



Stigler Center

for the Study of the Economy and the State

70 Years of US Corporate Profits

Simcha Barkai

London Business School and Stigler Center

Seth G. Benzell

MIT Initiative on the Digital Economy

April 2018

New Working Paper Series No. 22

Stigler Center for the Study of the Economy and the State
University of Chicago Booth School of Business
5807 S Woodlawn Ave
Chicago, IL 60637

70 Years of US Corporate Profits*

Simcha Barkai

Seth G. Benzell

April 2018

Abstract

We extend [Barkai \(2016a\)](#) and measure capital costs and profits over the period 1946–2015. The profit share is declining from 1946 to the early 1980s and has been increasing since. As a share of gross value added, profits today are higher than they were in 1984, but lower than their value in the years after World War II. Alternative measures of profits show similar trends.

1 Introduction

Financial profit is ostensibly the goal of almost all business activity. It is the incentive to create new ideas, firms, and products. Distinguishing between capital income and profit income is essential for calibrating both short- and long-term models. In models of economic growth and development, profit features as an incentive for innovation and as an indicator of anti-competitive behavior. In models of macroeconomic fluctuations, changes in markups and profits are theorized to play a key role in mediating the Phillips curve. In all economic models, distinguishing between capital and profit income is essential for properly measuring the elasticity of substitution between capital and labor.

Extending [Barkai \(2016a\)](#), we measure capital costs and profits in the U.S. non-financial corporate sector over the period 1946–2015. Capital consists of physical capital (structures and equipment) as well as the forms of intangible capital that are measured by the BEA (software, R&D, and artistic originals). Capital costs are measured as the product of the required rate of return of capital and the value of the capital stock. Profits are measured as a residual after deducting labor costs, capital costs, and indirect taxes on production from gross value added. The capital share is the ratio of capital costs to gross value added and the profit share is the ratio of profits to gross value added.

*Barkai: London Business School and Stigler Center for the Study of the Economy and the State; Email: sbarkai@london.edu. Benzell: MIT Initiative on the Digital Economy; Email: sbenzell@mit.edu. We thank Tyler Cowen, Guillermo Lagarda, Pascual Restrepo, Daniel Rock, Willem van Vliet, Tony Zhang, and Luigi Zingales for helpful comments.

Our main finding is that the profit share decreased from 1946 to the early 1980s and has increased since. In parallel, the capital share increased from 1946 to the early 1980s and has decreased since. As a share of gross value added, profits today are high when compared to the mid-1980's, but they are lower than their value in the decade after World War II.

Several noticeable features of the time series of the capital and profit shares raise a possible concern of measurement error. Both series display substantially higher volatility than the labor share series. Second, the negative correlation between the profit and capital shares is much greater in absolute value than the negative correlation between the profit and labor shares. Last, the capital and profit shares series display a short-term reversal of trends during the early 1970s followed by large movements over the period 1977–1985. Therefore, to confirm our main finding, we consider several other measures of profits.

In Section 3.2 we consider alternative measures of expected inflation and alternative specifications of the required rate of return. Our main finding of a decline in the profit share from 1946 to the early 1980s and a subsequent increase is robust to these alternative specifications. At the same time, the level of profits during the late 1970s as well as the magnitude and timing of the subsequent decline in profits vary considerably with our measures of expected inflation.

In Section 4 we compare our series of the profit share to alternative measures. First, we measure profits under the assumption of a constant cost of capital and constant asset-specific expected capital inflation. This approach is taken by [Rognlie \(2015\)](#). Second, we consider two BEA measures of accounting profits. Third, we consider profits that are implied by the estimated markups in [Traina \(2018\)](#). We find many common features across various measures of profits. We present the various measures of the profit share in Figure 1.

All measures of the profit share show that the profit share is declining from 1946 to the early 1980s and has been increasing since, though the magnitude of the decline and the subsequent increase vary across the measures. Across measures, the profit share in 2015 is higher than it was 1984, but lower than its value in 1951. Each of these comparison measures has drawbacks: the fixed real rate approach ignores important variation in the cost of capital over time; BEA accounting measures don't necessarily measure economic profits; the estimation of markups as well as the construction of implied profits require many assumptions. While each of the alternative measures of the profit share has shortcomings, the common features that we find across the various measures give us confidence that the time series variation of the profit share that we are documenting is economically meaningful.

Addressing the particular concern of measurement error, we find that all of the measures of the profit share are more volatile than the labor share. While the standard deviation of our baseline measure of profits is greater than that of the other measures, it is only 5% greater than one of the measures of accounting profits. Next, for each measure of profits we construct implied capital costs as gross value added less labor costs less

indirect taxes less profits. We then measure the time series correlation between the profit share and capital share. Across measures, the time series correlation between the profit share and the implied capital share ranges from -58% to -94%. The negative correlation between our baseline measures of the profit and capital shares is similar to the correlation implied by the BEA accounting measures of profits. Last, we compute the time series correlations of the different measures of the profit share over the period 1951–2015. Over this period, our baseline measure of the profit share is positively correlated with the alternative measures of the profit share. At the high end, our baseline measure of the profit share has a correlation of over 90% with the BEA accounting profit share. These results are summarized in Tables 1 and 2. These similarities across the various measures help alleviate the concern that our findings are due to measurement error.

Despite the similarities, there are substantial differences between the measures of the profit share. The measures differ in the magnitude of the increase in the profit share since the 1980s. One period of time with a particularly severe divergence is the late 1970s. Our baseline measure is the only one to show a high level of profits during this period. As we mentioned above, we find that measurement of expected capital inflation has a significant impact on the level of profits during this period as well as on the magnitude and timing of the subsequent decline in profits. As the 1970s were a period of particularly high and uncertain inflation, it is possible that measurement issues lead us to find exaggerated profits.

Finally, we discuss three possible explanations for our findings: adjustment costs, missing intangible capital, and competition.

2 Measuring Capital Costs and Profits

In this section we describe the construction of capital costs and profits. The measurement of capital costs and profits extends Barkai (2016a).

2.1 Capital Costs

Given an asset-specific specification of the required rate of return, R_s , capital costs for capital of type s are

$$E_s = R_s P_s^K K_s \tag{1}$$

where K_s is the quantity of capital of type s , P_s^K is the price of capital of type s , and $P_s^K K_s$ is the nominal value of the stock capital of type s . Capital costs are measured in nominal dollars. Aggregate capital costs

are the sum of the asset-specific capital costs

$$E = \sum_s R_s P_s^K K_s \quad (2)$$

We can decompose aggregate capital costs into an aggregate required rate of return on capital and the nominal value of the capital stock

$$\sum_s R_s P_s^K K_s = \underbrace{\sum_s \frac{P_s^K K_s}{\sum_j P_j^K K_j} R_s}_R \times \underbrace{\sum_s P_s^K K_s}_{P^K K} \quad (3)$$

The first term is the weighted average of the asset-specific required rates of return, where the weight on asset s is proportional to the nominal value of the stock of capital of type s . The second term is the nominal value of the aggregate capital stock.

The capital share of gross value added is

$$S^K = \frac{\sum_s R_s P_s^K K_s}{P^Y Y} \quad (4)$$

where $\sum_s R_s P_s^K K_s$ are aggregate capital costs and $P^Y Y$ is nominal gross value added.

2.2 National Accounting

We assume that the true model of accounting for the U.S. non-financial corporate sector in current dollars is

$$P_t^Y Y_t = w_t L_t + R_t P_{t-1}^K K_t + \Pi_t \quad (5)$$

where P_t^Y is the current dollar price of output and $P_t^Y Y_t$ is the current dollar value of gross value added, w_t is the current dollar wage rate and $w_t L_t$ is the total current dollar expenditures on labor, R_t is the required rate of return on capital, P_{t-1}^K is the price of capital purchased in period $t - 1$, K_t is the stock of capital used in production in period t and is equal to the stock of capital available at the end of period $t - 1$, and $R_t P_{t-1}^K K_t$ are current dollar capital costs, and Π_t are current dollar profits. This can be written in shares of gross value added as

$$1 = S_t^L + S_t^K + S_t^\Pi \quad (6)$$

where $S_t^L = \frac{w_t L_t}{P_t^Y Y_t}$ is the labor share, $S_t^K = \frac{R_t P_{t-1}^K K_t}{P_t^Y Y_t}$ is the capital share, and $S_t^\Pi = \frac{\Pi_t}{P_t^Y Y_t}$ is the profit share.

In the data, nominal gross value added $P^Y Y$ is the sum of expenditures on labor wL , gross operating

surplus, and taxes on production and imports less subsidies. Unlike taxes on corporate profits, it is unclear how to allocate these indirect taxes on production across capital, labor, and profits. As a share of gross value added, these taxes on production show little variation (with a low of 7.5% in 1979 and a high of 9.6% in 1971). We study factor shares while ignoring these taxes. Allocating these taxes across labor, capital, and profits in proportion to their share of output yields similar results.

2.3 The Required Rate of Return

The construction of the required rate of return on capital follows [Hall and Jorgenson \(1967\)](#). We consider three specifications. In the baseline specification, the required rate of return on capital of type s is

$$R_s = (i^D - \mathbb{E}[\pi_s] + \delta_s) \quad (7)$$

where i^D is the cost of debt borrowing in financial markets (henceforth, *cost of capital*), π_s is the inflation rate of capital of type s , and δ_s is the depreciation rate of capital of type s .

The second specification accounts for both debt and equity financing

$$R_s = \left(\left(\frac{D}{D+E} i^D + \frac{E}{D+E} i^E \right) - \mathbb{E}[\pi_s] + \delta_s \right) \quad (8)$$

where D is the market value of debt, i^D is the debt cost of capital, E is the market value of equity, i^E is the equity cost of capital, and $\left(\frac{D}{D+E} i^D + \frac{E}{D+E} i^E \right)$ is the weighted average cost of capital.

