# A Macroeconomic Perspective on Stock Market Valuation Ratios*

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## Abstract

Traditional valuation metrics for the U.S. stock market based on a comparison of the aggregate market value of U.S. corporations to measures of dividends, earnings, output, and the replacement cost of measured capital have been above historical norms for 25-30 years. Will they return to their historical means? We use macroeconomic data to argue that the observed decline in labor's share of corporate output in conjunction with relatively weak corporate investment mechanically generates a persistent decline in the ratio of corporate earnings relative to corporate valuation, even absent any changes in expected returns or growth rates.

Keywords: Earnings, Enterprise Value, Free Cash Flow

JEL classification codes: E22, E44, G12, G35

*The views expressed herein are those of the authors and not necessarily those of the Federal Reserve Bank of Minneapolis or the Federal Reserve System. This paper relies heavily on the work of the Bureau of Economic Analysis and Federal Reserve Board in producing the Integrated Macroeconomic Accounts, which aim to present a unified accounting of macroeconomic flows and asset valuations implied by financial markets. We thank Gabe Chodorow-Reich and four referees for very useful comments.

# 1 Introduction

Traditional valuation metrics for the U.S. stock market based on a comparison of the aggregate market value of U.S. corporations to measures of dividends, earnings, output, and the replacement cost of capital have been well above historical norms for the past 25-30 years. A large literature uses valuation metrics of this kind to forecast the future performance of the stock market based on the idea that these metrics should eventually mean revert.[1] But there is little sign in recent years of their doing so.

How should academics and investors interpret the fact that some of these valuation metrics have now been above their historical means for decades? Should we expect a large decline in these market valuation metrics at some point going forward as market valuations of U.S. corporations return to historical norms?[2] Or have there been structural changes in the economy that justify these historically high market valuations? If so, do these structural changes alter our interpretation of some valuation metrics more than others?[3]

In this paper, we use macroeconomic data derived from the *Integrated Macroeconomic Accounts* (hereafter IMA) to construct aggregate valuation metrics for the U.S. corporate sector to address these questions.[4] These IMA data offer a long historical record in a consistent accounting format, allowing us to discuss the proximate drivers of a range of corporate valuation metrics. Specifically, we use quarterly IMA data to construct measures of enterprise value and corporate income from 1952 through the first quarter of 2026.

We focus on valuation metrics for the U.S. corporate sector based on two broad macroeconomic measures of corporate income: one which we label *earnings* and the other *free cash flow*, where the latter is defined as earnings minus net investment. Free cash flow is the measure

[1] These ideas are put forward in Campbell and Shiller (1988a) and Campbell and Shiller (1988b) using ratios of price per share to dividends per share and earnings per share for Standard and Poor's stock market indices. Lettau and Ludvigson (2001) and Lettau and Ludvigson (2004) conduct similar analyses using ratios of the market value of U.S. corporations to macroeconomic aggregates such as consumption and output. Chapter 5 of Campbell (2018) reviews the large body of work using these valuation ratios to analyze stock market dynamics.

[2] Campbell and Shiller (2005) discuss this possibility regarding the valuation of the stock market at its peak in 2000.

[3] As an example of such a structural change, note that increased share repurchases by incumbent firms in recent decades and reduced equity issuance at initial public offerings have mechanically led to a persistent drop in the ratio of dividends per share to price per share, raising concerns about this traditional valuation metric. See Campbell and Shiller (2005), Chapter 5.3.3 of Campbell (2018), Atkeson et al. (2026) and Appendix B.4 for more discussion of these concerns. This structural change in corporate financial policies has led to greater focus on valuation metrics based on earnings, particularly the smoothed version of this metric called CAPE introduced in Campbell and Shiller (1988b).

[4] There is a growing literature using macroeconomic data to assess the drivers of corporate valuations. Seminal papers in this literature include Hall (2001), Hall (2003), and McGrattan and Prescott (2005).

of cash flows to firm owners that Miller and Modigliani (1961) take as the fundamental in corporate valuation in their seminal paper on the irrelevance of payout policy for value. It is also the measure of cash flow to firm owners in the standard growth model at the core of macroeconomics.[5]

We compare the time series for the ratio of corporate free cash flow to enterprise value to the path for the ratio of earnings to enterprise value, and show that these two valuation metrics offer seemingly contradictory signals about U.S. corporate valuations over the past several decades. In particular, we show that

1. The large increase in the ratio of enterprise value to corporate gross value added since 1980 coincides with a roughly proportional increase in the share of value added flowing to owners as free cash flow. The ratio of free cash flow to enterprise value has therefore been roughly stable, and an observer focused on this metric would not view current valuations as extreme by historical standards.

2. In contrast, the earnings yield — the ratio of corporate earnings to enterprise value — has declined dramatically since the early 1980s. It reached a historical low in the 2000 stock market boom and is approaching that low again. An observer focused on this metric might view current valuations as extreme and expect a large decline to restore the earnings yield to its historical norm.[6]

Why do these two market valuation metrics offer contradictory signals in recent decades? We argue that the differences in the evolution of these two market valuation metrics are a natural consequence of widely noted economic developments that have been reshaping the U.S. macroeconomy in recent decades. Specifically, measured investment and measured capital have been shrinking in importance as sources of corporate value. As a result, the earnings yield has been converging towards the free cash flow yield, and such a convergence would be expected to occur even in the absence of any changes in expected discount rates or growth rates. That is, our main claim is that the historical relationship between the aggregate earnings yield and subsequent stock returns that has gained so much attention among both academics and investors may have broken down.

Our main claim about the impact of changes in the importance of measured investment and capital in value on the gap between the earnings and free cash flow yields can be demonstrated as a matter of accounting. By definition, the gap between earnings and free cash flow of the

[5] In Atkeson et al. (2025b), we construct annual measures of free cash flow and enterprise value starting from 1929.

[6] See, for example, Jakab (2025).

corporate sector in our macro data is investment net of depreciation (net investment). Thus, the gap between the ratios of earnings and free cash flow to enterprise value can be written as

$$\frac{EARN_t}{V_t} - \frac{FCF_t}{V_t} = \frac{NETINV_t}{V_t} = \left(\frac{NETINV_t}{P_t^K K_{t+1}}\right) \times \left(\frac{P_t^K K_{t+1}}{V_t}\right), \tag{1}$$

where $EARN_t$ and $FCF_t$ denote nominal earnings and free cash flow during period $t$, $V_t$ is nominal enterprise value at the end of period $t$, $NETINV_t$ is nominal net investment during period $t$, and $P_t^K K_{t+1}$ denotes the nominal replacement value of the measured capital stock at the end of $t$.

Consider the first equality in equation (1). In the data, the ratio of net investment to enterprise value has fallen dramatically since the early 1980s, leading mechanically to a shrinking gap between the earnings yield and the free cash flow yield. The second equality in equation (1) offers a decomposition of this decline into two components: the ratio of net investment to the replacement value of capital and the ratio of the replacement value of capital to enterprise value. By definition, the ratio of net investment to the replacement value of capital on the right side of equation (1) is equal to the real growth in the measured capital stock (see equation 5). The ratio of the replacement value of capital to enterprise value on the right side of equation (1) reflects the importance of measured capital in enterprise value as indicated by the inverse of Tobin's Q. The gap between the earnings yield and the free cash flow yield is the product of these two terms. In our macroeconomic data, both terms have contributed to a narrowing of the gap between the earnings yield and the free cash flow yield, with the second term playing the dominant role.

To better understand the decline in aggregate net investment relative to aggregate valuation, it is useful to decompose the drivers of growth in free cash flow in recent decades. We show that this growth in free cash flow has two key sources.

One is that corporate earnings have risen strongly relative to corporate gross value added, primarily because of a decline in payments to labor as a share of value added. This trend has been emphasized by others, including Eggertsson et al. (2021) and Greenwald et al. (2025).

The second source, which is less emphasized in the existing literature, is that free cash flow has risen even more quickly than earnings, because net investment has not risen as fast as earnings. Note that

$$FCF_t = EARN_t \times \text{PayoutRatio}_t \tag{2}$$

where the payout ratio is defined as the share of earnings that is available for payout to firm owners rather than used to fund new investment:

$$\text{PayoutRatio}_t = \frac{EARN_t - NETINV_t}{EARN_t} = 1 - \frac{NETINV_t}{EARN_t} \tag{3}$$

U.S. firms have generated growth in earnings relative to value added without boosting the share of value added devoted to new investment. The fact that growth in $EARN_t$ has outpaced growth in $NETINV_t$ has translated into a rising payout ratio (equation 3), which has supercharged growth in free cash flow (equation 2). Valuations have risen at a similarly rapid pace to free cash flow, while earnings have risen more slowly, and net investment more slowly still. In terms of the accounting in equation (1), that ranking explains why the ratio of aggregate net investment to aggregate enterprise value has declined.

We do not take a stand on the structural forces driving trends in labor compensation and investment as shares of value added. Rather, unless these observed changes are somehow reversed, the earnings yield will remain low relative to historical norms, even absent any changes in the expected rate of return on stocks or in the expected growth rate of corporate earnings. Thus, standard valuation conclusions based on this familiar valuation metric should be reinterpreted.

We build on a substantial literature.

Our finding regarding the stability of the ratio of free cash flow to enterprise value extends findings in Larrain and Yogo (2008) and is consistent with the view that the persistent fall in traditional measures of the dividend yield for the stock market over the past several decades relative to historical norms is due to changes in firms' payout policies and trends in firm entry to and exit from public markets rather than to more fundamental factors.[7]

Our findings regarding a decline in labor's share, weak investment, and strong cash flow growth echo those in a growing number of papers including Gutiérrez and Philippon (2017), Farhi and Gourio (2018), Eggertsson et al. (2021), Crouzet and Eberly (2023a), Crouzet and Eberly (2023b), Greenwald et al. (2025), Corhay et al. (2025) and Atkeson et al. (2025a).

As discussed above, we see the central contribution of this paper as the insight that these prior findings immediately imply a persistent decline in the earnings yield relative to the free cash flow yield. Thus, persistently low earnings yields need not reflect mispricing, bubbles, or unusually low discount rates. Moreover, the impact of the sustained decline in net investment relative to enterprise value on the earnings yield cautions against the use of forecasting regressions that implicitly assume a stable link between earnings and cash flow to investors.

[7]See also Dichev (2007), Boudoukh et al. (2007), and Davydiuk et al. (2023).

