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 the past 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 rise in the ratio of corporate valuation relative to corporate earnings, even absent any changes in expected returns or growth rates.

KEYWORDS: Earnings, Enterprise Value, Free Cash Flows
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.

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 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 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 a long time?

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 and to explore their trends.[2] The primary advantage of using these IMA data is that they offer a longer and more detailed historical record of the economic factors driving changes in income flowing to owners of U.S. firms than is available from financial accounting data for public firms.

Specifically, we use the quarterly IMA data for the U.S. corporate sector to construct measures of corporate value (enterprise value) and corporate income from 1952 through the third quarter of 2025. We consider two broad measures of corporate income, which we label *earnings* and *free cash flow*, where the latter is defined as earnings minus net investment.[3] These data offer the following insights regarding trends in the value of U.S. corporations.

1. The enterprise value of U.S. corporations has boomed in recent decades relative to corporate output.

2. The large increase in the enterprise value of U.S. corporations from 1980 until the middle of 2022 coincides with an equal-sized increase in the share of corporate value added flowing to corporate owners as free cash flow. Thus, the ratio of free cash flow to enterprise value was unchanged over that period.

3. The observed growth in free cash flow largely reflects a similar-sized decline in the share of corporate value added paid to labor.

4. The boom in corporate valuations has not been accompanied by significant growth in measured investment and capital. As a result, measured investment and capital are now a much smaller portion of enterprise value than was the case historically.

[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. Campbell and Shiller (2001) applies these ideas to analyze the valuation of the stock market at its peak in 2000. 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 academic work using these valuation ratios to analyze stock market dynamics.

[2] There is a growing academic 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).

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

The main point of our paper is to show that the macroeconomic developments listed above mechanically account for a final fact:

5. The ratio of corporate earnings to enterprise value of the corporate sector, which we call the earnings yield, declined dramatically between 1980 and the middle of 2022, even as the free cash flow yield was unchanged.

We do not take a stand on the structural forces driving trends in labor compensation and investment as shares of value added. Rather, we show that 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.[4]

This result can be demonstrated as a matter of accounting. By definition, the gap between earnings and free cash flow of the corporate sector in our macro data is investment net of depreciation (net investment). Thus, the gap between the ratio 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.

In the data, the ratio of net investment to enterprise value has fallen dramatically since the early 1980s. Equation 1 offers a decomposition of this decline into two components. 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. 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.[5]

In our macroeconomic data, both terms on the right side of equation 1 have contributed to a narrowing of the gap between the earnings yield and the free cash flow yield. Specifically, the free cash flow yield in our data was close to its historical mean of 3.6% in both the fourth quarter of 1980 and the second quarter of 2022. In contrast, the earnings yield fell dramatically across these two quarters, from 9.5% to 4.6%. A decline in the importance of measured capital in enterprise value accounts for over two-thirds of this decline in the earnings yield, while a decline in the net investment rate explains the rest.[6] In the body of our paper, we document that these trends of

[4] See, for example, Jakab (2025)

[5] Note that equation 1 applies even if firms make unmeasured investments that cumulate into unmeasured capital. The macroeconomic measures of earnings and free cash flow in this equation differ by *measured* investment.

[6] The decline in the gap between the earnings yield and the free cash flow yield from 5.86% to 1.00% is a decline in this gap of 1.76 log points. The ratio of net investment to capital fell from 4.1% to 2.3%, contributing 0.59 log points to this decline. The ratio of measured capital to enterprise value fell from 144%

falling growth of measured capital and declining importance of measured capital in enterprise value played out relatively smoothly over recent decades.

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 (2023b), Crouzet and Eberly (2023a), Greenwald et al. (2025), Corhay et al. (2025) and Atkeson et al. (2025a). These developments have all been widely noted in the literature.

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 sustained decline in net investment relative to enterprise value cautions against the use of forecasting regressions that implicitly assume a stable link between earnings and cash flow to investors.

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. We also compare these macroeconomic valuation metrics to similar metrics obtained in public firm data. In Section 4 we analyze the different dynamics of the earnings yield and free cash flow yields in our data. In Section 5, we conclude. We include an Appendix with data sources and additional data analysis.

2 Macroeconomic Benchmarks for Valuation

We now describe the data from the Integrated Macroeconomic Accounts (IMA) that we use to conduct our valuation exercises.

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.[8] The conceptual framework we use to measure

to 44% contributing the remaining 1.18 log points of this decline in the gap.

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

[8] Our conceptual measure of free cash flow is that corresponding to Miller and Modigliani (1961). It is the cash flows to owners of the firm if it were 100% equity financed and had no financial assets. This is distinct from measures of free cash flow to the firm (which allows for financial assets) or free cash flow to equity.

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 and Wealth* ($CTAX_t$). These correspond primarily to corporate profits taxes and property taxes.[9]

3. A third portion of output is used for *Capital Expenditures* ($INVEST_t$).

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

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 firms' choices of debt versus equity financing. 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 reduces measured investment, but in both cases free cash flow is reduced by the same amount.

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 capital expenditures net of consumption of fixed capital.

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 is equal to net operating surplus minus corporate taxes.

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

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 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.

We take measures of the replacement value of capital in the corporate sector from the Fixed Assets Tables of the Bureau of Economic Analysis (BEA). The BEA constructs this measure of the replacement cost of the fixed assets in the corporate sector 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

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

Here P_t^K is the nominal price of capital goods and K_{t+1} is the stock of capital services available as of the end of period t to be used in production in period $t+1$. The product $P_t^K K_{t+1}$ is the nominal replacement cost of fixed assets at the end of period t. 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

$$\frac{K_{t+1} - K_t}{K_{t+1}} = \frac{NETINV_t}{P_t^K K_{t+1}}. \tag{2}$$

In Appendix Section A.3 we compare the realized nominal quarterly returns implied by our IMA data to realized total returns (with dividends) for the S&P 500 index; the two measures correspond closely.

In Appendix Figure 11, we compare our IMA-based measure for earnings relative to enterprise value to the earnings yield for the S&P 500 reported by Robert Shiller. The two series track each other closely.