The third specification accounts for both debt and equity financing as well as the tax treatment of debt and capital. Unlike compensation of employees, firms are unable to fully expense investment in capital and as a result the corporate tax rate increases the firm's cost of capital inputs. Since interest payments on debt are tax-deductible, the financing of capital with debt lowers the firm's cost of capital inputs. Once we account for the tax treatment of both capital and debt, the required rate of return on capital of type s is

$$R_s = \left(\left(\frac{D}{D+E} i^D (1 - \tau) + \frac{E}{D+E} i^E \right) - \mathbb{E}[\pi_s] + \delta_s \right) \frac{1 - itc_s - z_s \tau}{1 - \tau} \quad (9)$$

where τ is the corporate income tax rate, itc_s is the investment tax credit of capital of type s , and z_s is the net present value of depreciation allowances of capital of type s .

2.4 Data

2.4.1 National Income and Capital

Data for the U.S. non-financial corporate sector are taken from the following sources. Data on nominal gross value added, compensation of employees, and taxes on production are taken from the National Income and Productivity Accounts (NIPA) Table 1.14 (lines 17, 20, 23). Compensation of employees includes all wages in salaries, whether paid in cash or in kind, and includes employer costs of health insurance, pension contributions, and the exercising of most stock options. Compensation of employees further includes compensation of corporate officers.

Capital data are taken from the Bureau of Economic Analysis (BEA) Fixed Asset Table 4.1. The BEA capital data provide measures of the capital stock, the depreciation rate of capital, and inflation for three categories of capital (non-residential structures, equipment, and intellectual property products). Our measure of capital includes all forms of physical capital, as well as several forms of intangible capital that are recognized by the BEA.¹ The output and capital data do not include any residential housing.² In the baseline results, asset-specific expected capital inflation is constructed as a three-year moving average of realized capital inflation.

2.4.2 Debt, Equity, and Taxes

Data on the market value of debt and equity for the U.S. non-financial corporate sector are taken from the Integrated Macroeconomic Accounts for the United States Table S.5.a (debt is the sum of lines 130 and 134, equity is line 140). Data on the corporate tax rate for the period 1946–1986 are taken from [Jorgenson and Yun \(1991\)](#), and data for the period 1987–2015 are taken from the OECD tax database. Data on capital allowances for the period 1946–1980 are taken from [Jorgenson and Sullivan \(1981\)](#), and data for the period 1981–2012 are taken from the Tax Foundation. Data on the investment tax credit are taken from [Jorgenson and Sullivan \(1981\)](#).³

Data on the debt cost of capital are taken from the Federal Reserve Economic Data (FRED). In the baseline specification, the debt cost of capital is equal to the yield on Moody’s Aaa bond portfolio. The

¹The 14th comprehensive revision of NIPA in 2013 expanded its recognition of intangible capital beyond software to include R&D and entertainment, literary, and artistic originals. The stock of this fixed asset is measured as a depreciated, quality-adjusted perpetual inventory of expenditures.

²BEA Fixed Asset Table 5.1 indicates that the corporate sector owns a small amount of residential housing in addition to non-residential fixed assets (non-residential structures, equipment, and intellectual property products). Corporate-owned residential housing is small when compared to the total value of residential housing (never exceeding 1.4% of the total value of residential housing). Furthermore, corporate-owned residential housing is small when compared to the value of non-residential capital owned by the non-financial corporate sector (never exceeding 1.8% of the value of the non-residential fixed assets owned by the non-financial corporate sector). The results are robust to including corporate-owned residential housing.

³The values of the tax credits from [Jorgenson and Sullivan \(1981\)](#) are scaled to match total corporate credits claimed (NIPA Table 8.25, line 25). This adjustment follows [McGrattan and Prescott \(2005\)](#). The adjusted values in 1984–1985 are set equal to the values in the year 1983. The results are robust to using the unadjusted values.

results are similar when we use the yield on Moody’s Baa bond portfolio. Unlike the debt cost of capital, which is observable in market data, the equity cost of capital is unobserved. We construct the equity cost of capital as the sum of the yield on the ten-year U.S. treasury and a 5% equity risk premium. Increasing the equity risk premium increases the level of the capital share but leads to similar trends in the shares of capital and profits.

3 Results

In this section we present our measured series of the capital share and profit share for the U.S. non-financial corporate sector over the period 1946–2015. We find that the capital share is increasing from 1946 to the early 1980s and has been declining since and we find that the profit share is declining from 1946 to the early 1980s and has been increasing since.

In addition to the baseline results, we consider alternative measures of expected inflation and alternative specifications of the required rate of return. Our main finding of a decline in the profit share from 1946 to the early 1980s and a subsequent increase is robust to the alternative specifications. However, the level of profits during the late 1970s as well as the magnitude and timing of the subsequent decline in profits over the period 1977–1985 vary considerably with our measures of expected inflation.

3.1 Baseline Measure of Capital and Profit Shares

Figure 2 shows our baseline measurement of the capital and profit shares of gross value added for the U.S. non-financial corporate sector over the period 1946–2015. The baseline required rate of return on capital is calculated in accordance with equation 7 and expected capital inflation is constructed as a three-year moving average of realized capital inflation. Panel A shows that the capital share is increasing from 1946 to the early 1980s and has been declining since. Panel B shows that the profit share is declining from 1946 to the early 1980s and has been increasing since.

Figure 2 points to three additional noticeable features of the time series of the capital and profit shares. First, both series display high volatility. The standard deviation of our baseline measure of the profit share is nearly three times greater than the standard deviation of the labor share. Second, the capital share and profit share series are highly negatively correlated (-94%). Third, the capital and profit share series display a short-term reversal of trends during the early 1970s followed by large movements over the period 1977–1985. This combination of high volatility, a high negative time series correlation, and large movements over a short time horizon raises concern that our measurement of capital costs and profits could be driven by measurement error in the required rate of return or the value of the capital stock. We address this concern

in Section 4.

Figure 3 provides a detailed breakdown of the components entering our baseline required rate of return as well as the ratio of capital to output.

Panel A shows the debt cost of capital. The debt cost of capital is increasing from 1946 to 1983, followed by a decline from 1983 to 2015. Panel B presents the baseline measure of expected capital inflation, which we measure as a three-year moving average of realized capital inflation. Expected capital inflation is volatile from 1946 to 1960, increases from 1960 to 1980, drops sharply in the early 1980s, and displays little volatility and a low level since the early 1980s. Panel C presents the depreciation rate of capital. Depreciation shows a steadily increasing trend from 1946 to 2015. The increase in the depreciation rate reflects a change in the composition of the capital stock: intellectual property products (especially R&D) are an increasing fraction of the capital stock and these assets depreciate at a higher rate than structures and equipment.

Panel D combines the debt cost of capital, expected capital inflation, and the depreciation rate of capital to show the baseline specification of the required rate of return on capital, which was presented in equation 7. Panel E presents the difference between the debt cost of capital and expected capital inflation. The variation in the required rate of return closely follows the difference between the debt cost of capital and expected capital inflation. This is unsurprising because depreciation, the remaining component of the required rate of return, is relatively stable.

Panel F presents the ratio of the nominal value of the capital stock to nominal gross value added. The figure shows substantial year-to-year variation in the capital-output ratio and the ratio increases during economic recessions. While there is a substantial decline in the 1960s and a substantial increase in the 2000s, the capital-output ratio shows no time series trend. As a result, the trends in the capital share follow the trends of the required rate of return. Variation in the capital-output ratio contributes to the volatility of the capital share. The standard deviation of the capital share is 50% larger than the standard deviation of the required rate of return.

3.2 Robustness

Figure 4 explores the robustness of our results to alternative specifications of the required rate of return. Panel A presents three measures of the cost of capital: the debt cost of capital, equal to the yield on Moody's Aaa bond portfolio; the equity cost of capital, equal to the sum of the risk-free rate (the yield on the ten-year treasury) and the equity risk premium (5%); and the weighted average cost of capital $\left(\frac{D}{D+E}i^D(1-\tau) + \frac{E}{D+E}i^E\right)$. All three measures of the cost of capital are increasing from 1946 to 1983 and are declining from 1983 to 2015.

Panel B presents three measures of expected capital inflation: realized capital inflation, a three-year moving average of realized capital inflation $\left(\mathbb{E}[\pi_t] = \frac{1}{3} \sum_{i \leq 3} \pi_{t-i}\right)$, and a five-year centered average of realized capital inflation $\left(\mathbb{E}[\pi_t] = \frac{1}{5} \sum_{-2 \leq i \leq 2} \pi_{t+i}\right)$. The three measures of expected inflation show substantial time series variation. While the three measures of expected capital inflation display different degrees of volatility, all three measures display the same time series patterns. Panel C compares realized capital inflation to various measures of realized consumption inflation.⁴ Capital and consumption inflation display the same time series patterns. Over the entire period, the time series correlation between capital inflation and the broadest measure of consumption inflation (Urban: All Items) is 80%. Over the more volatile period of 1946–1985 the time series correlation is 81%. The high correlation between capital inflation and consumption inflation shows that our measure of capital inflation is economically meaningful. We find similar overall trends for the capital and profit shares when we use these alternative measures of expected capital inflation or consumption inflation. At the same time, the level of profits in the late 1970s as well as the timing and magnitude of the large decline in the required rate of return that occurs in the years around 1980 vary when we use these different measures of expected inflation.