In the remainder of this paper, we discuss the measures of cash flows and value that we construct from the Integrated Macroeconomic Accounts in Section 2. In Section 3 we examine the historical behavior of our series for free cash flow, earnings, and enterprise value and the valuation metrics implied by these series. In Section 4, we conclude. An online appendix provides detail on data sources and additional data analyses.

# 2 Macroeconomic Benchmarks for Valuation

We now describe the Integrated Macroeconomic Accounts (IMA) data that we use in our analysis.[8]

## 2.1 Derivation of IMA Free Cash Flow and Earnings

We construct *Free Cash Flow* as our comprehensive measure of the cash flows available to be paid out each quarter to owners of U.S. corporations.[9] The conceptual framework we use to measure aggregate corporate free cash flow splits the output of the corporate sector, as measured by its *Gross Value Added* ($GVA_t$), into four parts:

1. The largest portion is paid out to labor employed in the corporate sector as *Compensation of Employees* ($WL_t$). We refer to this income as *Labor Income*.

2. A second portion is paid to the government as *Taxes* ($TAX_t$). There are two main categories of taxes paid by corporations. The first is called *Taxes on Production and Imports Less Subsidies* ($IBT_t$). These correspond primarily to sales taxes and tariffs less any business subsidies. The second is called *Corporate Taxes on Income* ($CTAX_t$). These correspond primarily to corporate profits taxes.[10]

3. A third portion of output is used for *Capital Expenditures* and *net investment in inventories* ($INVEST_t$).

4. Finally, any remaining gross value added flows to owners of firms as *Free Cash Flow* ($FCF_t$).

[8] We provide precise descriptions of our data sources in Appendix A.

[9] Our conceptual measure of free cash flow corresponds to the Miller and Modigliani (1961) notion of cash flows available to owners, applied here to the aggregate U.S. corporate sector. Specifically, it is the cash flow that would be available to corporate owners if the sector were 100% equity financed and held no financial assets.

[10] We include a small data category *Business Transfers* ($BTRAN_t$) in our measure of taxes because these transfers are not available to be paid out to owners of the firms in the U.S. corporate sector.

Thus,

$$FCF_t = GVA_t - WL_t - TAX_t - INVEST_t.$$

Note that our measure of free cash flow is a comprehensive measure of the cash flows available to be paid to owners of firms. It does not differentiate between cash flows to debt (interest expenses) and cash flows to equity. Thus, it is invariant to the allocation of after-tax cash flows between debt and equity holders, holding taxes fixed. It is also invariant to firms' choices regarding whether to transfer income to equity holders via dividend payments or through share repurchases. Firms are not required to pay out their free cash flow immediately. They can use it to acquire financial assets or pay down outstanding liabilities.

Finally, free cash flow is invariant to whether firm expenditures on intangible capital are categorized as intermediate input expenses or as capital investments. In the first case, such spending reduces measured corporate gross value added, while in the second it increases measured investment, but in both cases free cash flow is reduced by the same amount.[11]

While we see free cash flow as the fundamental metric for corporate valuation, we also construct a macroeconomic measure of corporate earnings analogous to earnings measures from firms' financial accounts that are used frequently in constructing benchmarks for equity valuation. To construct our macroeconomic measure of corporate earnings, we add back to free cash flow net investment.

We define *Earnings* as

$$EARN_t = FCF_t + NETINV_t.$$

where *Net Investment* is investment minus consumption of fixed capital, $CFC_t$:

$$NETINV_t = INVEST_t - CFC_t.$$

Note that by construction, earnings equal net operating surplus minus corporate taxes minus business transfers.

## 2.2 Derivation of IMA Enterprise Value

We label our measure of the market valuation of the non-financial assets of the corporate sector *Enterprise Value* ($V_t$). The Integrated Macroeconomic Accounts include balance sheets for the non-financial and financial components of the corporate sector that can be used to

[11]See also Atkeson (2020). In contrast, measured earnings *is* impacted by the accounting treatment of intangible investment. See Appendix C for further discussion of this point.

construct a series for enterprise value. With some minor accounting adjustments, enterprise value is constructed by adding together the market value of corporate equities (both those publicly traded and an imputation of the value of closely held equity) plus liabilities, less financial assets.

Our measure of enterprise value differs from the market value of corporate equities in two important respects. First, it is invariant to the mix of net debt and equity firms use in their financing.

Second, it incorporates an imputed value of the U.S. subsidiaries of foreign multinationals and deducts an imputed value of the foreign subsidiaries of U.S. multinationals. Thus, it corresponds to a measure of value for all U.S. resident corporations (those filing U.S. corporate tax returns). This is the same universe of corporations used to construct the free cash flow and earnings series described above.

Our measure for the replacement value of capital is based on the current cost of fixed assets in the corporate sector as reported in the Fixed Assets Tables of the Bureau of Economic Analysis (BEA). We add to this measure the stock of corporate inventories at current cost. The BEA constructs the replacement cost of the fixed assets by cumulating capital expenditures net of consumption of fixed capital (net investment) with an adjustment for the change from one period to the next in the nominal price of capital goods. As a matter of the accounting done by the BEA, this series evolves over time according to

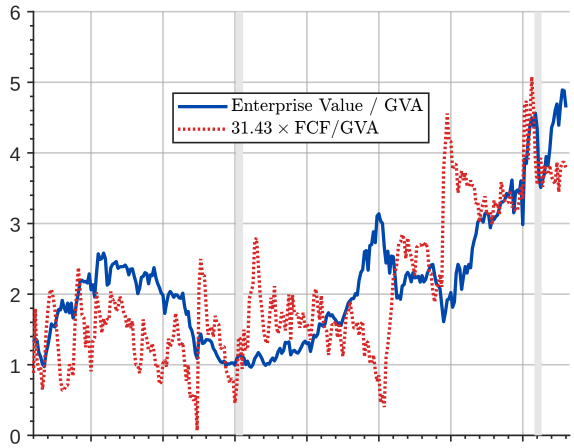
$$P_t^K K_{t+1} = P_{t-1}^K K_t + \underbrace{(P_t^K - P_{t-1}^K) K_t}_{revaluation} + NETINV_t. \tag{4}$$

Here $P_t^K$ is the nominal price of capital goods and $K_{t+1}$ is the measured capital stock at the end of period $t$, available for production in period t+1. The product $P_t^K K_{t+1}$ is the nominal replacement cost of capital at the end of period $t$. A similar valuation adjustment is made for inventories.[12]

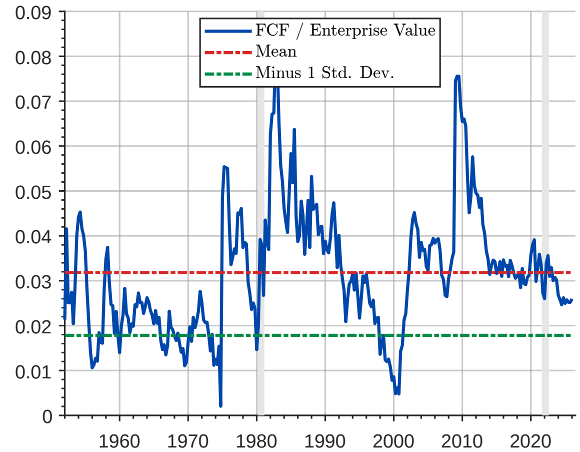
Dividing both sides of this accounting equation by $P_t^K K_{t+1}$ gives our relationship between net investment and the growth of the capital stock

$$\frac{K_{t+1} - K_t}{K_{t+1}} = \frac{NETINV_t}{P_t^K K_{t+1}}. \tag{5}$$

[12]The time path for the capital stock is plotted in Appendix Figure A9.




**(a)** Blue solid: Enterprise Value over Gross Value Added. Red dashed: Predicted Enterprise Value over GVA measured as 31.43 $\times FCF_t/GVA_t$




**(b)** Blue solid: Free Cash Flow over Enterprise Value. Red dashed: Sample mean of this ratio. Green dashed: Sample mean less one sample standard deviation of this ratio.

**Figure 1:** Valuation Metrics based on Free Cash Flow.

# 3 Corporate Valuation Metrics

We now review standard valuation metrics using our IMA data for the U.S. corporate sector. We first examine the joint evolution of free cash flow and enterprise value. We next consider the evolution of earnings relative to enterprise value. Finally, we document that observed declines in the labor share coupled with weak investment account for the joint dynamics of the free cash flow yield and the earnings yield.

## 3.1 Growth in Valuations versus Free Cash Flow

The solid line in Figure 1a plots our IMA data for the enterprise value of the U.S. corporate sector relative to the gross value added of that sector (GVA) since 1952. Enterprise value has boomed dramatically in recent decades, and is now at a historical peak.[13]

How much of the enterprise-value boom can be accounted for by the boom in free cash flow? The Gordon Growth Model provides and simple benchmark.[14] According to this model, under the assumptions that free cash flow is expected to grow at a constant rate $g$ and that investors discount these cash flows at a constant rate $r$, we get a prediction $\hat{V}_t$ for enterprise

[13] In Appendix A.1 Figure A1 we show that enterprise value closely tracks the aggregate market capitalization of publicly traded equities.

[14] This valuation model is named after Myron J. Gordon and was first published in Gordon and Shapiro (1956).

value of

$$\frac{\hat{V}_t}{GVA_t} = \frac{1+g}{r-g} \times \frac{FCF_t}{GVA_t},$$

corresponding to a constant valuation ratio of $(1+g)/(r-g)$.

The dotted line in Figure 1a shows the prediction of this valuation model $\hat{V}_t/GVA_t$ valuing current free cash flow at a constant multiple of 31.43 (so $r - g = (1+g)/31.43 \approx 0.0325$).[15] We see in this figure that, at this constant valuation multiple, the increase in free cash flow that firms generated for their owners between 1980 and 2022 accounts for all of the increase in the ratio of enterprise value to output observed over that period. There has been a significant additional increase in enterprise value relative to free cash flow in the most recent three years. We return to this observation in Section 3.5.

The solid line in the right panel of Figure 1 shows the free cash flow yield defined as the ratio of free cash flow to enterprise value, $FCF_t/V_t$. The dashed horizontal lines show the historical mean for this ratio, and the value that is one standard deviation below the mean. We see that this valuation ratio has fluctuated substantially since 1952, but it does not show a clear trend over the last 70 years. In particular, it has crossed its historical mean several times in the past 30 years. We do see a sharp decline in the free cash flow yield over the past three years , but at the end of the sample it is not at a historical low; it is less than half a standard deviation below its historical mean.[16]

## 3.2 Free Cash Flow Yield versus Earnings Yield

In standard valuation models, including the Gordon Growth Model, corporate valuations are ultimately tied to cash flows – income payable to firm owners – and not to accounting measures of earnings or profits which do not subtract the costs of net investment. Nonetheless, the price-to-earnings ratio, or its inverse, the earnings yield, is a commonly-used benchmark for equity valuation. The logic is that if investment is volatile, then earnings might be a better predictor of future cash flow than cash flow itself.

