Federal Reserve Bank of St. Louis
Risk Free Rate US	FRED Federal Reserve Bank of St. Louis
Wage Growth	FSO (Work and Income, Wages, Income from Employment and Labour Costs)
Yield Moody's Aaa bond portfolio	FRED, Federal Reserve Bank of St. Louis

B Specifications

Table 2 gives an overview of all specifications.

Table 2: Specifications Overview

Specification	Inflation π	Depreciation rate δ
1	FSO (nominal capital stock / real capital stock)	PTW
2	SNB	PTW
3	PWT	PTW

C Additional Results

Table 3 illustrates the results obtained with all specifications. As it is possible to see, all specifications led to similar findings. Given the different length of the series, to make the different results comparable, we represent the change as the yearly percentage points change. This equals the slope coefficient of the trend line. Figure 11 shows the plot of the change of the first three specifications. The other three specifications are not included since the difference is negligible.

Table 3: Yearly Percentage Points Change (Source: See Section 4 and Appendix A)

	Specification					
	1	2	3	4	5	6
Labor Share(OECD)	0.13	0.13	0.13	0.13	0.13	0.13
Labor Share (PWT)	-0.05	-0.05	-0.05	-0.05	-0.05	-0.05
Required Rate of return	-0.24	-0.16	-0.2	-0.22	-0.14	-0.2
Capital Share	-0.53	-0.36	-0.46	-0.47	-0.32	-0.47
Factorless Income Share (OECD)	0.48	0.28	0.35	0.47	0.28	0.35
Factorless Income Share (PTW)	0.58	0.45	0.54	0.57	0.44	0.52

Figure 11: Additional Results (Source: See Section 4 and Appendix A)