Panel D presents the profit share using the three specifications of the required rate of return on capital, which were presented in equations 7–9. For the purpose of this figure, expected capital inflation is constructed as a three-year moving average of realized capital inflation. While the level of profits varies across the three specifications of the required rate of return, the time series trend and volatility are very similar.

4 Comparison to Alternative Measures of Profits

In this section we compare our profit share series to alternative existing measures of the profit share. While each of the alternative measures of the profit share has shortcomings, the common features that we find across the various measures give us confidence that the time series variation of the profit share that we are documenting is economically meaningful, rather than the result of measurement error.

1. Fixed real rate. The first alternative measure that we consider constructs capital costs under the assumption of a constant cost of capital and constant asset-specific expected capital inflation. This approach is taken by [Rognlie \(2015\)](#). We calculate the constant asset-specific expected capital inflation as the average realized capital inflation over the period 1946–2015. Having calculated constant measures of asset-specific expected capital inflation, the choice of the constant cost of capital will determine the

⁴The measures of consumption inflation and their respective FRED series codes are: Consumer Price Index for All Urban Consumers: All Items (CPIAUCNS), Consumer Price Index for All Urban Consumers: All Items Less Food (CPIULFNS), and Consumer Price Index for All Urban Consumers: All Items Less Food and Energy (CPILFESL).

level of the profit share but will not affect the trends. We pick the constant cost of capital that makes the level of profits in 1984 equal to our baseline. The disadvantage of this approach is that it misses large variation in the cost of capital over time (in excess of expected inflation). By ignoring the variation in the cost of capital, this approach leads to a significant understatement of the decline in the profit share over the period 1946–1984 and the subsequent increase over the period 1984–2015.⁵

2. BEA measures of accounting profits. We consider two accounting measures of profits. First, we consider *accounting profits*, which are profits before tax (without IVA and CCAdj) (NIPA Table 1.14, line 37). These accounting profits include the profits generated from business operations as well as interest received, which is a form of financial income. Second, we consider *operating profits*, which are accounting profits less interest received (Integrated Macroeconomic Accounts for the United States Table S.5.a, line 12). This second measure includes only profits that are generated from business operations.

There are important differences between accounting profits and economic profits. First, the cost of financing used in accounting profits is the interest payment on debt, rather than the product of the cost of capital and the value of the capital stock. When the book value of corporate debt is lower than the value of the capital stock, accounting methods underestimate capital costs and overestimate profits. Similarly, in periods when the market cost of capital is greater than the average yield on existing firm debt, accounting methods underestimate capital costs and overestimate profits. Second, accounting methods calculate the depreciation of assets based on a legal schedule rather than on an economic schedule. Last, accounting methods do not consider the revaluation of the capital stock. The stock of capital that is used to determine depreciation is valued at its historical cost and the revaluation of the capital stock is not added to corporate profits. These differences ensure that the measurement of accounting profits does not depend on the revaluation of capital or on the method of measurement of the capital stock. If our measurement of capital costs and profits is the result of measurement error in expected capital inflation or the ratio of capital to output, we would expect the results to disappear once we remove these sources of time series variation.

3. Profits inferred from markups. [De Loecker and Eeckhout \(2017\)](#) and [Traina \(2018\)](#) provide production-based estimates of markups for non-financial U.S. public firms over the period 1951–2016. In order to compare our measure of profits to production-based measures of markups we need to convert the estimated markups into an implied profit share of gross value added and this requires several strong assumptions. First, we assume that the firm level production technology displays constant returns to scale. Given this assumption and a measure of markups μ_t , we construct the implied profit share of

⁵See [Barkai \(2016a\)](#) for a discussion of this point.

sales as $\frac{\Pi_t}{sales_t} = 1 - \mu_t^{-1}$. In order to convert the implied profit share of sales into an implied profit share of gross value added, we need to multiply the profit share of sales by the ratio of sales to gross value added. Unfortunately, the BEA does not report sales for non-financial corporate business. Instead, we multiply the implied profit share of sales by the ratio of non-financial private sales (the sum of gross value added and intermediate inputs) to non-financial private gross value added. Last, we are implicitly assuming that publicly traded non-financial U.S. firms are representative of the non-financial corporate sector.⁶ The profits implied by [De Loecker and Eeckhout \(2017\)](#) exceed 80% of gross value added in 2014. These implied profits are implausibly high: so long as capital costs are non-negative, profits can't exceed gross value added less compensation of employees. This bound implies that profits can't exceed 42% of gross value added. For this reason, we limit our comparison to the markup measures of [Traina \(2018\)](#).

Figure 1 presents our baseline measure of the profit share along with the three comparison measures. Panel A presents our baseline results. Panel B presents estimates of the profit share under the assumption of a constant cost of capital and constant expected capital inflation. Panel C presents the profit shares constructed from two BEA measures of accounting profits. Panel D presents the profit share implied by the series of markups estimated by [Traina \(2018\)](#).

Table 1 presents summary statistics of the various measure of the profit share. In column 1 we calculate the time series standard deviation of the profit share. The baseline measure of the profit share has a standard deviation of 6.26 percentage points. This is between 1.05 and 2.6 times greater than the standard deviation of the alternative measures. All of the measures of the profit share that we consider are more volatile than the labor share. In column 2 we calculate the time series standard deviation of the HP-filtered⁷ profit share. The HP-filtered baseline measure of the profit share has a standard deviation of 1.51 percentage points. This large decline in standard deviation implies that most of the time series variation in the profit share is due to the trend component of the profit share rather than the cyclical component. The standard deviation of our baseline HP filtered measure is between 1.2 and 1.3 times greater than that of the alternative measures. In column 3, for each of the measures of profits we construct implied capital costs as gross value added less compensation of employees less indirect taxes less profits. We then measure the time series correlation between the profit share and the implied capital share. Across measures, the time series correlation between the profit share and the implied capital share ranges from -58% to -94%. The negative correlation between our baseline measures of the profit and capital shares is similar to the correlation implied by the BEA accounting measures of profits.

⁶See [Traina \(2018\)](#) for a discussion of this assumption.

⁷Following [Ravn and Uhlig \(2002\)](#) we use the HP-filter parameter value of 6.25.

In columns 4 and 5 we estimate the percentage point decline in the profit share over the period 1946–1984 and the percentage point increase in the profit share over the period 1984–2015. Specifically, for each measure of the profit share and for each of the two time periods we separately estimate a linear model $S_t^\Pi = a + b \times t + \varepsilon_t$ and report the change in fitted values from the beginning to the end of the time period. All measures of the profit share show a substantial decline from 1946–1984 ranging from -7.9 to -14.85 percentage points. Furthermore, all measures show an increase in the profit share over the period 1984–2015, ranging from 1.65 to 13.63 percentage points.

Table 2 presents the time series correlations of the different measures of the profit share over the period 1951–2015.⁸ Over this period, our baseline measure of the profit share is positively correlated with the alternative measures of the profit share. At the high end, our baseline measure has a correlation of 90% with the BEA operating profit share and a correlation of 92% with the BEA accounting profit share.

We find common features across various measures of profits: all measures show that the profit share is declining from 1946 to the early 1980s and has been increasing since, though the magnitude of the decline and the subsequent increase vary across the measures. All of the measures display high volatility and a high negative correlation with implied capital costs. Our baseline measure of the profit share is most similar to the BEA operating profit share: they display a similar magnitude of decline over the period 1946–1984 and a subsequent increase, they have a similar time series standard deviation, and the two measures are highly correlated (90%).

A noticeable difference between our baseline measure and the alternative measures of profits is the high profit share that we find in the late 1970s. It is possible that we are mismeasuring expected capital inflation during the late 1970s and as a result we find exaggerated profits during this period. Indeed, in Section 3.2 we found that the level of profits as well as the magnitude and timing of the large decline in the profit share depend on our measurement of expected capital inflation. Furthermore, when we move from using expected capital inflation to expected consumption inflation we find a significant impact on the level of profits during this period as well as on the magnitude and timing of the subsequent decline in profits. These differences all point to potentially large measurement error in expected capital inflation during the late 1970s.

Each of the measures that we consider has drawbacks. The fixed real rate approach ignores important variation in the cost of capital over time (in excess of expected inflation). BEA accounting measures of profits are based on accounting measures (rather than economic measures) of capital costs. The estimation of markups requires many parametric assumptions, and further assumptions are needed to construct implied profits. At the same time, these similarities in findings across the various measures help alleviate the concern

⁸Traina’s measure of markups is only available starting in 1951. When we estimate correlations of the other measures over the period 1946–2015 the results are slightly stronger.

that our findings are due to measurement error.

5 Discussion

Our main result is that the profit share of gross value added is declining from 1946 to the early 1980s and has been increasing since. In this section we discuss three possible explanations for our finding: adjustment costs, missing intangible capital, and competition.

Adjustment Costs

The cost of installing capital as well as unmeasured investments that firms make in order to fully take advantage of the capital are not included in our measure of capital costs.⁹ Therefore, our measure of capital costs is net of adjustment costs and our measure of profits is gross of adjustment costs.¹⁰

Might trends in adjustment costs explain the decline and the subsequent increase in the profit share? In standard models of adjustment costs, the value of installed capital exceeds the replacement cost of capital in periods of growth and firms with installed capital earn profits. During these periods of growth, firms increase their investment in capital, which in turn leads to a reduction in profits. The central prediction of models of adjustment costs is that an increase in profits should be accompanied by an increase in the ratio of investment to capital.