Figure 2 shows our macroeconomic measure of the free cash flow yield (solid line) together with our measure of the earnings yield (dashed). We see that in recent years the earnings

[15] We choose this valuation multiple for free cash flow as it corresponds to the historical mean in our data of the free cash flow yield measured as $FCF_t/V_t$.

[16] We do not intend to claim that the ratio of free cash flow to enterprise value is stationary in a strict statistical sense. From a macroeconomic perspective, such a strict notion of stationarity would require that the economy be fluctuating around a balanced growth path with a constant gap between the discount rate and the growth rate. We discuss possible evidence for a secular trend in the ratio of free cash flow to enterprise value in Appendix D.1.

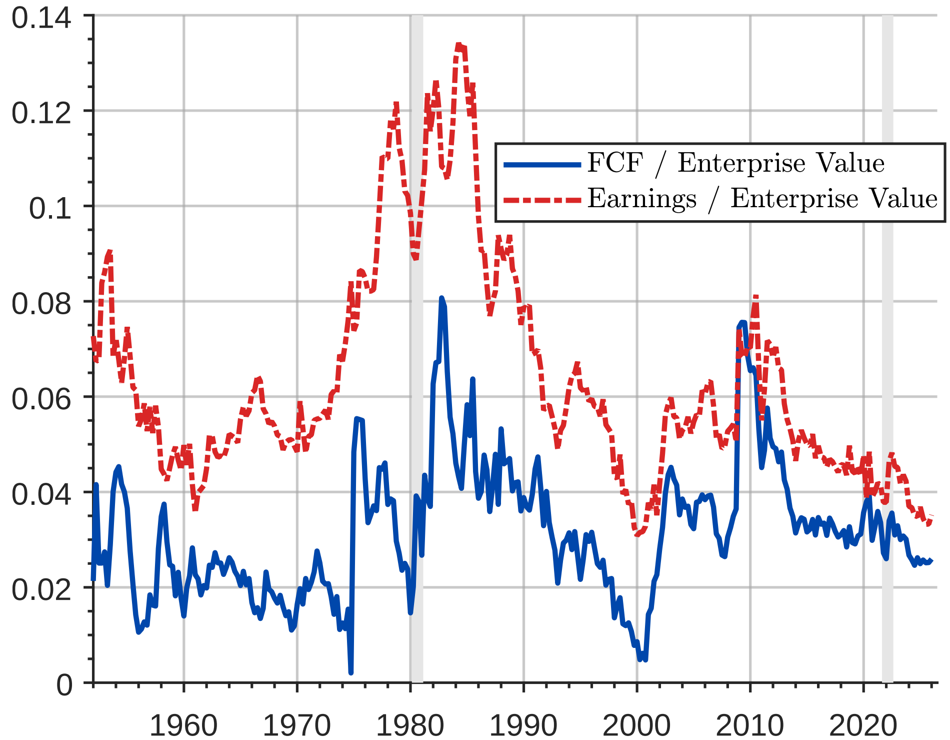



**Figure 2:** Free Cash Flow and Earnings over Enterprise Value.

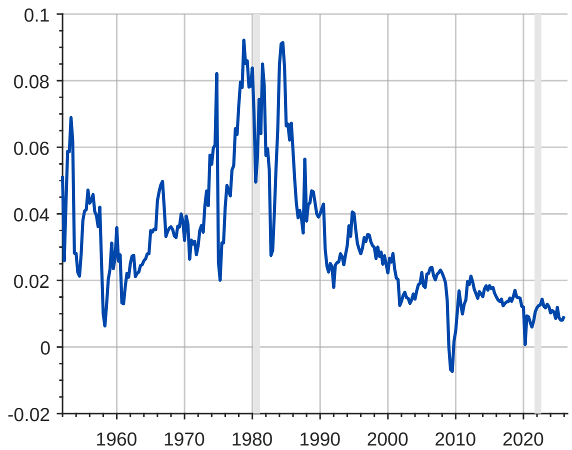
yield has fallen to historically low levels while the free cash flow yield is closer to historical norms. Specifically, consider the average values of these valuation ratios over the period 1980Q2 - 1981Q1 versus the period 2021Q4 - 2022Q3 (these two sub-periods are shaded light grey in the figure). The average free cash flow yield was close to its historical mean in both of these four quarter time periods: 3.10% in the first period and 3.07% in the second.. In contrast, the average earnings yield fell dramatically across these two time periods, from 9.37% to 4.26%. The figure also shows that the earnings yield is now much closer to the free cash flow yield than was the case in the past.

In our online appendices we compare our IMA valuation metrics with analogous metrics constructed from data on publicly traded firms. We find that they are quite similar.

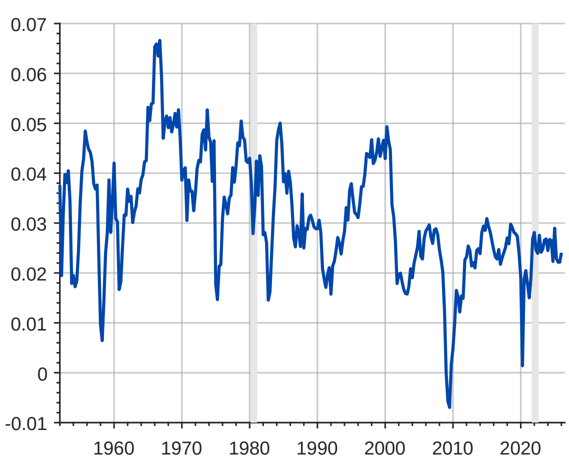
## 3.3 The Decline in Net Investment Relative to Valuation

What accounts for this different behavior of the earnings yield and the free cash flow yield? By equation (1), the gap between the two yields is the ratio of net investment to enterprise value, plotted in the top panel of Figure 3. The gap has narrowed because the ratio of net investment to enterprise value has fallen sharply since 1980.

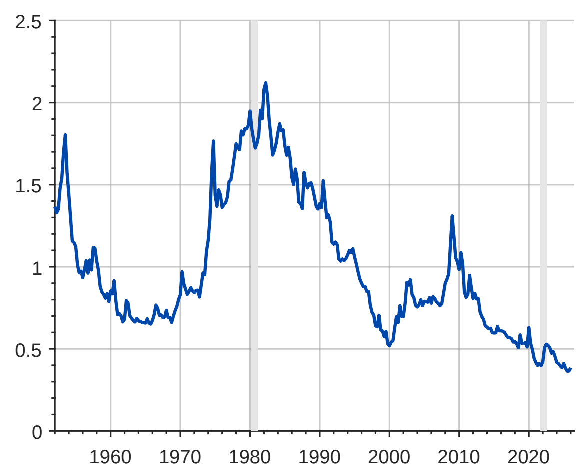
Equation (1) indicates that the ratio of net investment to enterprise value can fall for two




**(a)** Net Investment over Enterprise Value. Equals the product of the terms on the right-hand side of equation (1).




**(b)** Net Investment over Measured Capital.




**(c)** Measured Capital over Enterprise Value.

**Figure 3:** Net Investment over Enterprise Value and its Components.

reasons. One is a fall in the ratio of net investment to measured capital. A fall in this ratio reflects a decline in the real growth rate of measured capital (see equation 5). This ratio has fallen steadily since the mid 1960s, consistent with a trend decline in the growth of corporate output. The second reason is a fall in the ratio of measured capital to enterprise value (the inverse of Tobin's Q). This ratio declined sharply from around 1.8 in the early 1980s to a value below 0.5 at the end of our sample period. We plot both ratios in the bottom two panels of Figure 3. The decline in the importance of measured capital in enterprise value accounts for over two-thirds of the decline in the gap between the earnings yield and the free cash flow yield over the two four-quarter periods we considered above: 1980Q2 - 1981Q1 and 2021Q4 - 2022Q3. The decline in the net investment rate explains the rest.[17]

$$\underbrace{\frac{EARN_t}{V_t}}_{\substack{\frac{r}{1+g} \text{ in GM} \\ \frac{r-g}{1+g} \text{ in LT}}} = \underbrace{\frac{FCF_t}{V_t}}_{\substack{\frac{r-g}{1+g} \text{ in GM} \\ \frac{r-g}{1+g} \text{ in LT}}} + \underbrace{\left(\frac{NETINV_t}{P_t^K K_{t+1}}\right)}_{\frac{g}{1+g} \text{ in GM}} \times \underbrace{\left(\frac{P_t^K K_{t+1}}{V_t}\right)}_{\substack{1 \text{ in GM} \\ 0 \text{ in LT}}} \tag{6}$$

Equation (6), which restates equation (1), offers additional intuition for why the earnings yield has declined sharply while the free cash flow yield appears relatively stable. Consider two commonly-used frameworks for asset pricing – the standard growth model (GM) and the Lucas tree model (LT). These two models are polar opposites in terms of their implications for the importance of measured capital in enterprise value. In the standard growth model, firm output is produced with a neoclassical technology $Y_t = F(K_t, L_t)$ and free cash flow to firm owners is the residual of output after payments to labor and investment,

$$FCF_t = Y_t - W_t L_t - (K_{t+1} - (1 - \delta)K_t),$$

where $\delta K_t$ denotes consumption of fixed capital. Earnings are given by free cash flow plus net investment,

$$EARN_t = FCF_t + (K_{t+1} - K_t).$$

In contrast, in the Lucas tree model, there is no capital or investment. Output and its division into labor income and free cash flow to firm owners are exogenous. Because net investment is zero, earnings, by definition, are equal to free cash flow.

[17] The gap between the average earnings yield and free cash flow yield over these two four-quarter time periods narrowed from 6.27% to 1.19%, which is a decline in this gap of 1.66 log points. The ratio of net investment to capital fell from 3.53% to 2.59%, contributing 0.31 log points to this decline. The ratio of measured capital to enterprise value fell from 177% to 46% contributing the remaining 1.34 log points of this decline in the gap.