3 Corporate Valuation Metrics

In this section, we review standard valuation metrics using our IMA data for the U.S. corporate sector. We first examine the evolution of enterprise value for the U.S. corporate sector relative to

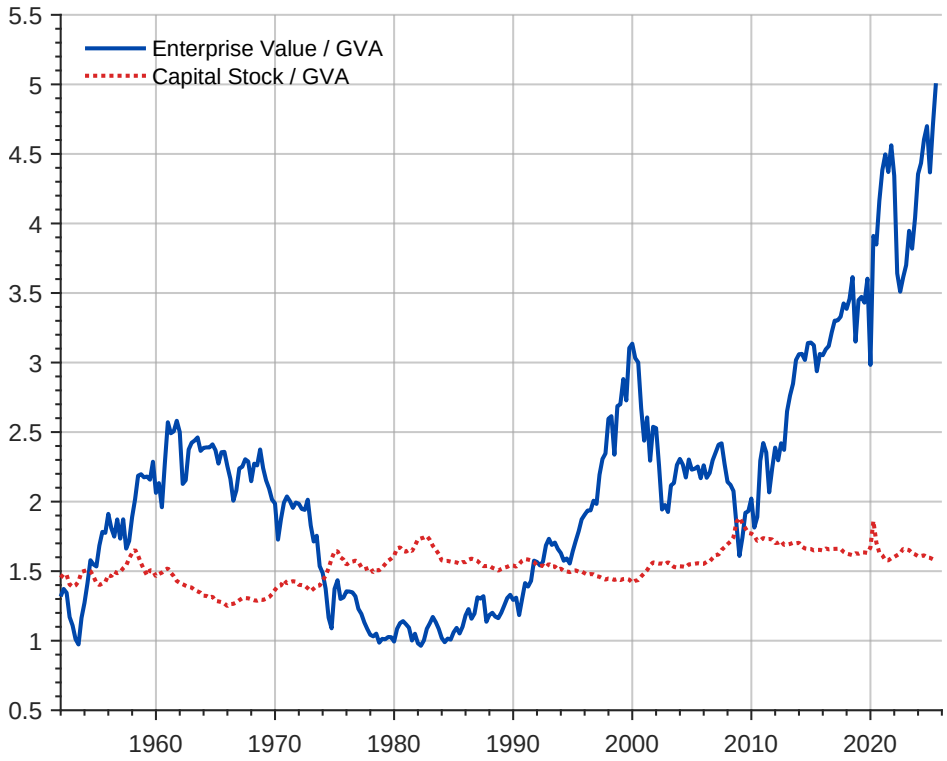


Figure 1: Enterprise Value and Measured Capital over Gross Value Added.

the output of that sector, and compare this to the path for measured capital. We then consider the joint evolution of free cash flow, the labor share, and enterprise value. Finally, we consider the evolution of earnings relative to enterprise value.[10]

3.1 Enterprise Value and Capital over Gross Value Added

The solid blue line in Figure 1 plots the evolution of enterprise value relative to corporate gross value added since 1952. Enterprise value is volatile and has boomed dramatically over the past 45 years. In Appendix A.4, Figure 9 we show that enterprise value closely tracks the aggregate market capitalization of publicly-traded equities. The red dotted line in Figure 1 shows the ratio of the BEA's measure of the replacement cost of capital to corporate gross value added. 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.

3.2 Free Cash Flow over Enterprise Value

What factors account for this large increase in the ratio of corporate enterprise value to corporate output? As a matter of accounting, there are two possibilities as indicated by the valuation

[10]We document the behavior of the S&P earnings and dividend yields in Appendix A.2, Figure 6.

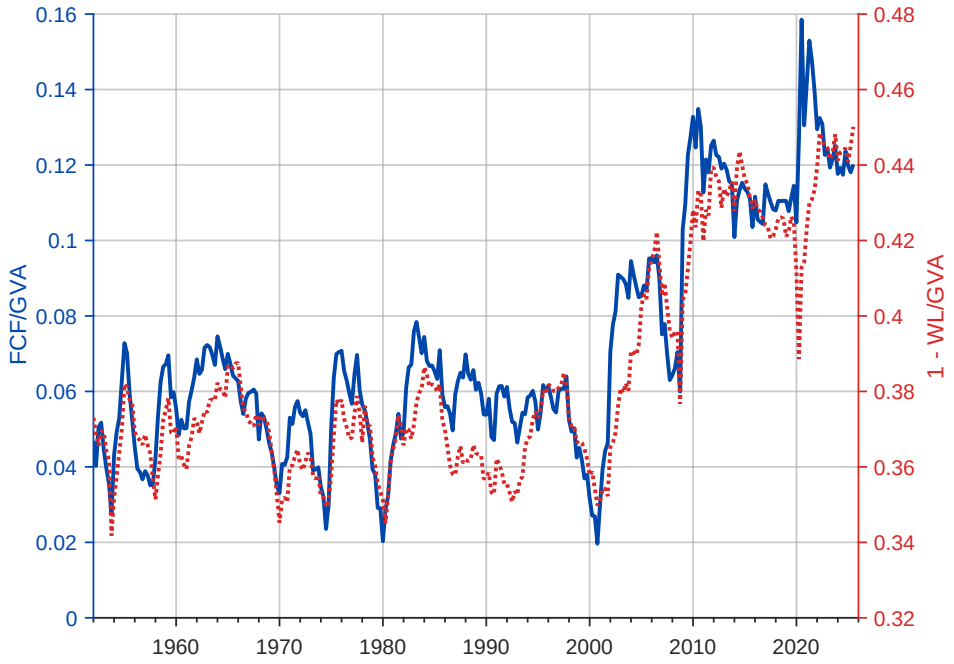


Figure 2: Blue solid (left axis): Free Cash Flow over Gross Value Added. Red dotted (right axis): One minus Compensation of Employees over Gross Value Added.