Figure 5 plots the ratio of investment to capital: Panel A presents the ratio of aggregate investment to aggregate capital; Panel B presents the ratio of investment to capital for each of the three BEA categories of capital (structures, equipment, and intellectual property products). We find suggestive evidence that adjustment costs may have contributed to variation in profits during some periods. For example, high productivity growth¹¹ during the 1960s is accompanied by elevated profits, high investment rates, and an increase in Tobin's Q. Other periods do not easily fit the adjustment cost story. The 1950s and 2000s are periods of relatively high profit shares and low investment rates.¹²

We find no evidence to suggest that the *trends* in the profit share that we document can be explained by adjustment costs.¹³ Whether we consider the aggregate stock of capital or each of the three BEA categories

⁹Bresnahan, Brynjolfsson and Hitt (2002) provide evidence that firms make unmeasured investments in own-use software, data, and organization in order to fully take advantage of new technologies.

¹⁰Just as our measure of capital costs is net of adjustment costs, existing measures of labor costs are net of the costs of training new employees.

¹¹Jorgenson, Ho and Stiroh (2008) provide evidence that total factor productivity growth was especially high during the period 1959 to 1973.

¹²That being said, it may be the case that adjustment costs were particularly high during the 1950s. During the post World War II era a government 'housing czar' prioritized the use of scarce national construction resources for residential housing, thus exacerbating the problem of business structure scarcity (Coleman (1950)).

¹³Although a theory of capital adjustment costs does not fit the trends in the capital and profit shares, such a theory may be able to explain several cyclical features. If marginal adjustment costs in capital are more volatile than those in labor, this could potentially explain part of the variance of the capital and profit shares. It may also be able to explain why profit share is more negatively correlated with the capital share than with the labor share.

of capital, the ratio of investment to capital does not have a declining trend from 1946 to the mid-1980s or an increasing trend from the mid-1980s to 2015. To offer a statistical measure, we estimate a linear model $\frac{I_t}{K_t} = a + b \times t + \varepsilon_t$ separately for the period 1946–1984 and for the period 1984–2015. Contrary to what a model of adjustment costs would predict, the point estimates of the linear models suggest that the ratio of aggregate investment to aggregate capital stock is in fact increasing during the period in which profits are decreasing (1946–1984) and is then decreasing during the period in which profits are increasing (1984–2015), though the point estimates are statistically insignificant. Similarly, when we consider the three BEA categories of capital separately, we find that high profits are accompanied by low investment.¹⁴ Last, we know of no evidence that suggests a break in the trend of adjustment costs in the early 1980s.

Intangible Capital

The BEA measures of capital that we use to calculate capital costs include all physical capital as well as several forms of intangible capital, such as R&D, software, and artistic designs. A large literature has considered several forms of intangible capital that are not currently capitalized by the BEA and has argued that these are important for explaining asset valuations and cash flows.¹⁵ These additional forms of intangible capital include organizational capital, market research, branding, and training of employees. Any form of missing intangible capital would cause us to understate capital costs and overstate profits.¹⁶ Moreover, a trend in the value of this missing intangible capital could explain our measured trends in the share of profits.¹⁷

If missing intangible capital are to explain the fall and the subsequent rise in the share of profits over the past 70 years, the share of income going to intangible capital would have to decline sharply over the period 1946–1984 and increase sharply over the period 1984–2015. While there is evidence of a large increase in the importance of intangible capital over the past 30 years, we know of no evidence that suggests a sharp decline in the importance of intangible capital over the period 1946–1984.¹⁸ Measured forms of intangible capital (R&D, software, and artistic designs) do not display such a pattern. Measured intangible capital are an increasing share of total investment and this increase is relatively stable over the entire sample period.

¹⁴While the evidence on structures and intellectual property products is statistically significant, the evidence on equipment is statistically insignificant. In addition, during the period 1946–1984 the point estimate for equipment is negative, in line with theories of adjustment costs.

¹⁵See, for example, Hall (2001), Atkeson and Kehoe (2005), Hansen, Heaton and Li (2005), Hulten and Hao (2008), Corrado, Hulten and Sichel (2009), McGrattan and Prescott (2010), and Eisfeldt and Papanikolaou (2013).

¹⁶Benzell and Brynjolfsson (2018) shows that when intangible capital is a close enough complement to traditional capital and labor and the total stock of intangible capital in the economy is fixed, then an increase in the use of labor and physical capital inputs will increase the share of income paid to intangible capital.

¹⁷See Barkai (2016a) for a discussion of the potential contribution of intangible capital to measured profits over the period 1984–2014.

¹⁸Greenwood and Jovanovic (1999) points out that in the mid-1970s firms first discovered the value of new information and communication technologies. Knowing that business organizations would have to be dramatically reoriented to take advantage of these opportunities, the value of old organizational capital may have decreased.

Similarly, measured intangible capital are an increasing share of the total value of the capital stock and this increase is relatively stable over the entire sample period.

Competition

Secular changes in competition are a natural explanation to consider for the fall and rise in profits. A recent literature provides evidence that a decline in competition has contributed over the past 30 years to lower wages ([Barkai \(2016a\)](#), [Azar, Marinescu and Steinbaum \(2017\)](#), [Benmelech, Bergman and Kim \(2018\)](#)), lower investment ([Gutiérrez and Philippon \(2016\)](#)), higher market valuations ([Bessen \(2016\)](#), [Grullon, Larkin and Michaely \(2016\)](#), [Kurz \(2017\)](#)), and a lower real interest rate ([Barkai \(2016b\)](#), [Eggertsson, Robbins and Wold \(2018\)](#)).

A notable feature of the data is out of line with standard theories of competition. In standard models of monopolistic competition, the profit share is nearly perfectly negatively correlated with the shares of both labor and capital. However, in the data the profit share is nearly perfectly negatively correlated with the capital share (-94%) but shows little correlation with the labor share (-19%). One possible explanation for the lack of a strong negative correlation between the profit and labor shares is profit sharing. [Blanchard and Giavazzi \(2003\)](#) present a model in which firms share profits with employees and provide statistical evidence that the decline of unions may have contributed to the decline in the labor share of income. In line with this model, it could be the case that during the early period of 1946–1984 firms would share profits with employees and as a result we find in the data a low correlation between the shares of profit and labor. If profit sharing between firms and workers explains the low correlation between the shares of labor and profit during the early period, then we would expect an increase in the magnitude of the correlation over the more recent period of weak labor unions. Consistent with this explanation, the correlation between the shares of labor and profit over the period 1984–2015 is -83%.

Two notable policy changes point to the early 1980s as a possible break in the trends in competition. First, there was an increase in antitrust enforcement from the mid-1940s to the mid-1970s, followed by a decline from the mid-1970s to the present ([Posner \(1970\)](#), [Gallo et al. \(2000\)](#)). Second, the Department of Justice adopted a more lenient merger guideline in 1982. As [Peltzman \(2014\)](#) shows, industry concentration began rising after this change to the merger guideline.

[Barkai \(2016a\)](#) and [Autor et al. \(2017\)](#) provide evidence that increases in industry concentration are associated with declines in the labor share. [Autor et al. \(2017\)](#) further provide evidence that the growth of concentration is disproportionately apparent in industries experiencing faster technical change, suggesting that technological change, rather than simply anticompetitive forces, have contributed to the increase in concentration and profits and the decline in the labor share.

References

- Atkeson, Andrew, and Patrick J. Kehoe.** 2005. “Modeling and Measuring Organization Capital.” *Journal of Political Economy*, 113(5): 1026–1053.
- Autor, David, David Dorn, Lawrence F. Katz, Christina Patterson, and John Van Reenen.** 2017. “The Fall of the Labor Share and the Rise of Superstar Firms.” NBER Working Paper No. 23396.
- Azar, José, Ioana Marinescu, and Marshall I. Steinbaum.** 2017. “Labor Market Concentration.” NBER Working Paper No. 24147.
- Barkai, Simcha.** 2016*a*. “Declining Labor and Capital Shares.” Stigler Center for the Study of the Economy and the State New Working Paper Series.
- Barkai, Simcha.** 2016*b*. “Profits, Redistribution of Income and Dynamic Efficiency.” Chicago Booth Mimeo.
- Benmelech, Efraim, Nittai Bergman, and Hyunseob Kim.** 2018. “Strong Employers and Weak Employees: How Does Employer Concentration Affect Wages?” NBER Working Paper No. 24307.
- Benzell, Seth G., and Erik Brynjolfsson.** 2018. “Digital Abundance and Scarce Genius: Implications for Interest Rates and Wages.” MIT Mimeo.
- Bessen, James E.** 2016. “Accounting for Rising Corporate Profits: Intangibles or Regulatory Rents?” Boston University School of Law, Law and Economics Research Paper No. 16–18.
- Blanchard, Olivier, and Francesco Giavazzi.** 2003. “Macroeconomic Effects of Regulation and Deregulation in Goods and Labor Markets.” *Quarterly Journal of Economics*, 118(3): 879–907.
- Bresnahan, Timothy F., Erik Brynjolfsson, and Lorin M. Hitt.** 2002. “Information Technology, Workplace Organization, and the Demand for Skilled Labor: Firm-Level Evidence.” *The Quarterly Journal of Economics*, 117(1): 339–376.
- Colean, Miles L.** 1950. *The Impact of Government on Real Estate Finance in the United States*. NBER Books.
- Corrado, Carol A., Charles R. Hulten, and Daniel Sichel.** 2009. “Intangible Capital and US Economic Growth.” *Review of Income and Wealth*, 55(3): 661–685.
- De Loecker, Jan, and Jan Eeckhout.** 2017. “The Rise of Market Power and the Macroeconomic Implications.” NBER Working Paper No. 23687.