The labels under the various terms in equation (6) report the values those terms take in each model on a balanced growth path. In both frameworks, the free cash flow yield on a balanced growth path is given by the familiar Gordon Growth Model expression, corresponding to the difference between the required rate of return on claims to corporate cash flows $r$ and the growth rate of the economy $g$ (or more precisely, $(r-g)/(1+g)$). The second term on the right-hand side of equation (6) differs across the two models. In the growth model, the balanced growth path growth rate of the capital stock is equal to $g$, while Tobin's Q is equal to one. Thus, in the standard growth model, we get the well-known result that the balanced growth path earnings yield is equal to $r/(1+g)$. In contrast, the Lucas tree model has no capital or net investment, so its balanced-growth-path earnings yield equals its free cash flow yield.

Over time, one can think of the U.S. corporate sector having gradually transitioned from something closer to the standard growth model benchmark (in which Tobin's Q equals one) toward something closer to the Lucas tree economy in which measured capital and investment are much less important . In this light, equation (6) indicates that we should expect a persistent fall in the earnings yield over time, even if both $r$ and $g$ have remained constant. Moreover, we should not expect the earnings yield to return to its historical mean even if the free cash flow yield does so return.

### 3.4 Why Has Free Cash Flow Boomed?

Figure 4 illustrates how a decline in labor's share of value added accounts for the rise in corporate earnings. The solid line (left axis) plots aggregate earnings divided by gross value added. The dotted line (right axis) shows $1 - WL_t/GVA_t$. Note that both the left and right axes have the same total span of 0.14. The figure illustrates that a declining labor share has driven strong growth in corporate earnings, as others have emphasized.

But free cash flow has grown even more strongly than earnings, in percentage terms. Equation (2) implies that free cash flow is equal to earnings times the payout ratio, which measures the fraction of earnings remaining as cash flow after funding new investment. If net investment rises faster than earnings, the payout ratio will decline, and free cash flow will grow more slowly than earnings. Conversely, if net investment rises more slowly than earnings, the payout ratio will rise, and free cash flow growth will exceed growth in earnings.[18] Figure 5 plots the dynamics of earnings and net investment as shares of gross value added, and the implied payout ratio. Up until around 2000, both earnings and net investment were relatively

[18] Greenwald et al. (2025) assume that net investment is a fixed fraction of output, and note that this implies what they label a "leverage effect" that makes cash flow more volatile than earnings.

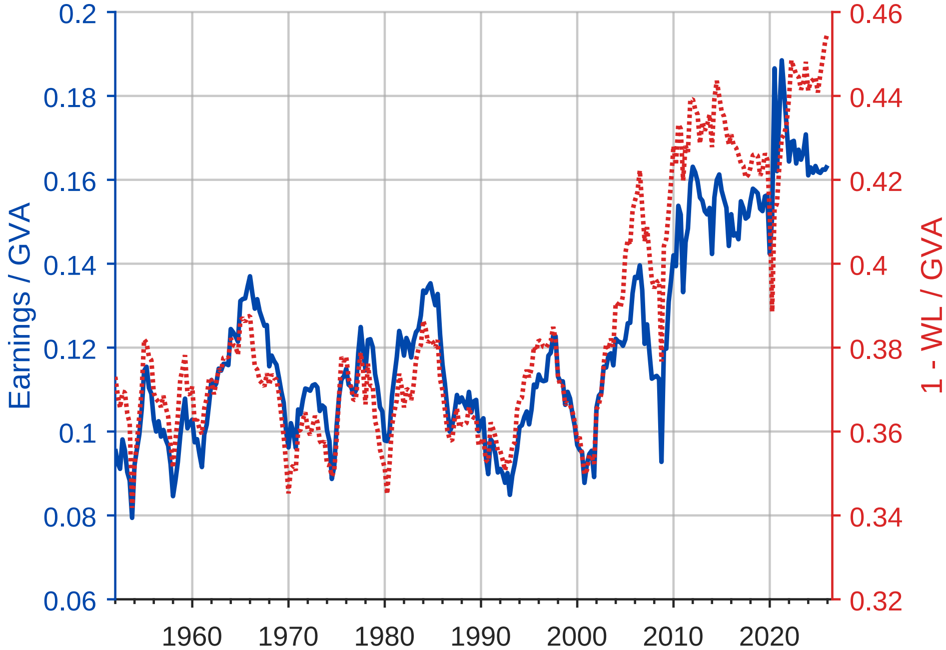
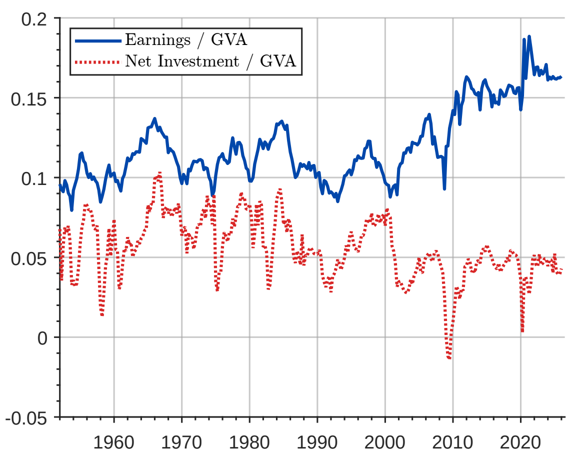
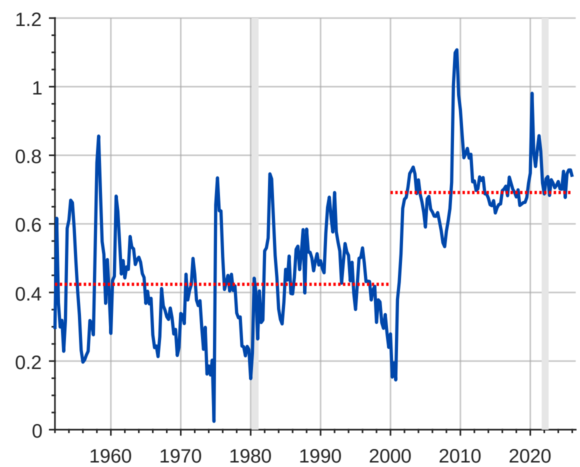



**Figure 4:** Blue solid (left axis): Earnings over Gross Value Added. Red dotted (right axis): One minus Compensation of Employees over Gross Value Added.




**(a)** Earnings and Net Investment over Gross Value Added.




**(b)** Payout Ratio: Free Cash Flow over Earnings. The dotted red lines show the average values for the payout ratio in the pre- and post-2000 subperiods.

**Figure 5:** Earnings, Net Investment, and the Payout Ratio.

stable shares of value added, implying a stable payout ratio around 0.42. In the period of rapid earnings growth post-2000, the share of value added used to fund new investment has actually declined slightly, implying a substantial increase in the payout ratio to 0.7. Thus, equation (2) implies much faster growth in free cash flow than in earnings over this period.[19]

Net investment growth has been weaker than earnings growth, which explains why cash flow growth has outpaced earnings growth and why the gap between the earnings yield and the free cash flow yield has narrowed. Free cash flow growth and thus valuation growth have been supercharged because U.S. corporations have generated growth in earnings without increasing the share of value added devoted to investment.[20]

### 3.5 Recent Developments and the Outlook

Figure 1 shows that the ratio of current free cash flow to enterprise value had fallen to 2.59% at the end of Q1 2026. What would it take to return the free cash flow yield from this most recent level to a higher yield of 3.18% in line with the historical average?

Using the left panel of Figure 1 as guidance suggests two scenarios. One would involve a decline in enterprise value relative to output so that the solid line in that figure falls to meet the dotted line. This would entail a drop in the ratio of enterprise value to output of 20 log points (or, in dollar terms, of roughly $15 trillion).

A second scenario would involve a future sustained increase in the ratio of free cash flow to output so that the dotted line in that figure rises to meet the solid line. This would correspond to an increase in the ratio of free cash flow to output to 14.7%. Such a change in the ratio of free cash flow to output might be accompanied by a further sustained decline in the labor share of roughly 2.7 percentage points. While this would be a large change in the share of labor compensation in corporate output, it would not be unprecedented relative to experience over the past several decades.

A third possibility is that there have been changes recently in the spread between the discount rate for enterprise value and the expected growth rate that could turn out to be persistent, leading to a persistent decline in the ratio of free cash flow to enterprise value.[21]

[19] Dividing both sides of equation (2) by enterprise value and taking logs gives an additive decomposition: $\log(EARN_t/V_t) = \log(FCF_t/V_t) - \log(\text{PayoutRatio}_t)$. Across the two four-quarter periods used above, the log earnings yield declined by roughly 0.79 log points. Because the free cash flow yield was essentially unchanged , an equal-sized rise in the log payout ratio accounted for all of this decline.

[20] Appendix Figures A8 and A10 plot free cash flow, earnings and net investment as shares of GVA.

[21] In Appendix D.1, we compare the ratio of free cash flow to enterprise value to estimates by Holston et al. (2017) of the gap between the trend real interest rate (plus a 400-basis-point equity-premium adjustment) and the trend growth rate for the period since 1961.

Note that Figure 5a shows no increase in net investment at the end of our sample, notwithstanding the widely noted surge in AI-related capital expenditures. Net investment is also flat relative to value added in the aggregate of firms in our Compustat sample. Thus, while one might have conjectured that a surge in AI-related investment would reverse the narrowing differential we have documented between earnings and free cash flow, there is no sign to date of this happening.

# 4 Conclusion

In this paper, we have used macroeconomic data to argue that, given the widely-observed macroeconomic developments that have occurred over recent decades, we should not expect stock market valuation metrics other than the free cash flow yield to return to their historical means. The earnings yield has fallen in a persistent fashion relative to the free cash flow yield, because firms have generated more earnings as a share of value added without increasing measured net investment.

The literature offers at least four possible explanations.

The first possibility is that investment is mismeasured in the data, and that in fact there *has* been a large rise in investment in intangible capital that is not captured in the national accounts.[22] If rising intangible investments have been inappropriately classified as purchases of intermediate inputs, then measured earnings may be understated. Note that under this hypothesis, as discussed earlier, free cash flow and enterprise value are still measured correctly, and thus the free cash flow yield remains an appropriate valuation benchmark.

A second potential factor is slowing growth. If economic growth slows, so will net investment as a share of value added, and this ratio has indeed declined somewhat over our sample period. If growth slows to the point that net investment falls to zero, then the earnings yield and the free cash flow yield will converge. However, it is not clear why slowing growth should boost corporate earnings as a share of output.[23]

A third potential explanation is that some portion of the observed increase in measured free cash flow and enterprise value represents a shift in how payments to employees are classified. First, grants of equity options have become more important relative to salary for highly skilled workers.[24] Second, S-corporations have become an increasingly important component

[22] See, for example, Eisfeldt and Papanikolaou (2014), Corrado et al. (2022), and the papers cited therein.