decomposition identity

$$\frac{V_t}{GVA_t} = \frac{FCF_t}{GVA_t} \div \frac{FCF_t}{V_t}.$$

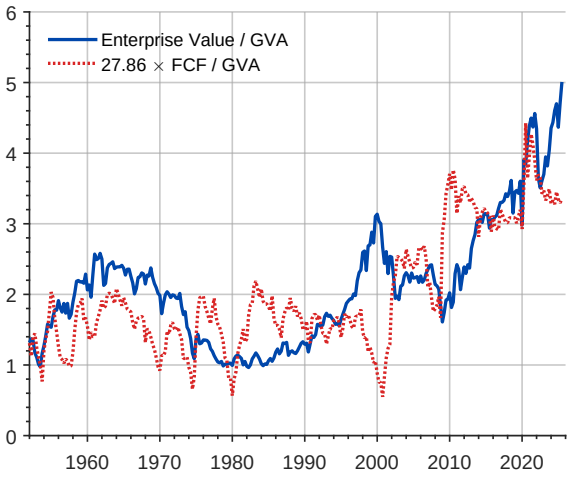
That is, this increase in the ratio of enterprise value to corporate output could be the result of an increase in the share of corporate output available to be paid out to corporate owners and/or an increase in the multiple of free cash flow at which the market is valuing these corporations. We examine these two terms next.

The solid blue line in Figure 2 shows the ratio of corporate free cash flow to corporate output. We see that in the early 1980s this ratio was hovering around 4%, but it has risen to 12% or more in recent years. Thus, a much larger share of corporate output now flows to owners of U.S. corporations relative to the early 1980s.

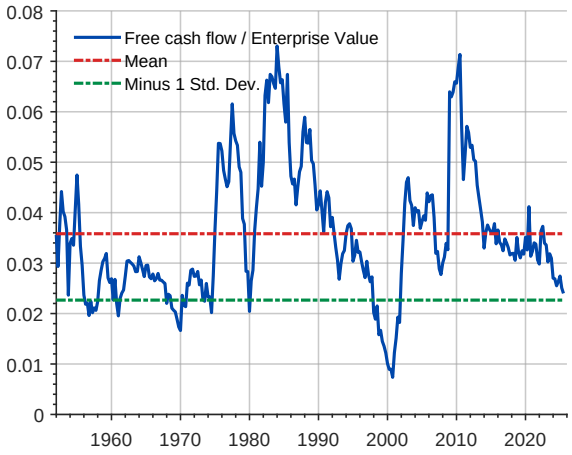
Much of this boom in the ratio of free cash flow to corporate output is due to a fall in the share of corporate output paid as compensation to employees. To demonstrate this point, Figure 2 also shows $1 - WL_t/GVA_t$ in red on the right axis. Note that both the left and right axes have the same total span of 0.16. Thus, as a matter of accounting, the roughly 8 percentage point increase in the fraction of corporate output going to free cash flow from the early 1980s until the present is explained by a 8 percentage point decline in the share of value added going to labor.

What portion of the boom observed in enterprise value can be accounted for by the boom observed in free cash flow? To get an answer to that question, we turn to the simple valuation formula provided by the Gordon Growth Model.[11] According to this model, under the assumptions that

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



(a) Blue solid: Enterprise Value over Gross Value Added. Red dashed: Predicted Enterprise Value measured as $27.86 \times FCF_t/GVA_t$



(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 3: Valuation Metrics based on Free Cash Flow.

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 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

$$\frac{\hat{V}_t}{FCF_t} = \frac{1+g}{r-g}.$$

In the left panel of Figure 3 we show in blue our data for enterprise value relative to output and in red the prediction of our valuation model $\hat{V}_t/GVA_t$ valuing current free cash flow at a constant valuation multiple of 27.9 (so $r - g \approx 0.036$).[12] 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 mid 2022 accounts for all of the increase in the ratio of enterprise value to output observed over that period. There has been a significant increase in enterprise value relative to free cash flow in the last three years.

We can also look at the valuation ratio itself. The blue line in the right panel of Figure 3 shows the free cash flow yield defined as the ratio FCF_t/V_t. The dotted red line is the historical mean for this ratio. The dotted green line is at one standard deviation below the mean. We see that this valuation ratio has fluctuated substantially since 1952, but it does not show a 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 (from about 3.6% to

[12]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.

about 2.4%), but at the end of sample it is not at a historical low; it remains within one standard deviation of its historical mean.

We interpret the evidence in Figure 3 as consistent with the view that the boom in the ratio of enterprise value to gross value added of U.S. corporations in recent decades has been driven in large part by an increase in the share of free cash flow in gross value added, at least through the middle of 2022.

One advantage of our macroeconomic data is that we can compute our measure of free cash flow back in time much further than is possible with public firm accounting data. In Figure 10 in Appendix Section A.5 we compare our IMA free cash flow yield to the free cash flow yield on the S&P 500 Index computed by Standard and Poor's that is available from 1990. In that figure we see that our two measures of the free cash flow yield coincide fairly well in the period over which both series are available. This evidence corroborates the view that the low *dividend* yield for public firms observed over the past 25 years primarily reflects a change in payout policies as opposed to a change in how investors are valuing underlying free cash flow.

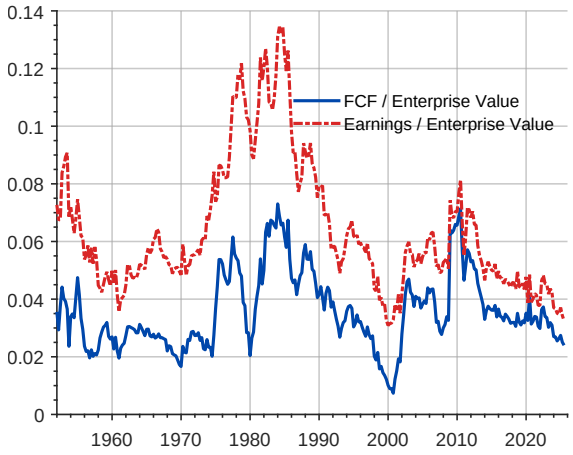
One last observation from Figure 3 is that the ratio of current free cash flow to enterprise value has fallen to 2.40% at the end of Q3 2025. What would it take to return the free cash flow yield from this most recent level of 2.40% to a higher yield of 3.64% in line with the historical average?