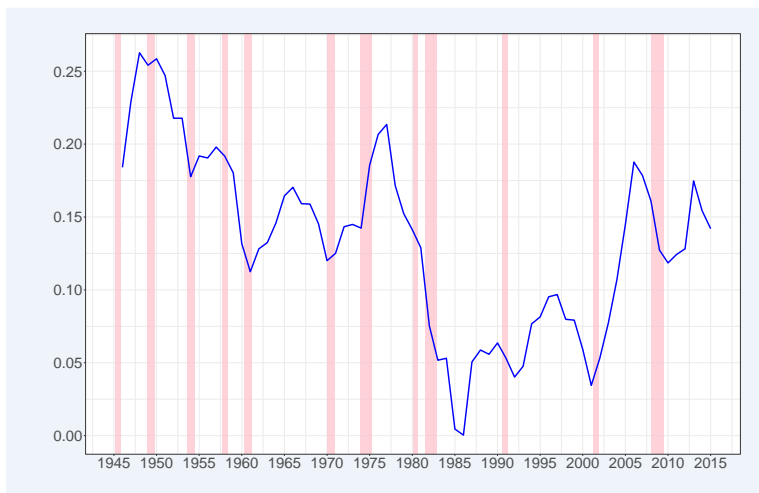
- Eggertsson, Gauti B., Jacob A. Robbins, and Ella Getz Wold.** 2018. “Kaldor and Piketty’s Facts: The Rise of Monopoly Power in the United States.” NBER Working Paper No. 24287.
- Eisfeldt, Andrea L., and Dimitris Papanikolaou.** 2013. “Organization Capital and the Cross-Section of Expected Returns.” *The Journal of Finance*, 68(4): 1365–1406.
- Gallo, Joseph C., Kenneth Dau-Schmidt, Joseph L. Craycraft, and Charles J. Parker.** 2000. “Department of Justice Antitrust Enforcement, 1955–1997: An Empirical Study.” *Review of Industrial Organization*, 17(1): 75–133.
- Greenwood, Jeremy, and Boyan Jovanovic.** 1999. “The Information-Technology Revolution and the Stock Market.” *American Economic Review*, 89(2): 116–122.
- Grullon, Gustavo, Yelena Larkin, and Roni Michaely.** 2016. “Are U.S. Industries Becoming More Concentrated?” <https://ssrn.com/abstract=2612047>.
- Gutiérrez, Germán, and Thomas Philippon.** 2016. “Investment-less Growth: An Empirical Investigation.” NBER Working Paper No. 22897.
- Hall, Robert E.** 2001. “The Stock Market and Capital Accumulation.” *American Economic Review*, 91(5): 1185–1202.
- Hall, Robert E., and Dale W. Jorgenson.** 1967. “Tax Policy and Investment Behavior.” *American Economic Review*, 57(3): 391–414.
- Hansen, Lars Peter, John C. Heaton, and Nan Li.** 2005. “Intangible Risk.” In *Measuring Capital in the New Economy*, ed. Carol Corrado, John Haltiwanger and Daniel Sichel, 111–152. University of Chicago Press.
- Hulten, Charles R., and Xiaohui Hao.** 2008. “What is a Company Really Worth? Intangible Capital and the “Market to Book Value” Puzzle.” NBER Working Paper 14548.
- Jorgenson, Dale, and M.A. Sullivan.** 1981. “Inflation and Corporate Capital Recovery.” *Depreciation, Inflation, and the Taxation of Income from Capital*, ed. C. R. Hulten, 171–238. The Urban Institute Press.
- Jorgenson, Dale W., and Kun-Young Yun.** 1991. *Tax Reform and the Cost of Capital*. Oxford University Press.
- Jorgenson, Dale W., Mun S. Ho, and Kevin J. Stiroh.** 2008. “A Retrospective Look at the US Productivity Growth Resurgence.” *Journal of Economic Perspectives*, 22(1): 3–24.

- Kurz, Mordecai.** 2017. “On the Formation of Capital and Wealth: IT, Monopoly Power and Rising Inequality.” <https://ssrn.com/abstract=3014361>.
- McGrattan, Ellen R., and Edward C. Prescott.** 2005. “Taxes, Regulations, and the Value of US and UK Corporations.” *The Review of Economic Studies*, 72(3): 767–796.
- McGrattan, Ellen R., and Edward C. Prescott.** 2010. “Unmeasured Investment and the Puzzling US Boom in the 1990s.” *American Economic Journal: Macroeconomics*, 2(4): 88–123.
- Peltzman, Sam.** 2014. “Industrial Concentration under the Rule of Reason.” *Journal of Law and Economics*, 57(S3): S101–S120.
- Posner, Richard A.** 1970. “A Statistical Study of Antitrust Enforcement.” *The Journal of Law and Economics*, 13(2): 365–419.
- Ravn, Morten O., and Harald Uhlig.** 2002. “On Adjusting the Hodrick–Prescott Filter for the Frequency of Observations.” *Review of Economics and Statistics*, 84(2): 371–376.
- Rognlie, Matthew.** 2015. “Deciphering the Fall and Rise in the Net Capital Share: Accumulation or Scarcity?” *Brookings Papers on Economic Activity*, 2015(1): 1–69.
- Traina, James.** 2018. “Is Aggregate Market Power Increasing? Production Trends Using Financial Statements.” Stigler Center for the Study of the Economy and the State New Working Paper Series.

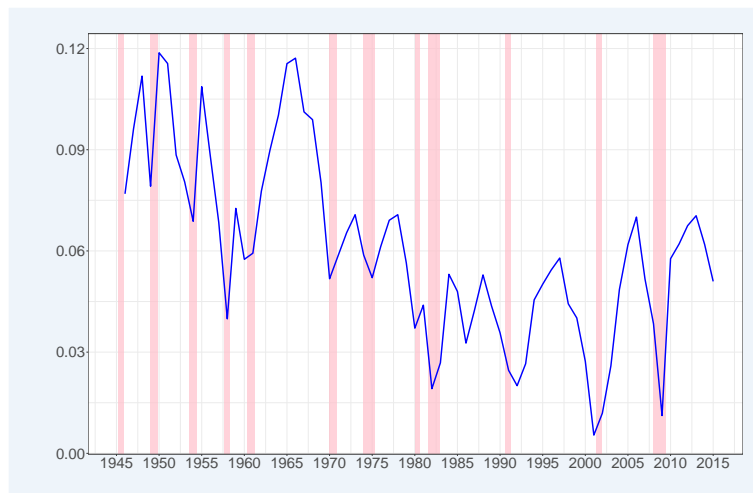
Figure 1: **Alternative Measures of the Profit Share**

The figure shows our baseline measure of the profit share and three alternative measures of the profit share. See Section Section 4 for further details.

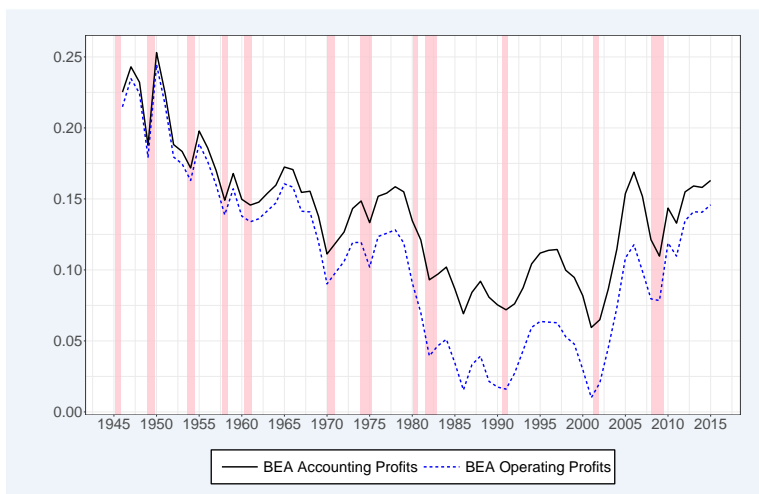
(a) Baseline



(b) Constant Cost of Capital and Expected Inflation



(c) BEA Accounting Profits



(d) Profits Implied by Production-Based Markups

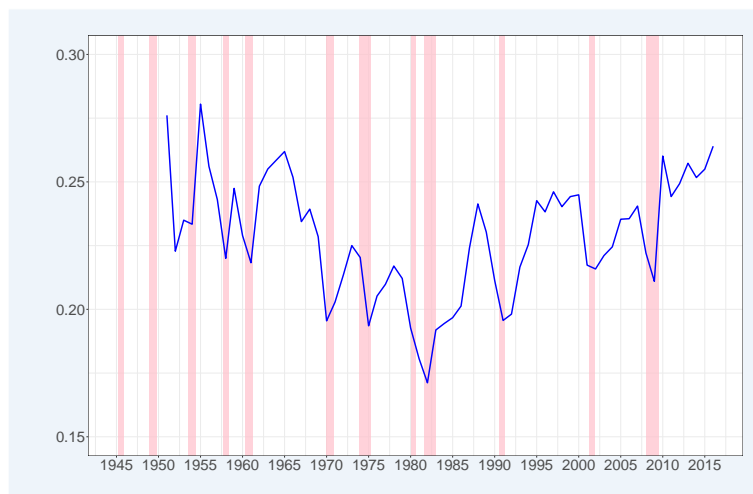
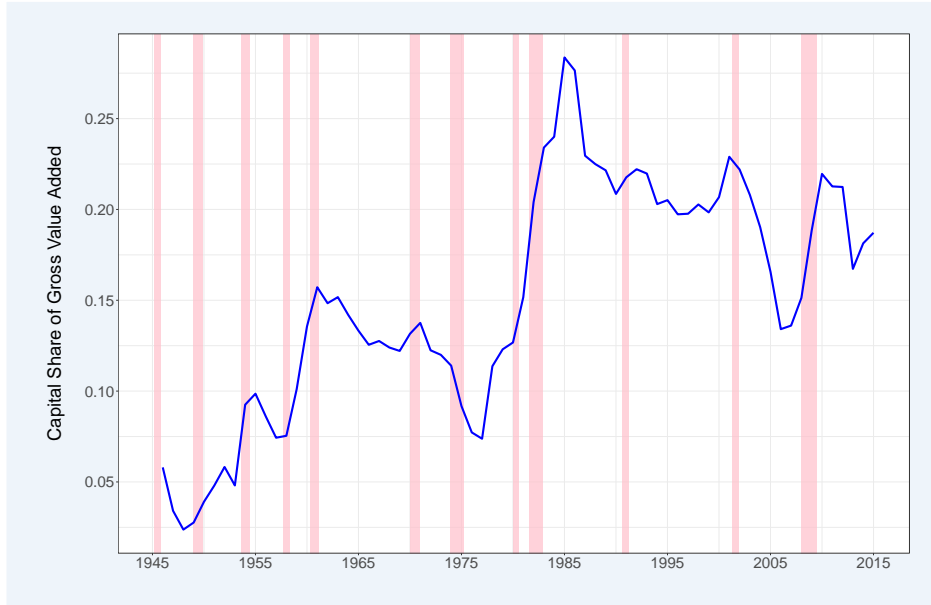