[23] Whether slowing growth should generate a decline in the earnings yield or a rise in the free cash flow yield depends on how equilibrium returns vary with growth.

[24] See, for example, Eisfeldt et al. (2023).

of the corporate sector, and the owners of such closely held firms may prefer to take their compensation as capital income rather than labor income.[25]

A final possible explanation for the strong observed growth in earnings absent growth in measured investment is that firms have enjoyed an increase in monopoly power in recent decades, and that this has allowed them to earn greater pure rents or "factorless income" that is not income to capital.[26]

We leave the resolution of which of these economic factors are at play to future research.

[25]See, for example, Smith et al. (2019) and Bhandari and McGrattan (2021).

[26]See, for example, Gutiérrez and Philippon (2017), Farhi and Gourio (2018), Karabarbounis and Neiman (2019), de Loecker et al. (2020), and Barkai (2020).

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# Online Appendix

There are four appendices. Appendix A describes our construction of variables using data from the Integrated Macroeconomic Accounts. Appendix B compares our IMA-based valuation metrics to counterparts for the 500 firms in the Standard and Poor's index. Appendix C compares our valuation metrics to counterparts computed using the universe of firms in the CRSP/Compustat data set. Appendix D includes some additional plots from our IMA data.

## A IMA Data Sources and Variable Construction

We obtain measures of Gross Value Added (line 1), Consumption of Fixed Capital (line 2), Net Operating Surplus (line 8), Compensation of Employees (line 4), Taxes on Production and Imports less Subsidies (line 7), Business Current Transfer Payments (line 10), and Corporate Taxes on Income (line 19) for the domestic corporate business sector from the Bureau of Economic Analysis' (BEA) National Income and Product Account (NIPA) Table 1.14 vintage May 28, 2026. In the data, quarterly flows are reported at an annual rate. When computing rates of return, we divide these flows by 4. Our yield measures do not divide flows by 4.[27]

We measure Capital Expenditures as Gross Fixed Capital Formation. Thus, our measure of Investment is the sum of Gross Fixed Capital Formation plus the Change in Inventories for the Non-financial Corporate Sector from Table S11.1.i.a (series FA105019085.Q and FA105020005.Q ) and for Domestic Financial Business from Table S12.i.a (series FA795013005.Q) of the Integrated Macroeconomic Accounts available in the Board of Governors of the Federal Reserve System *Financial Accounts of the United States*.[28] All Financial Accounts data come from the June 11, 2026 release. Note that with this release, all of the tables have been renumbered. The series identifiers have remained the same.

We obtain measures of the market value of the non-financial assets (i.e., enterprise value)

[27]Corporate-sector gross value added is a production-side measure of the value added by domestic corporate businesses. It is equal to the sum of gross value added across firms in the corporate sector, where firm-level gross value added is gross output less intermediate inputs, including imported intermediate inputs. The total sales or receipts of firms in the corporate sector correspond more closely to gross output than to gross value added, and the measures of revenue or sales available for publicly traded firms are therefore closer to gross output than to gross value added. Gross value added does not have a direct counterpart in standard financial accounting statements. It does, however, have a clear macroeconomic interpretation: it is the contribution of the domestic corporate sector to U.S. GDP. Gross value added of the domestic corporate sector is typically a bit less than 60 percent of total U.S. GDP. The remainder of GDP is produced by the household and non-corporate business sectors, including housing and commercial real estate, and by federal, state, and local governments.

[28]Available at https://www.federalreserve.gov/releases/z1/.

in the Non-financial Corporate Sector (series LM102010405.Q) and for Domestic Financial Business (series LM792010405.Q) from Table S1.b of the *Financial Accounts of the United States*. These series are defined in these financial accounts as the market value of corporate equity, plus foreign direct investment: equity, plus miscellaneous other equity (excluding proprietors' equity), plus total liabilities, less total financial assets. We use the sum of these series as our measure of Enterprise Value. We obtain measures of the current cost of the fixed assets in these two sectors from the *Financial Accounts of the United States* (series FL105015085.Q and FL795013865.Q) which reports measures from the BEA's Fixed Assets Tables. We obtain a measure of the stock of inventories for the non-financial corporate sector from series LM105020015.Q. All of these measures are end-of-quarter estimates. We take the sum of these measures for the Non-Financial Corporate Sector and for Domestic Financial Business as our measure of the replacement value of the capital stock for the U.S. corporate sector.

We obtain measures of the value of publicly traded equities from Table F51.1.s of the *Financial Accounts of the United States*. We sum the values of publicly traded equities for the non-financial corporate sector (series LM103164115.Q) and for U.S. Chartered Depository Institutions (series LM763164113.Q), Property and Casualty Insurance Companies (series LM513164113.Q), Life Insurance Companies (series LM543164113.Q), Government Sponsored Enterprises (series LM403164105.Q), Mortgage Real Estate Investment Trusts (series LM643164113.Q), Security Broker Dealers (series LM663164113.Q), Holding Companies (series LM733164113.Q), and Other Financial Businesses (series LM503164115.Q). We exclude closed end funds and exchange traded funds from our calculation of public equity value.

One important issue with our macroeconomic data is that it is collected on what is called a *residence* basis. Many firms are large multinational enterprises. The units of those firms that are incorporated in the United States (and which file U.S. corporate tax returns) are considered U.S. resident corporations, regardless of whether they have domestic or foreign parents. This measurement basis is different from what is typically reported in public firm accounting statements. Our measures of economic flows and capital stocks are those for U.S. resident corporations. Our measure of enterprise value also focuses on U.S. resident corporations as we add in estimates of the value of FDI equity of foreign parents in the U.S. subsidiaries and subtract the value of FDI equity that U.S. parents have in their foreign subsidiaries. See Avdjiev et al. (2018) and Atkeson et al. (2025a) for a discussion of these measurement issues.

The BEA and the Federal Reserve use many data sources to assemble these measures. These are discussed in the following documents.

See https://www.federalreserve.gov/econresdata/notes/feds-notes/2014/measuring-direct-investment-in-the-financial-accounts-of-the-united-states-20141031.html and https://www.federalreserve.gov/econresdata/notes/feds-notes/2016/corporate-equities-by-issuer-in-the-financial-accounts-of-the-united-states-20160329.html for discussions of how FDI equity and closely held corporations are valued in the Financial Accounts of the United States.

The BEA benchmarks its measures of Domestic Corporate Profits and Net Interest for the corporate sector using data from the Internal Revenue Service's summary of corporate tax filings in its *Statistics of Income* annual series. The adjustments that the BEA makes to these data are detailed in NIPA Tables 7.16 and 7.17 respectively. See also Chapters 13 and 14 of the Bureau of Economic Analysis (2024) NIPA Handbook.[29]

The data sources that the BEA uses to measure investment are described in Kornfeld (2025).

The BEA offers comparisons of its measures of Corporate Profits with earnings of public firms in Mead et al. (2004) and Hodge (2011). See also Himmelberg et al. (2004) and Dichev and Zhao (2021).

## A.1 IMA Enterprise Value vs Value of Publicly Traded Equity

Figure A1 plots enterprise value (solid line, left axis) against the market capitalization of publicly traded equities of U.S. corporations (dotted line, right axis) as reported in the *Financial Accounts of the United States*. Both series are relative to corporate gross value added. The right axis of this panel spans the same range as the left axis, but is shifted down by 0.5. We take away from this figure that the large majority of the fluctuations in the ratio of enterprise value to corporate output correspond to movements in the market value of public equities.[30]

[29] Available at https://www.bea.gov/resources/methodologies/nipa-handbook.

[30] Recall that the difference between these two series corresponds to the imputed value of closely held equities as well as the value of liabilities less financial assets relative to $GVA_t$.

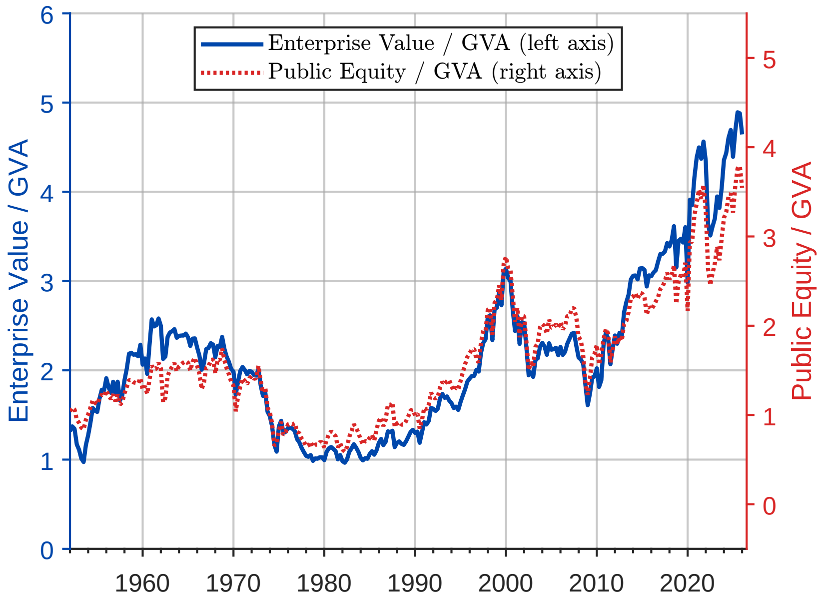



**Figure A1:** Enterprise Value and Public Equity over Gross Value Added.

# B Comparison between IMA and S&P 500

## B.1 Returns: IMA and S&P 500

Here we compare the realized quarterly nominal returns on enterprise value implied by our IMA data to the realized total return (with dividends) on the S&P 500 index. We show that these two return measures correspond closely over the period 1952 Q2 through 2025 Q4.

We construct realized nominal returns from our IMA data using

$$1 + r_{t+1}^{IMA} = \frac{V_{t+1} + FCF_{t+1}/4}{V_t}$$

We divide free cash flow by 4 as this series is reported annualized and these are quarterly data. Our series for IMA returns starts in 1952 Q2 as $V_t$ is enterprise value at the end of period $t$. We obtain monthly total returns on the S&P 500 from CRSP and compound these returns to give returns on a quarterly basis.

We first report the means and standard deviations of log returns in these two data sets.