Using the left panel of Figure 3 as guidance suggests two scenarios. One would involve a decline in enterprise value relative to output so that the blue line in that figure falls to meet the red line. This would entail a drop in the ratio of enterprise value to output of 40 log points (or, in dollar terms, of roughly $27 trillion).

A second scenario would involve a future sustained increase in the ratio of free cash flow to output so that the red line in that figure rises to meet the blue line. This would correspond to an increase in the ratio of free cash flow to output to 17.9%. Given the data in Figure 2, 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 6 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.

4 The Earnings Yield

In all 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. In this section, we examine our macroeconomic measure of the earnings yield, compare it to measures of the earnings yield on the S&P 500, and offer our accounting for the observation that the earnings yield has fallen to an historically-low level even though the free cash flow yield has not.



(a) Free Cash Flow and Earnings over Enterprise Value.

(b) Net Investment over Enterprise Value. Equals the product of terms on right side of equation 1.

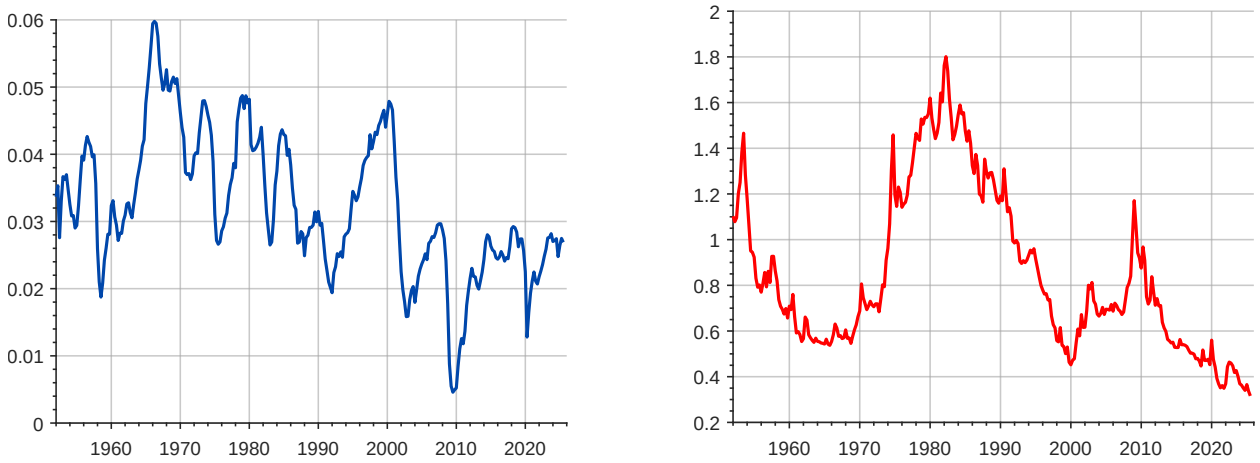
Figure 4: Free Cash Flow, Earnings and Net Investment all over Enterprise Value.

In the left panel of Figure 4 we show our macroeconomic measure of the free cash flow yield in solid blue together with our measure of the earnings yield in dashed red. We see that in recent years the earnings yield has fallen to historically low levels while the free cash flow yield is closer to historical norms. The panel also shows that the earnings yield is now much closer to the free cash flow yield than was the case in the past.

What accounts for this different behavior of the earnings yield and the free cash flow yield? As discussed in equation 1, as a matter of accounting, the only difference between earnings and free cash flow is net investment. Thus, the difference between our macroeconomic measures of the earnings yield and the free cash flow yield is the ratio of net investment to enterprise value, which is plotted in the right panel of Figure 4. The gap between the earnings yield and the free cash flow yield 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 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 2). The second is a fall in the ratio of measured capital to enterprise value. A fall in this ratio reflects a decline in the importance of measured capital in enterprise value. We plot these two ratios in Figure 5.

The left panel of Figure 5 shows the evolution of the ratio of net investment to the replacement value of the capital stock. This series, reflecting the growth of measured capital, has fallen steadily over time since the mid 1960s, consistent with a trend decline in the growth of corporate output. In the right panel of Figure 5 we show the ratio of the replacement value of the capital stock to enterprise value (the inverse of Tobin's Q). Here we see a large decline in this series from the early 1980s.



(a) Net Investment over Measured Capital

(b) Measured Capital over Enterprise Value

Figure 5: Components of the Ratio of Net Investment to Enterprise Value.

$$\underbrace{\frac{EARN_t}{V_t}}_{\substack{\frac{r}{1+g} \text{ in GM} \\ \frac{r-g}{1+g} \text{ in LT}}} = \underbrace{\frac{FCF_t}{V_t}}_{\substack{\frac{r-g}{1+g} \text{ in GM} \\ \frac{r-g}{1+g} \text{ in LT}}} + \underbrace{\left(\frac{NETINV_t}{P_t^K K_{t+1}}\right)}_{\substack{\frac{g}{1+g} \text{ in GM} \\ 0 \text{ in LT}}} \times \underbrace{\left(\frac{P_t^K K_{t+1}}{V_t}\right)}_{\substack{1 \text{ in GM} \\ 0 \text{ in LT}}} \tag{3}$$

Equation 3, which restates equation 1, offers a simple intuition for why one might expect the earnings yield to decline over time as measured capital becomes a less important component of total corporate enterprise value. 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. The labels under the various terms in equation 3 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. The second term on the right-hand side of equation 3 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, in the Lucas tree model, investment and capital are both zero, and thus the balanced growth path earnings yield is equal to the free cash flow yield.

Over time, one can think of the U.S. corporate sector having gradually transitioned from being close to the standard growth model (with Tobin's Q near one) to something closer to the Lucas tree economy (with a much higher value for Tobin's Q). In this light, equation 3 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.