Figure 2: The Capital and Profit Shares

The figure shows the capital and profit for the U.S. non-financial corporate sector over the period 1949–2015. Capital costs are the product of the required rate of return on capital and the value of the capital stock. The required rate of return on capital is calculated as the yield on Moody's Aaa less expected capital inflation plus the depreciation rate of capital, $R = (i^D - \mathbb{E}[\pi] + \delta)$. Expected capital inflation is calculated as a three-year moving average of realized capital inflation. Profits are gross value added less compensation of employees less capital costs less taxes on production and imports plus subsidies. Panel A: the capital share is the ratio of capital costs to gross value added. Panel B: the profit share is the ratio of profits to gross value added. See Section 3.1 for further details.

(a) Capital Share



(b) Profit Share

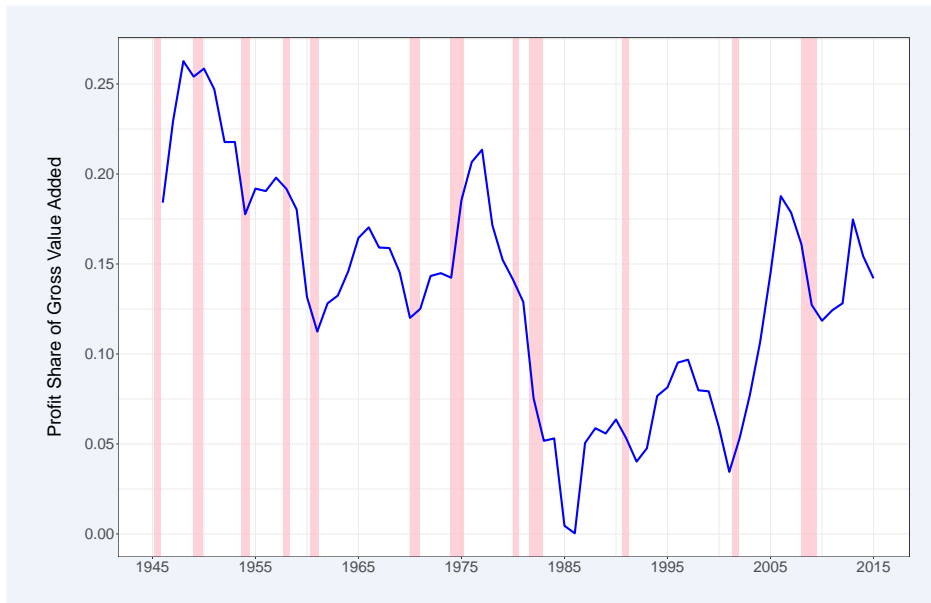
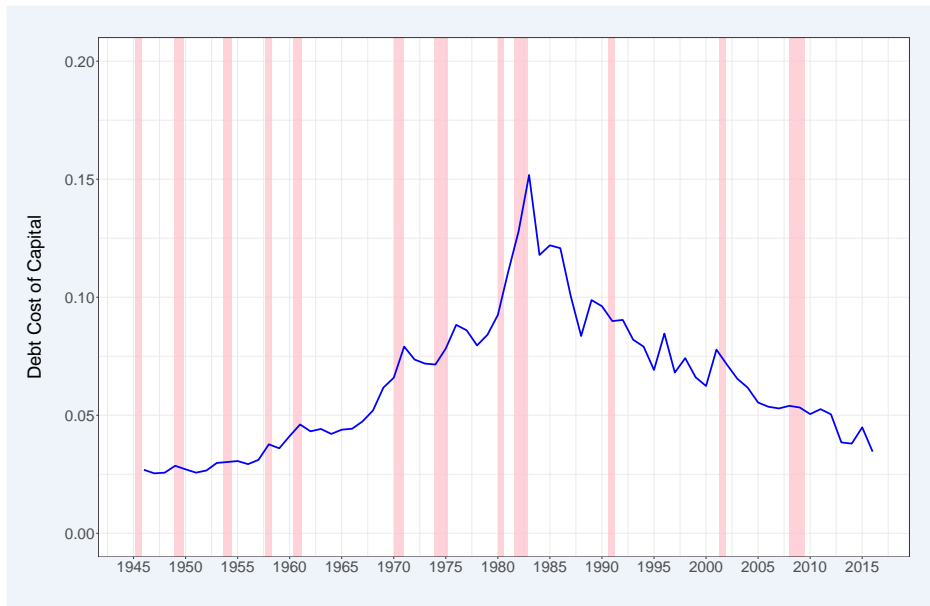


Figure 3: Decomposition of the Capital Share

The figure provides a decomposition of the capital share into the components of the required rate of return and the capital-output ratio. See Section 3.1 for further details.

(a) Cost of Capital



(b) Expected Capital Inflation

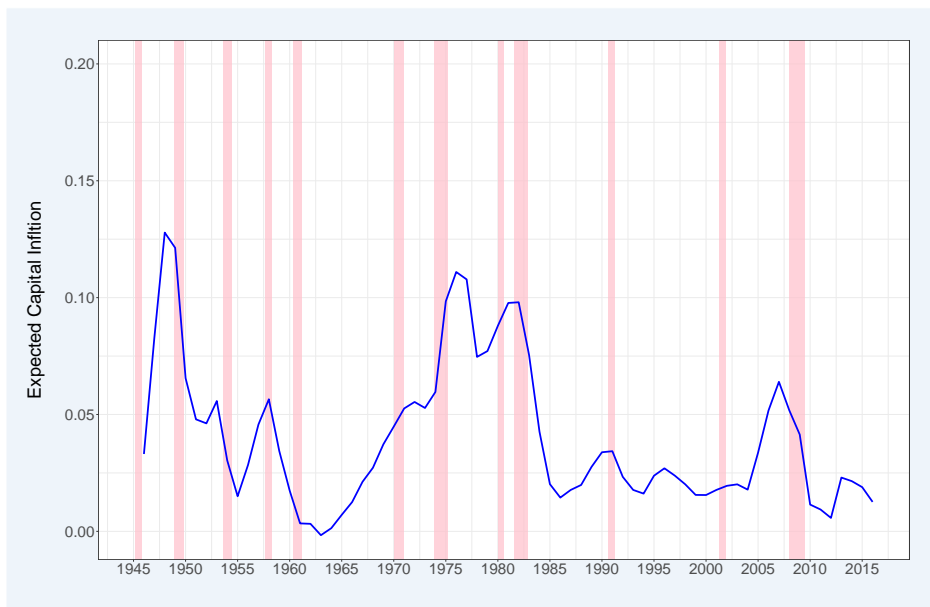
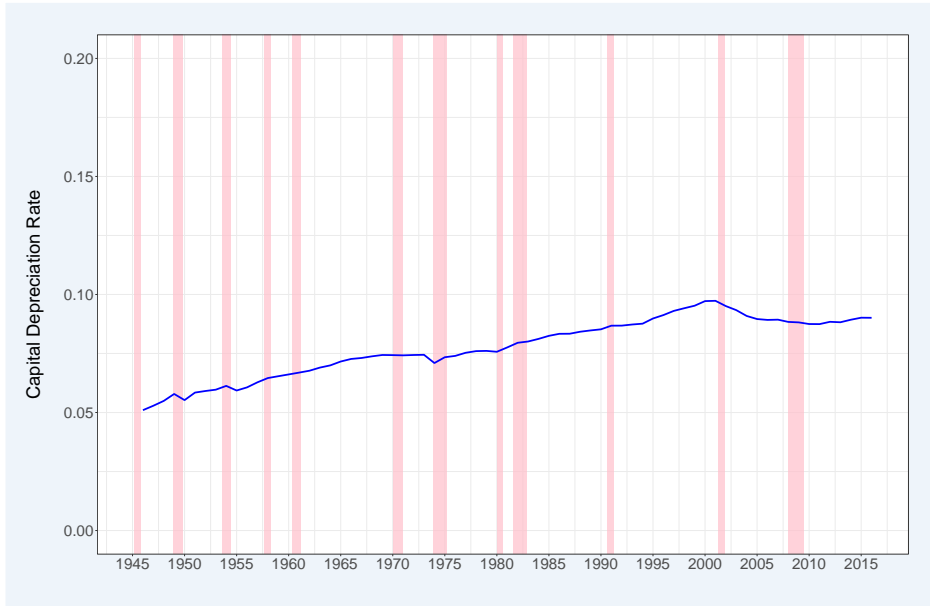