Mean log nominal returns quarterly: S&P 500 0.0268. IMA 0.0278
Standard deviation of log nominal returns quarterly: S&P 500 0.0789. IMA 0.0635
The correlation of S&P 500 and IMA log nominal returns quarterly is 0.9110.

In Figure A2 we plot our two series for realized nominal returns. The IMA returns are solid

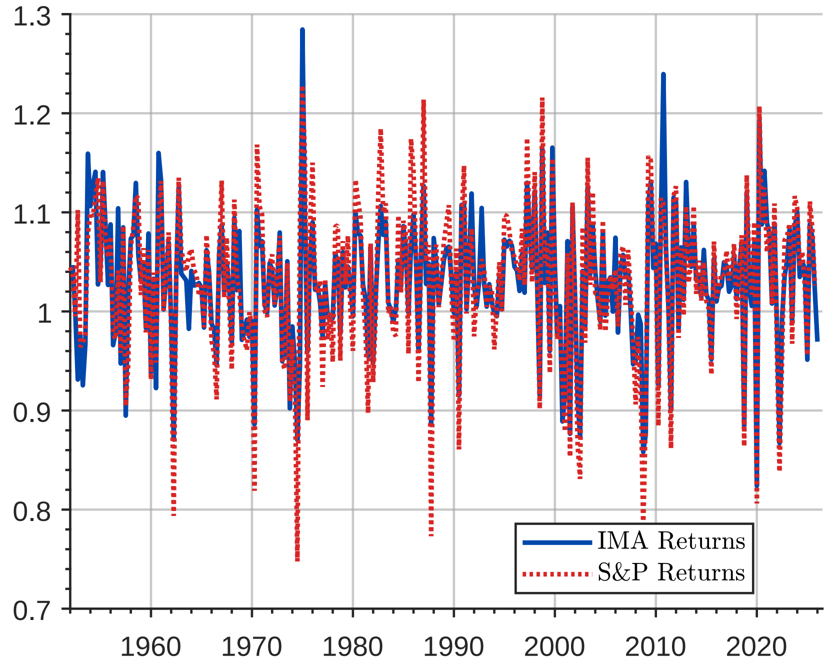



**Figure A2:** IMA and S&P Nominal Returns, 1952-2025.

blue and the S&P are dotted red. Figure A3 shows a scatter plot of these two return series with S&P 500 returns on the x-axis and IMA returns on the y-axis. The red line in that figure is a 45-degree line.

The fact that S&P returns are more volatile than IMA returns reflects the fact that equities are a leveraged claim on enterprise value.

## B.2 IMA Free Cash Flow Yield versus S&P Free Cash Flow Yield

Standard and Poor's offer a measure of the free cash flow yield on the firms in the S&P 500 index quarterly starting in 1990.[31] In Figure A4, we compare our macroeconomic measure of the ratio of free cash flow to enterprise value in solid blue to this measure of the free cash flow yield provided by Standard & Poor's in dotted red. We see in this figure that these two measures correspond fairly closely.

## B.3 IMA Earnings Yield versus Shiller's S&P Earnings Yield

Figure A5 shows our measure of the macroeconomic earnings yield for the corporate sector in solid blue alongside monthly data on the earnings yield of the S&P 500 reported by Robert

[31] Our data for the *Free Cash Flow Yield* for the S&P 500 index is taken from the valuation data for the SPX Index available on Bloomberg.

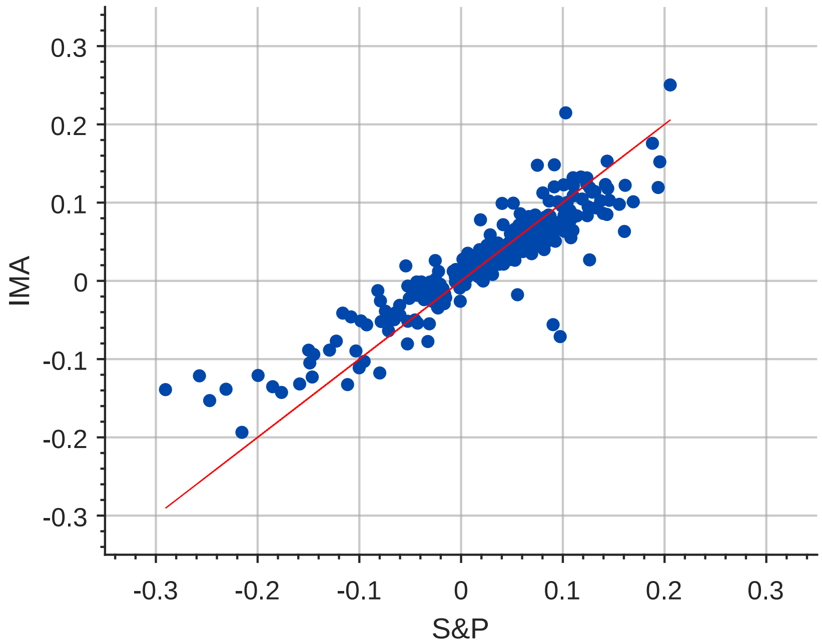



**Figure A3:** IMA and S&P Log Nominal Returns, 1952-2025.

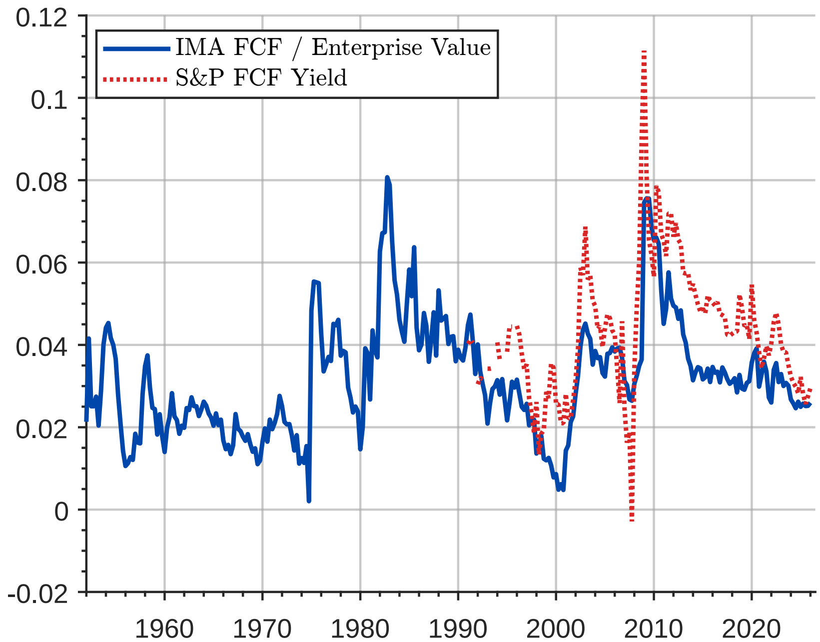



**Figure A4:** Solid blue: Free Cash Flow over Enterprise Value from the Integrated Macroeconomic Accounts. Dotted red: S&P Free Cash Flow Yield.

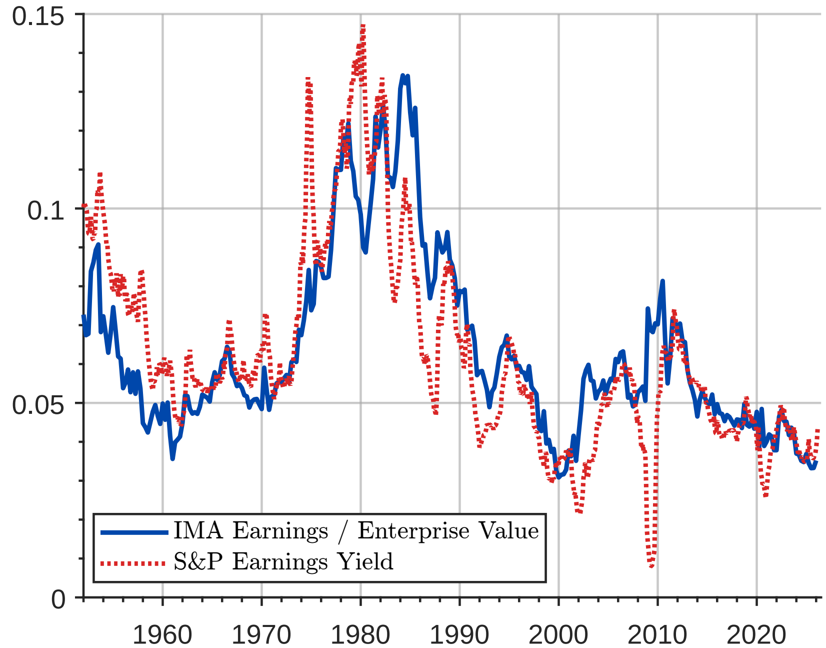



**Figure A5:** Solid blue: Earnings over Enterprise Value from the Integrated Macroeconomic Accounts. Dotted red: Monthly Earnings per Share to Price per Share for the S&P Index as reported by Robert Shiller.

Shiller in dotted red.[32]

We take two points away from this figure. First, our macroeconomic earnings yield corresponds quite closely to the earnings yield for the S&P 500 despite the fact that they are derived from different data sources. Second, in both series, the earnings yield is now close to historic lows, and similar to levels seen at the peak of the 2000 dot-com boom.

## B.4 IMA Free Cash Flow Yield versus S&P Dividend Yield

Our macroeconomic measure of the free cash flow yield for U.S. corporations shown in Figure 1 does not show any particular trends over the period 1952 through the beginning of 2026. This relatively stable behavior of the free cash flow yield stands in sharp contrast to the dividend yield for the S&P Index reported by Robert Shiller. In Figure A6 we show monthly data on this measure of the dividend yield on the S&P Index in dotted red together with the IMA measure of the free cash flow yield in solid blue. We see in this figure that the dividend yield on the S&P Index has been close to historical lows for the past 25 years while the IMA free cash flow yield has fluctuated around its historical mean. This discrepancy between the

[32] Our data for the earnings and dividend yield on the S&P Composite Index are taken from the spreadsheet maintained by Robert Shiller at https://shillerdata.com. To construct these monthly measures, we divide real dividends per share and real earnings per share by real price per share.