A complementary description of corporate valuation history is that corporations have been able to generate growth in earnings without increasing the share of corporate value added devoted to measured investment; in fact the investment share has declined over time (see Figure 13 in the Appendix). As a result, the corporate *payout ratio*, measured as the ratio of free cash flow to earnings, has increased over time (Figure 14 in the Appendix). As corporations have paid out an increasing fraction of their earnings, free cash flow has naturally grown faster than earnings. Given a stable free cash flow yield, the fact that earnings growth has been slower than cash flow growth has translated into a declining earnings yield.

5 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 traditional stock market valuation metrics other than the free cash flow yield to return to their historical means. That is, the ratio of the stock market to output has boomed in tandem with a persistent decline in labor's share of corporate output. The ratio of the stock market to measured capital has boomed because measured investment and capital have remained fairly stable relative to corporate output. These developments have led to a large decline in the earnings yield through a combination of a decline in the growth rate of measured capital and a decline in the importance of measured capital in market value, with this second effect playing a larger role.

This narrative raises the economic question of how firms have been able to generate more earnings as a share of value-added without increasing measured net investment and capital. At least four possible explanations have been discussed in the literature.

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.[13] 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.[14]

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.[15]

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,

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

[14] In contrast, if rising intangible investments have been inappropriately classified as purchases of intermediate inputs, then measured value added and earnings may be understated relative to a measurement system that classifies these expenditures on intangibles as investment.

[15] 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. See Paron (2025) for an exploration of the link between growth and returns

grants of equity options have become more important relative to salary for highly-skilled workers.[16] Second, S-corporations have become an increasingly important component 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.[17]

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.[18]

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

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

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

[18] This idea has been developed in many recent papers including Gutiérrez and Philippon (2017), Farhi and Gourio (2018), Karabarbounis and Neiman (2019), de Loecker et al. (2020), and Barkai (2020).

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A Appendix

A.1 Data Sources and Construction

We obtain measures of Gross Value Added, Consumption of Fixed Capital, Net Operating Surplus, Compensation of Employees, Taxes on Production and Imports less Subsidies, Business Transfer Payments, and Corporate Taxes on Income and Wealth from the Bureau of Economic Analysis' (BEA) National Income and Product Account (NIPA) Table 1.14.[19]

We obtain measures of Gross Fixed Capital Formation for the Nonfinancial Corporate Sector from Table S5 and for Domestic Financial Business from Table S6 of the Integrated Macroeconomic Accounts available in the Board of Governors of the Federal Reserve System *Financial Accounts of the United States*.[20]

We obtain measures of the market value of the non-financial assets (i.e., enterprise value) in the Nonfinancial Corporate Sector and for Domestic Financial Business from Table B1 of the *Financial Accounts of the United States*. We obtain measures of the current cost of the fixed assets in these two sectors from Table L4 of the *Financial Accounts of the United States* which reports measures from the BEA's Fixed Assets Tables. Both 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 measures of enterprise value and 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 L224 of the *Financial Accounts of the United States*. We sum the values of publicly traded equities for the non-financial corporate sector and for U.S. Chartered Depository Institutions, Property and Casualty Insurance Companies, Life Insurance Companies, Government Sponsored

[19] Gross value added includes expenditures by households, government, investment expenditures by business both corporate and non-corporate, and exports by the corporate sector. Imports of the corporate sector are deducted as a cost of production. Gross value added is also equivalent to the sum of gross value added at the firm level across all the firms in the corporate sector. Gross value added at the firm level is equal to firm sales less firm expenditures on intermediate inputs (other than labor). This measure of firm-level gross value added forms the tax base for value-added taxes in many countries other than the U.S. The total sales of firms in the corporate sector is the *gross output* of that sector. The measures of revenue or sales available for publicly traded firms would correspond more closely to gross output than gross value added. Gross value added does not have a direct correspondence to standard financial accounting measures. It does have an interpretation, however, as the contribution of the corporate sector to total Gross Domestic Product for the United States. Gross value added of the corporate sector is typically a bit less than 60% to the total Gross Domestic Product of the U.S. economy. The household and non-corporate sectors (primarily housing and commercial real estate) and the government sectors (Federal, State, and Local governments) produce the remainder of Gross Domestic Product.

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

Enterprises, Mortgage Real Estate Investment Trusts, Security Broker Dealers, Holding Companies, and Other Financial Businesses. We exclude closed end funds and exchange traded funds from our calculation of public equity value.

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

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. (2025) for a discussion of these measurement issues.

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 does 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.[21]

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).