Figure 3: **Decomposition of the Capital Share** (continued from previous page)

(c) Depreciation Rate



(d) Baseline R

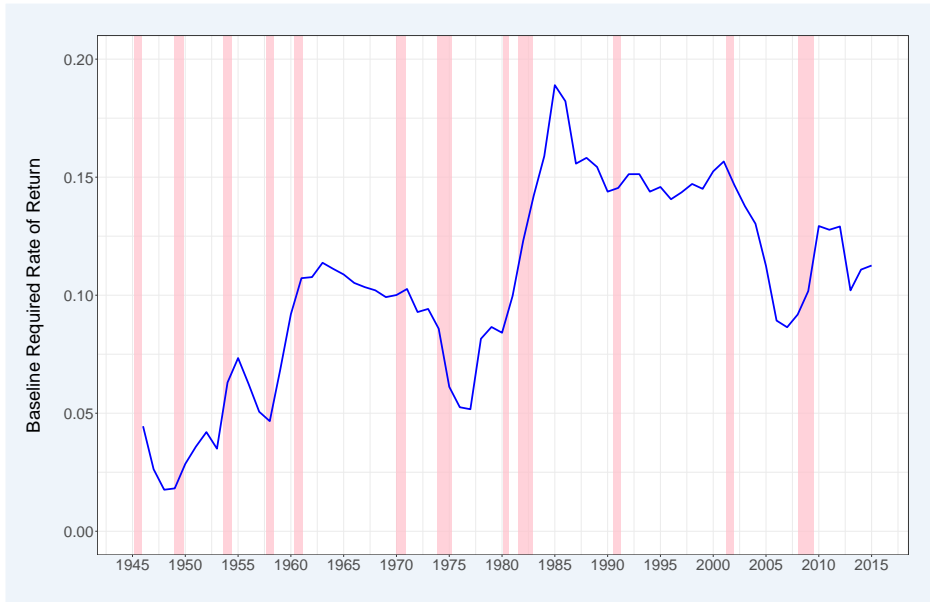
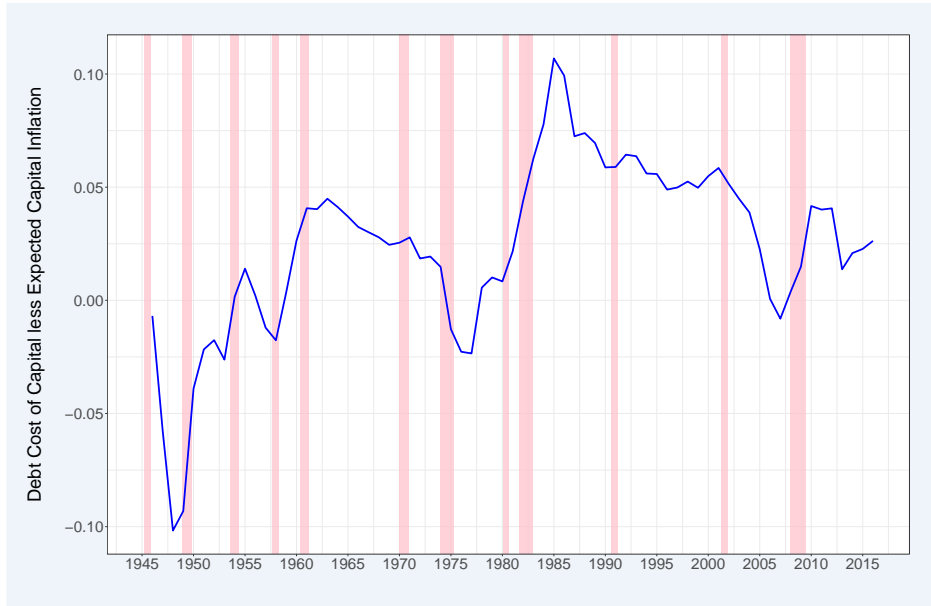


Figure 3: **Decomposition of the Capital Share** (continued from previous page)

(e) Debt Cost of Capital less Expected Capital Inflation



(f) Capital-Output Ratio

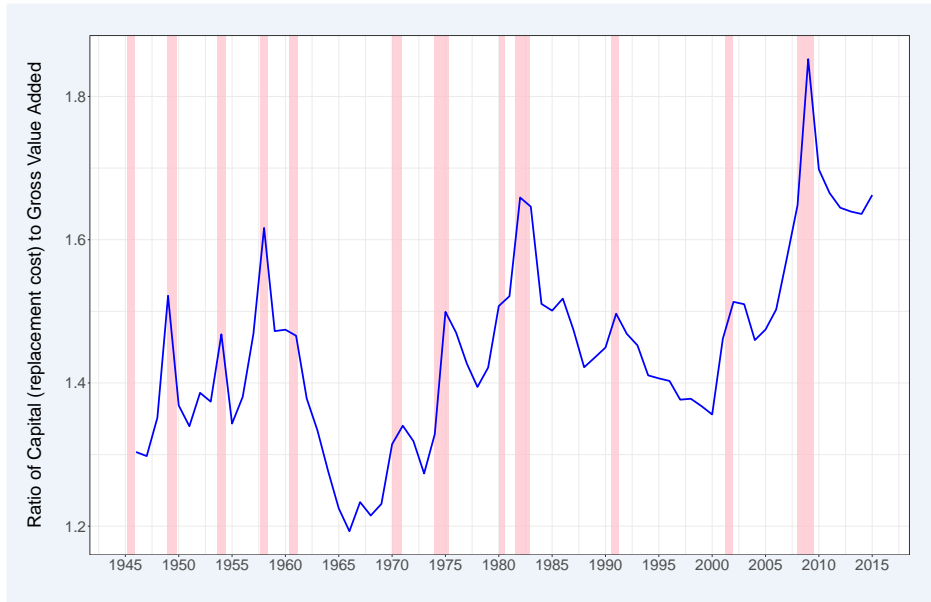
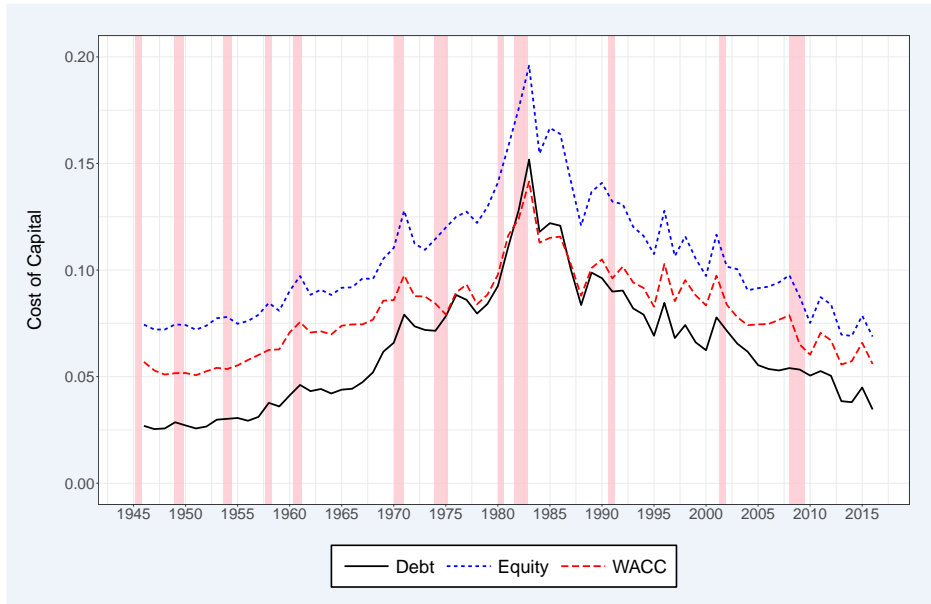


Figure 4: **Robustness**

The figure presents alternative specifications of the cost of capital, expected consumption inflation, and the required rate of return. See Section 3.2 for further details.