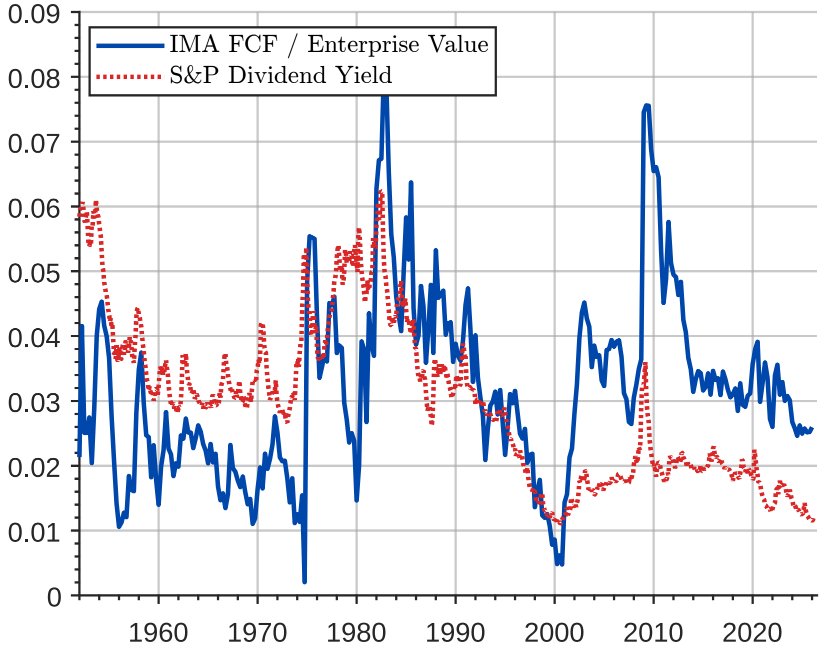



**Figure A6:** Solid blue: IMA Free Cash Flow over Enterprise Value. Dotted red: Monthly data on the Dividend Yield of the S&P Index reported by Robert Shiller.

free cash flow yield and the dividend yield over the past several decades reflects changes in firms' payout policies. In particular, the aggregate dividend yield has declined because many incumbent firms have stopped paying dividends and are instead returning free cash flow to firm owners via share repurchases, and because net entry of firms into public markets has slowed considerably. See Chapter 5.3.3 of Campbell (2018) and Atkeson et al. (2026) for further discussion of this point.

# C Comparison between IMA Valuation Metrics and CRSP/Compustat Analogues

In this appendix, we compare the evolution of valuation metrics we have documented using IMA data with comparable metrics computed by aggregating data from public firms.

## C.1 Earnings, free cash flow and net investment in CRSP/Compustat

We start by computing Earnings and Free Cash Flow yield (displayed in Figure 2) on the universe of firms in the CRSP/Compustat sample.

**Variable Construction** For each firm in the CRSP/Compustat sample we construct the following four variables

**Net investment** We compute two measures of net investment in CRSP/Compustat. The first (labeled Net Investment, baseline) approximates the IMA concept, and includes expenditures in equipment, structures and R&D, minus consumption of fixed capital (which includes depreciation of the stock of R&D capital). We first construct gross investment in CRSP/Compustat by adding expenditures on plant and equipment (**capx**) and R&D expenditures (**xrd** + **rdip**). To obtain net investment we subtract depreciation and amortization of plants and equipment (**dep**) and depreciation of R&D capital, which is computed by multiplying the stock of R&D capital provided by Peters and Taylor (2017) by a 15% yearly depreciation rate.[33] The second measure of net investment in CRSP/Compustat (labeled Net Investment, incl. organizational capital) includes a broader measure of intangibles, by adding net investment in organizational capital to our first measure.[34]

**Free cash Flow** To construct free cash flow in CRSP/Compustat we follow the guidelines of Hall (2003). We start from sales (**sale**) and we first subtract cost of goods sold (**cogs**) and Selling, General, and Administrative Expenses (**xsga**). This measure is often referred to as EBITDA. To get to a free cash flow measure that is comparable to the one in IMA data

[33] Peters and Taylor (2017) provide data on the stock of R&D capital until 2023. For the years 2024 and 2025 we updated the series using the perpetual inventory method and the investment in R&D reported in CRSP/Compustat for those two years.

[34] Net investment in organizational capital is computed following Peters and Taylor (2017). In particular, for each firm we treat 30% of the non-R&D sales and general administration expenses (**xsga - xrd - rdip**) as investment in organizational capital. Depreciation of organizational capital is computed as 20% of the stock of organizational capital reported by Peters and Taylor (2017), updated to 2025, using the same procedure we used to update the stock of R&D capital.

we also subtract taxes (**txt**) and investment in plants and equipment and add back rental expenses (**xrent**) to make free cash flow of firms with different lease vs ownership choices more comparable. Note that this measure of free cash flow is independent of whether we classify R&D or administration expenses as investment or as an expense, as in both cases these expenses reduce free cash flow.

**Earnings** Consistently with IMA, earnings in CRSP/Compustat are simply computed as free cash flow plus net investment. Since we have two measures of net investment we also have two measures of earnings, earnings and earnings incl. organizational capital.

**Enterprise Value** Enterprise value in CRSP/Compustat is computed as the market value of outstanding equity (**MthCap**) plus total non-equity liabilities (**lt**) minus short term assets (**act**), which includes holdings of financial assets.

**Sample selection** We start from all the firms in the linked CRSP/Compustat North America sample from 1960 until 2025. We drop firms which are not incorporated in the United States and firms whose 10-K is reported in financial services format.[35] Finally, we keep all firm-year observations which have non-missing earnings, free cash flow and enterprise value. This leaves us with a sample of 156,624 firm-year observations. In Table A1 below we report some summary statistics for selected years.

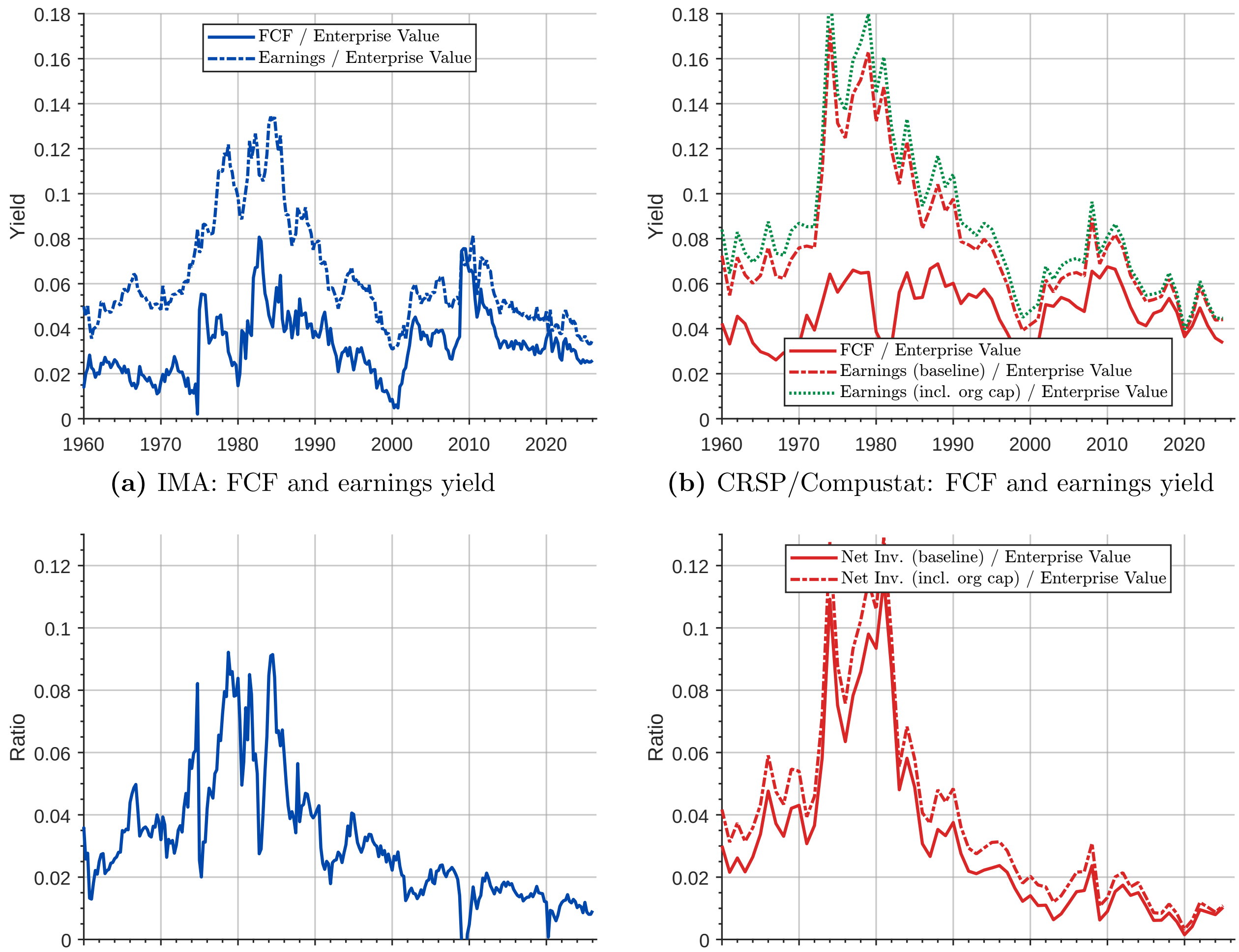
**Table A1:** CRSP/Compustat Summary Statistics

| Year | Net Inv | Net Inv (+org) | FCF | Earn | Earn (+org) | Ent. Value | Sample Size |
|---|---|---|---|---|---|---|---|
| | | | (Average, Millions of USD) | | | | |
| 1965 | 21.5 | 27.5 | 18.9 | 40.4 | 46.4 | 635.1 | 537 |
| 1985 | 23.9 | 28.3 | 26.1 | 50.0 | 54.4 | 488.7 | 2781 |
| 2005 | 42.5 | 64.5 | 190.9 | 233.4 | 255.5 | 3633.9 | 2972 |
| 2025 | 244.8 | 258.6 | 801.9 | 1046.7 | 1060.5 | 23771.3 | 1994 |

**Results** Figure A7 displays the results. Panel (a) is the same as Figure 2, and shows the free cash flow yield and the earnings yield in IMA data. Panel (b) displays the two measures of earnings and free cash flow computed as ratios of averages in the CRSP/Compustat sample. Panel (c) shows the path of net investment over enterprise value in IMA data, while panel (d) shows the two measures of net investment over enterprise value in the CRSP/Compustat sample.

[35] This is a standard selection in CRSP/Compustat.