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

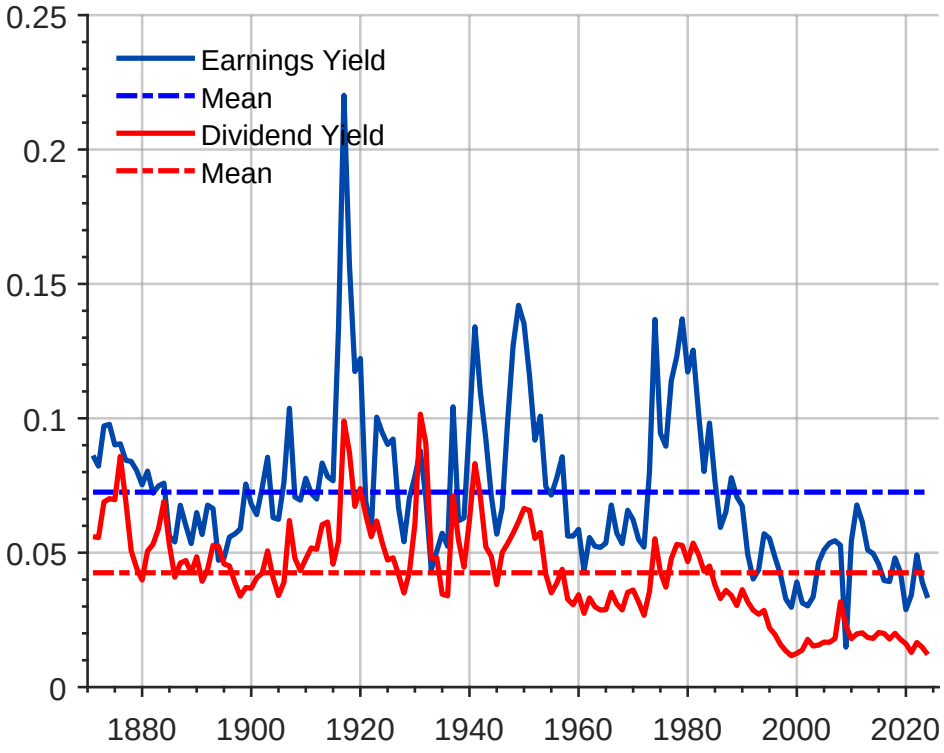

Figure 6: S&P Earnings and Dividend Yields since 1871.

A.2 Standard Valuation Metrics

In this section we document the evolution of standard stock market valuation metrics.

These include the dividend-price and earnings-price ratios for S&P broad stock market indices reported by Robert Shiller.[22] To construct these monthly measures, we take a 12 month moving average of lagged real dividends per share and earnings per share and divide these by real price per share. To construct annual measures, we use the monthly measure from December of each year.

In Figure 6 we show annual data on these dividend and earnings yields for S&P broad indices since 1871. The earnings yield is in blue and the dividend yield in red. The dashed blue and red lines are the sample means of these series. It is evident in this figure that these earnings and dividend yields have been below their historical mean for roughly 30 years.

[22] 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.

A.3 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 fairly closely over the period 1952 Q2 through 2024 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 0.0266. IMA 0.0288 Standard deviation of log nominal returns quarterly: S&P 500 0.0792. IMA 0.0634 The correlation of S&P 500 and IMA log nominal returns quarterly is 0.9121.

In Figure 7 we plot our two series for realized nominal returns. The IMA returns are in blue and the S&P are in red. Figure 8 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.

A.4 IMA Enterprise Value vs Value of Publicly-Traded Equity

For purposes of comparison, Figure 9 plots, together with enterprise value (on the left axis), the market capitalization of publicly traded equities of U.S. corporations as reported in the *Financial Accounts of the United States* relative to corporate gross value added (on the right axis). The right axis of this panel spans the same range as the left axis but it 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.[23] We also see that both of these valuation metrics have been persistently above their means prior to 1995 for most of the past 30 years.

[23]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.

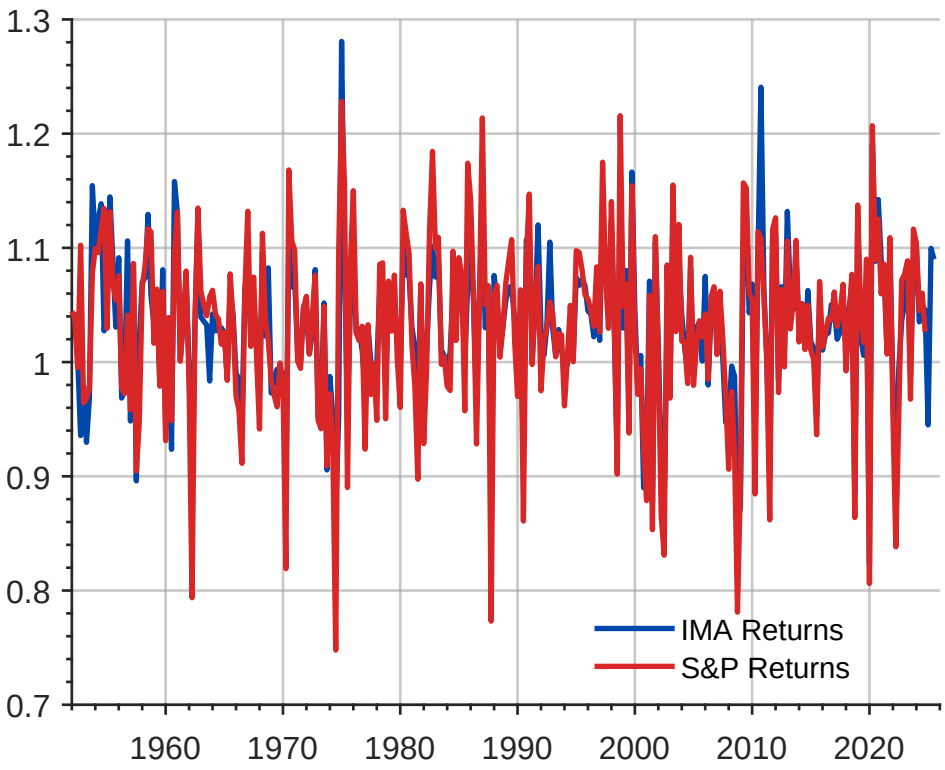

Figure 7: IMA and S&P Nominal Returns, 1952-2024.