(a) Measures of Cost of Capital



(b) Measures of Expected Capital Inflation

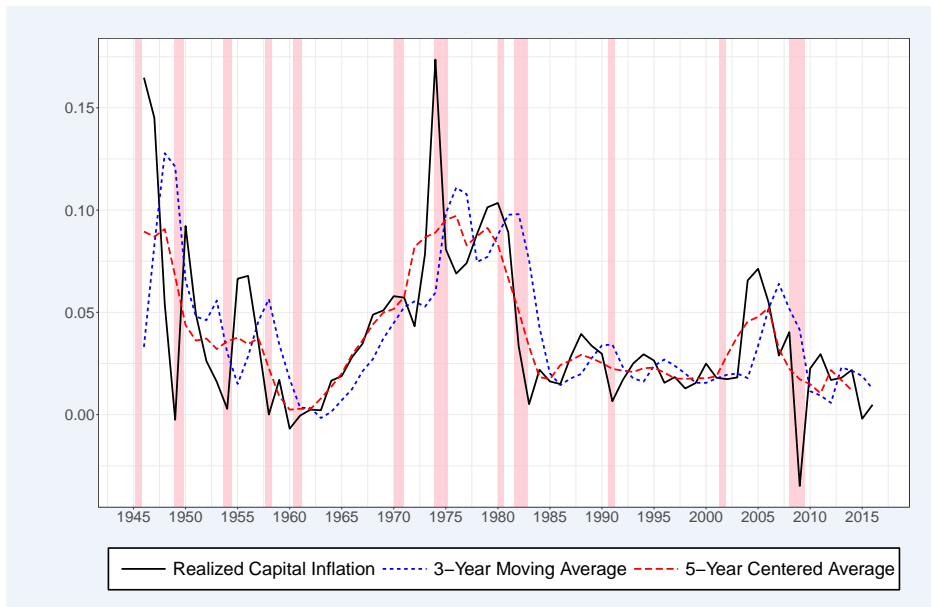
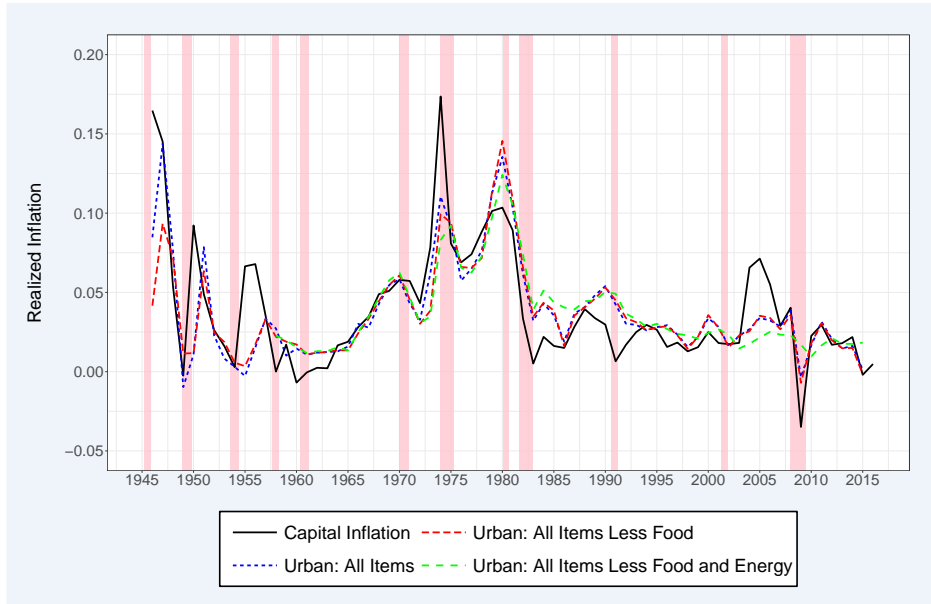


Figure 4: **Robustness** (continued from previous page)

(c) Capital and Consumption Inflation



(d) Profit Share by Required Rate of Return

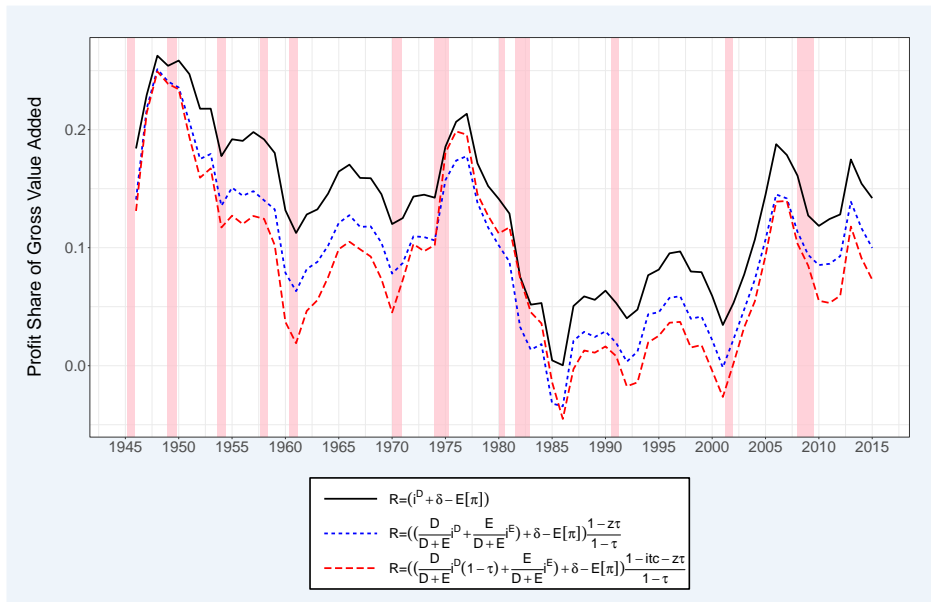
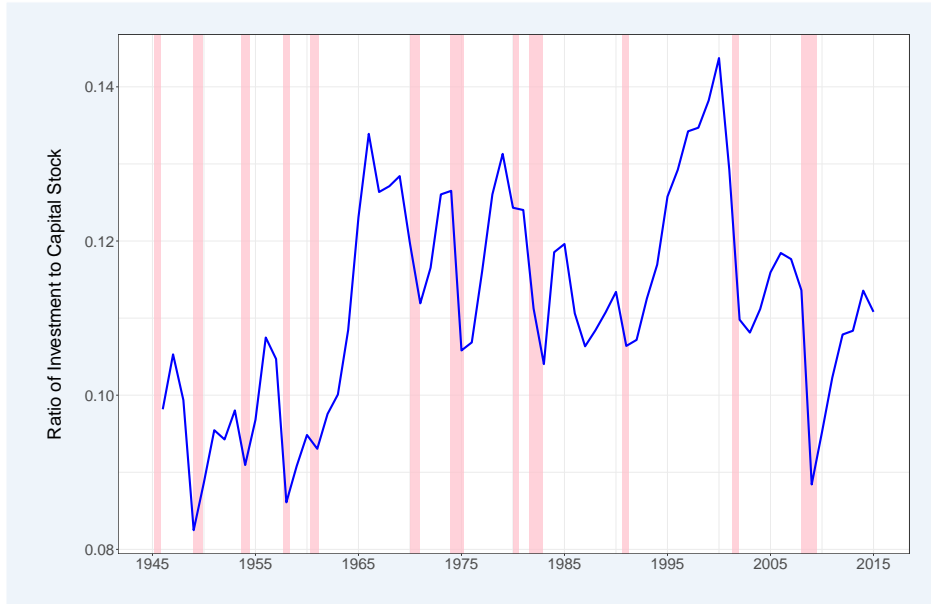


Figure 5: Ratio of Investment to Capital

The figure presents the ratio of nominal investment to the nominal replacement value of the capital stock. Panel A presents the ratio for aggregate capital. Panel B presents the ratio for each of the three BEA categories of capital. See Section 5 for further details.

(a) Aggregate Capital



(b) By BEA Category of Capital

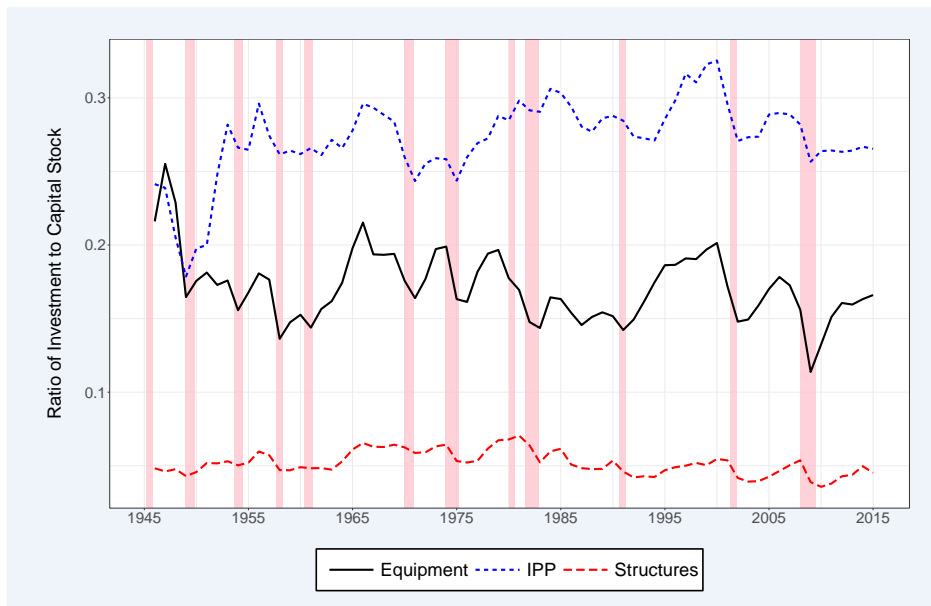


Table 1: **Comparison of Measures of Profit Share**

This table presents summary statistics of the profit share for each of the alternative measures of profits described in Section 4. See Section 4 for further details.

Measure	$sd(S^\Pi)$	$sd(\text{HP-Filtered } S^\Pi)$	Implied $\text{cor}(S^\Pi, S^K)$	Fitted Change 1946–1984	Fitted Change 1984–2015
Baseline	6.26	1.51	-0.94	-12.03	13.63
Fixed Real Rate	2.72	1.13	-0.75	-5.31	1.65
BEA Accounting Profits	4.42	1.21	-0.89	-10.73	8.02
BEA Operating Profits	5.94	1.23	-0.94	-14.85	11.38
Markup Implied Profits	2.33	1.14	-0.58	-7.85	4.11
Labor Share	2.14	0.64			

Table 2: Time Series Correlation (1951–2015)

This table presents the correlation matrix of the various measures of the profit share using each of the alternative measures of profits described in Section 4. See Section 4 for further details.

	Baseline	Fixed Real Rate	BEA Accounting Profits	BEA Operating Profits	Markup Implied Profits
Baseline	1.00	0.68	0.92	0.90	0.39
Fixed Real Rate	0.68	1.00	0.83	0.83	0.62
BEA Accounting Profits	0.92	0.83	1.00	0.98	0.56
BEA Operating Profits	0.90	0.83	0.98	1.00	0.56
Markup Implied Profits	0.39	0.62	0.56	0.56	1.00