The overall message of the figure is that the key trends highlighted in the IMA are also apparent for public firms. Both data sets show a roughly stable cash flow yield, and a falling earnings yield, with the divergence between the two yields explained by the secular decline in net investment relative to enterprise value. Panels (b) and (d) show that the decline in investment (and thus in earnings) does not appear to be driven by missing intangible investment, as the secular decline in net investment and earnings over enterprise value is actually slightly larger when we include investment in organizational capital in our measure of net investment and earnings.




**(a)** IMA: FCF and earnings yield

**(b)** CRSP/Compustat: FCF and earnings yield

**(c)** IMA: Net Investment

**(d)** CRSP/Compustat: Net Investment

**Figure A7:** Valuation Metrics in the IMA and in CRSP/Compustat

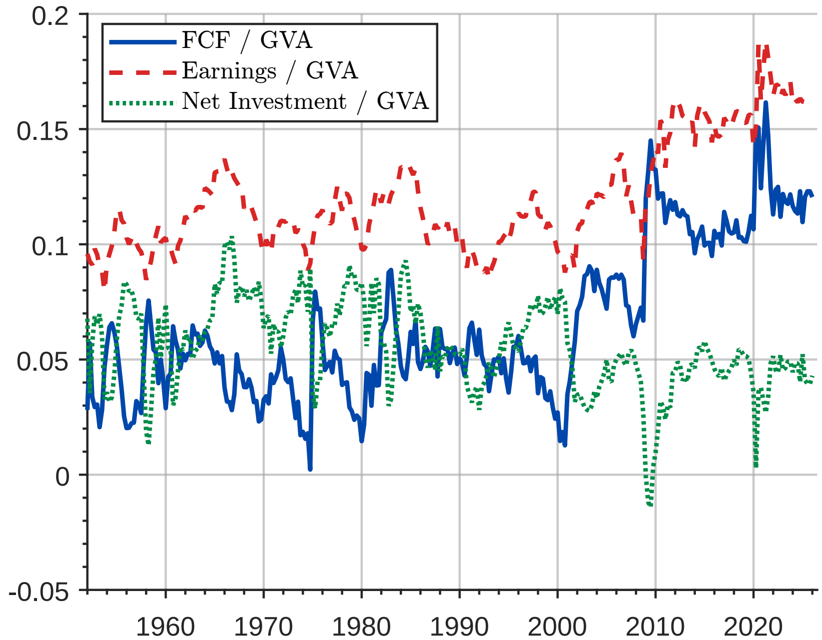



**Figure A8:** IMA Free Cash Flow, Earnings, and Net Investment over Gross Value Added.

# D Additional IMA Plots

Figure A8 illustrates the time paths for free cash flow, earnings, and net investment as shares of corporate gross value added. Note that rapid growth in earnings has not coincided with growth in the share of output devoted to investment. To the contrary, investment's share of output has been relatively low in the post-2000 period.

Figure A9 contrasts the time path for enterprise value relative to GVA (solid blue line) to the path for BEA's measure of the replacement cost of capital relative to GVA (red dotted line). As is evident in this figure, the ratio of measured capital to output in the corporate sector has remained relatively stable while the ratio of enterprise value to output has boomed. Thus, Tobin's Q, constructed as the ratio of enterprise value to measured capital, has risen sharply in recent decades. It is in this sense that we say that measured capital has become less important as a source of corporate value.

Figure A10 plots aggregate corporate free cash flow divided by gross value added (solid blue, left axis) against $1 - WL_t/GVA_t$ (dotted red, right axis). As a matter of accounting, the roughly 7 percentage point increase in the fraction of corporate output going to free cash flow from the early 1980s until the present is approximately explained by an 8 percentage point decline in the share of value added going to labor; the tax-plus-investment share rose by about 1 percentage point. Note that in a simple stochastic growth model with Cobb Douglas

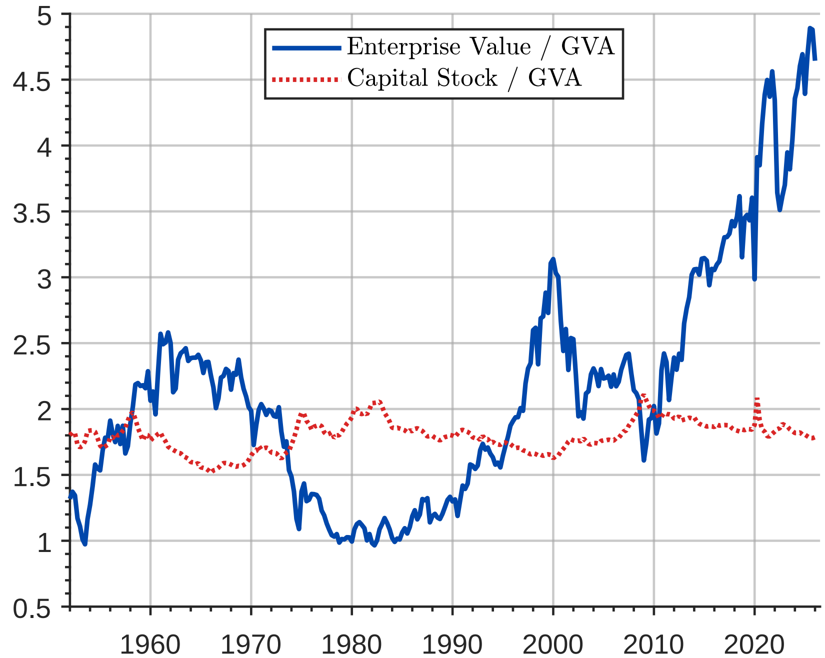



**Figure A9:** Enterprise Value and Measured Capital over Gross Value Added.

production (and hence a constant labor share of output) the fluctuations in the ratio of free cash flow to GVA should correspond to fluctuations in investment relative to GVA and not to fluctuations in the labor share of income.

## D.1 IMA Free Cash Flow over Enterprise Value and $r^\star - g$

In Figure A11 we plot the IMA data on the ratio of free cash flow to enterprise value in solid blue together with a plot in dotted red of the gap between the estimate of the trend real interest rate $r_t^\star$ (plus a 400 basis point equity premium) less the estimate of trend growth $\bar{g}_t$ from Holston et al. (2017), where these updated estimates are available at `https://www.newyorkfed.org/research/policy/rstar`. On a balanced growth path, the ratio of free cash flow to enterprise value should be approximately equal to $r - g$ where $r$ here denotes the expected return to enterprise value and $g$ here denotes the expected growth rate of free cash flow. Holston et al. (2017) aim to estimate the long-run trends for real interest rates and growth rates, $r_t^\star$ and $g$. Their estimates show a moderate downward trend from 1961 through 2000 and then a more substantial fall since then. We include this figure to illustrate the possibility that the IMA measure of the ratio of free cash flow to enterprise value may also show similar secular trends.

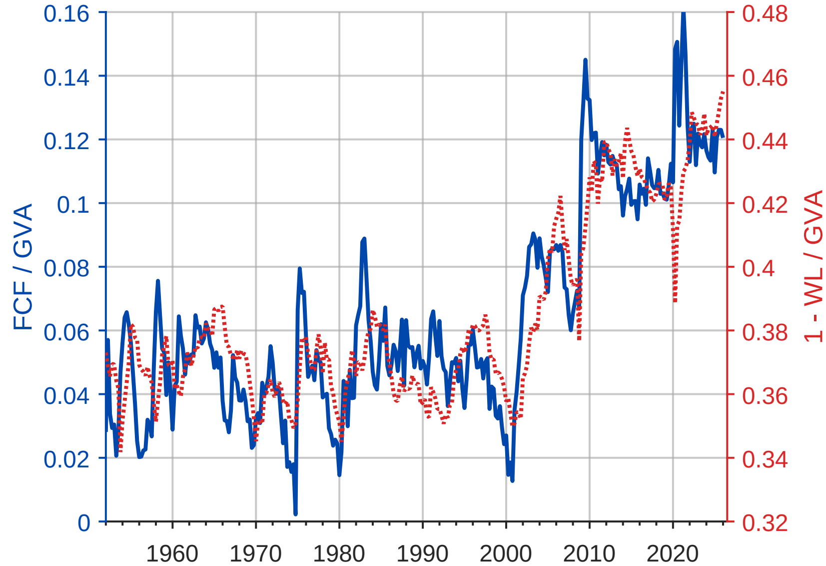



**Figure A10:** Blue solid (left axis): Free Cash Flow over Gross Value Added. Red dotted (right axis): One minus Compensation of Employees over Gross Value Added.

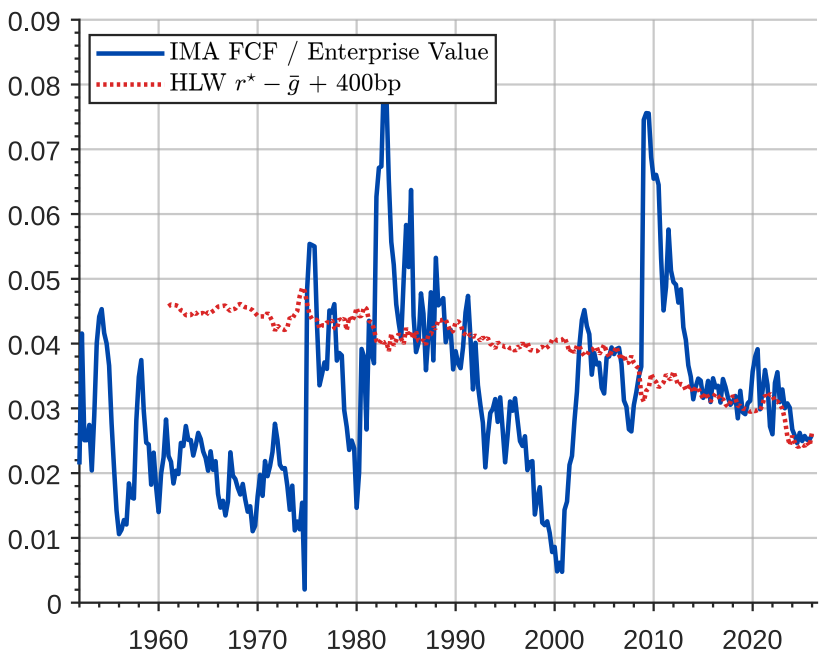



**Figure A11:** IMA Free Cash Flow over Enterprise Value (solid blue line) and Holston et al. (2017) estimate of $r_t^\star - \bar{g}_t$ plus 400 basis points (dotted red line).

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