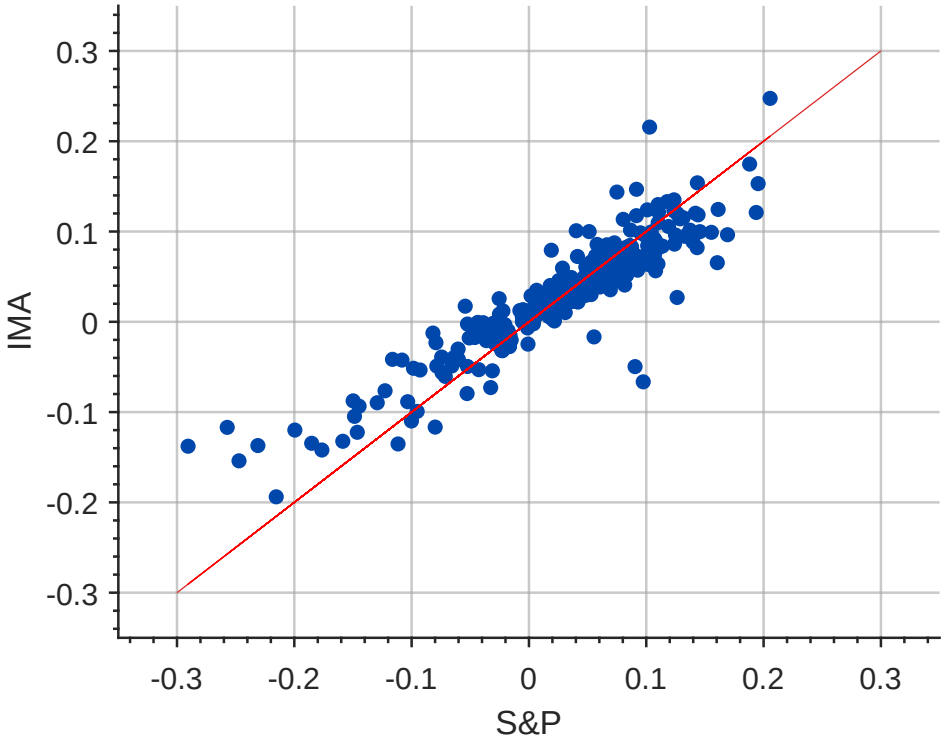

Figure 8: IMA and S&P Log Nominal Returns, 1952-2024.

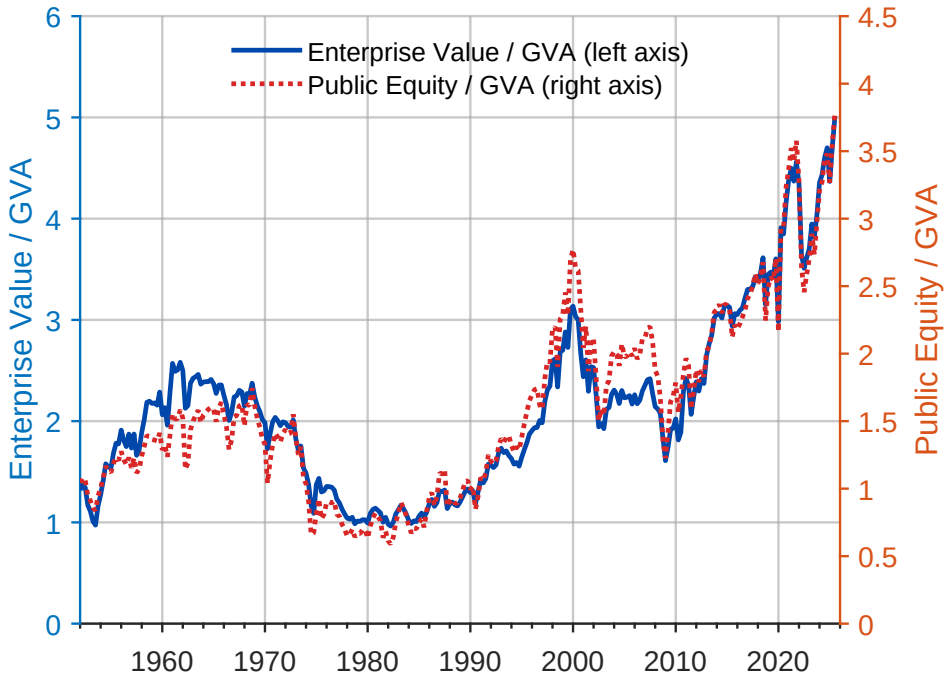

Figure 9: Enterprise Value and Public Equity over Gross Value Added.

A.5 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.[24] In Figure 10, we compare our macroeconomic measure of the ratio of free cash flow to enterprise value in blue to this measure of the free cash flow yield provided by Standard & Poor's in red. We see in this figure that these two measures correspond fairly well in the data since 1990. In particular, they both point to a decline in this free cash flow yield in the past three years.

A.6 IMA Earnings Yield versus Shiller's S&P Earnings Yield

Figure 11 shows our measure of the macroeconomic earnings yield for the corporate sector in blue alongside monthly data on the earnings yield of the S&P 500 reported by Robert Shiller in red.[25] 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.

[24] 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.

[25] See Section A.1 for directions to these data.

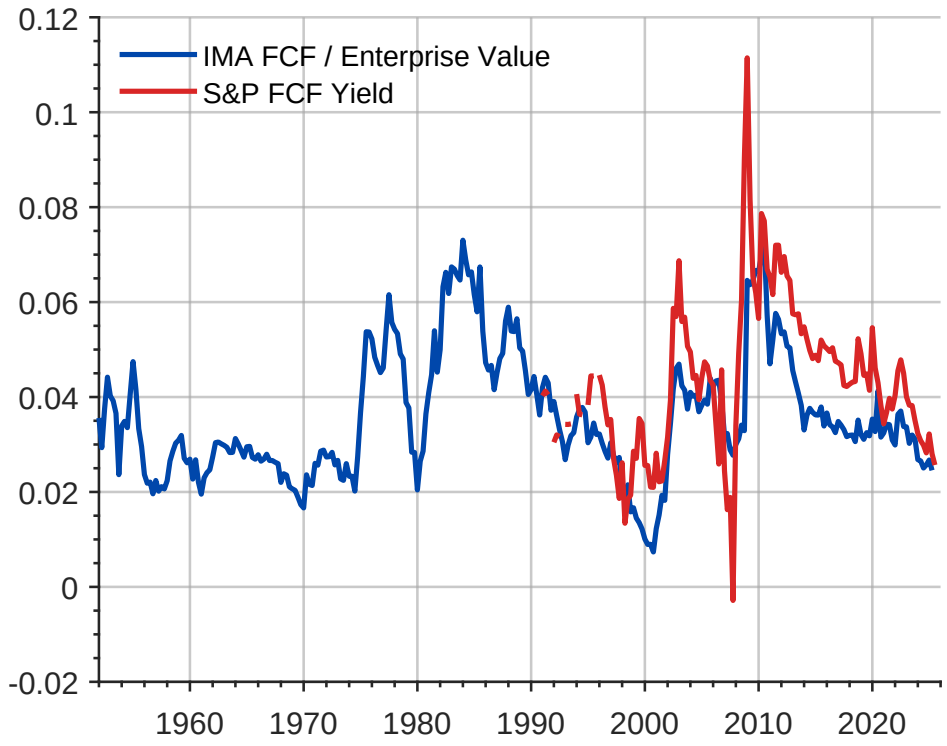

Figure 10: Blue: Free Cash Flow over Enterprise Value from the Integrated Macroeconomic Accounts. Red: S&P Free Cash Flow Yield.

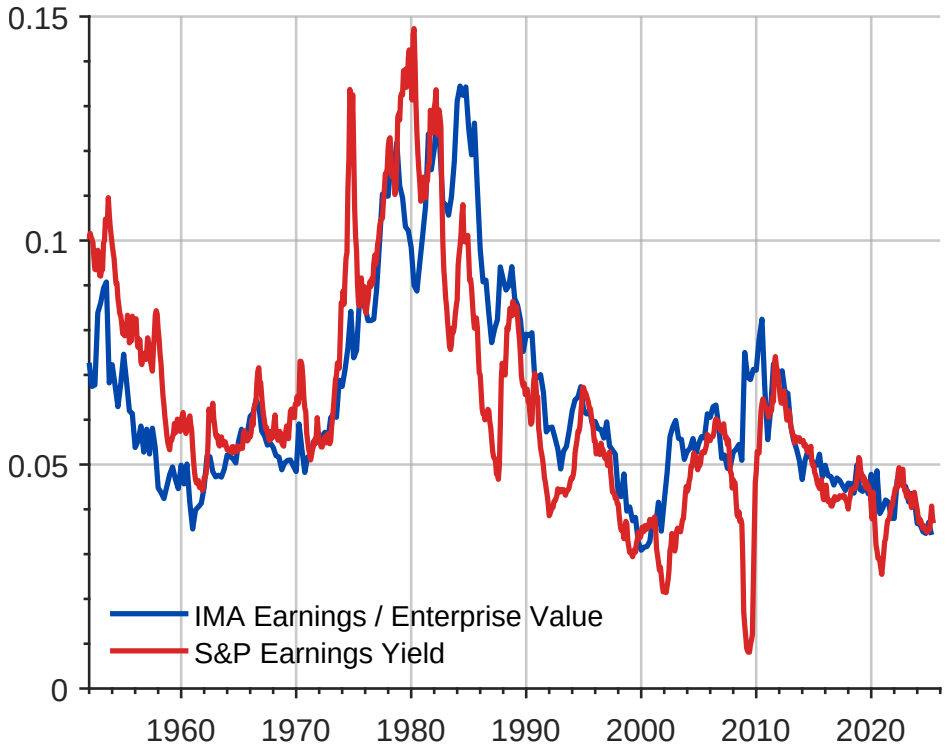

Figure 11: Blue: Earnings over Enterprise Value from the Integrated Macroeconomic Accounts. Red: Monthly Earnings per Share to Price per Share for the S&P Index as reported by Robert Shiller.

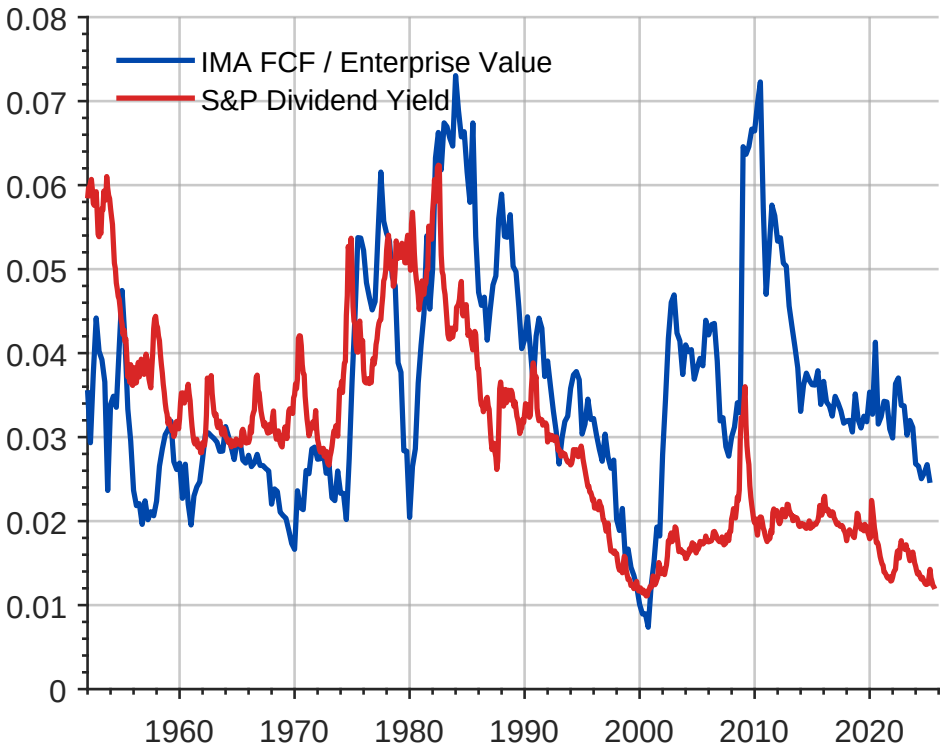

Figure 12: Blue: IMA Free Cash Flow over Enterprise Value. Red: Monthly data on the Dividend Yield of the S&P Index reported by Robert Shiller.

A.7 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 3 does not show any particular trends over the period 1952 through the middle of 2025. 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[26]. In Figure 12 we show monthly data on this measure of the dividend yield on the S&P Index in red together with the IMA measure of the free cash flow yield in 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 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 firms have stopped paying dividends and are instead returning free cash flow to firm owners via share repurchases.

[26] See Section A.1 for directions to these data.

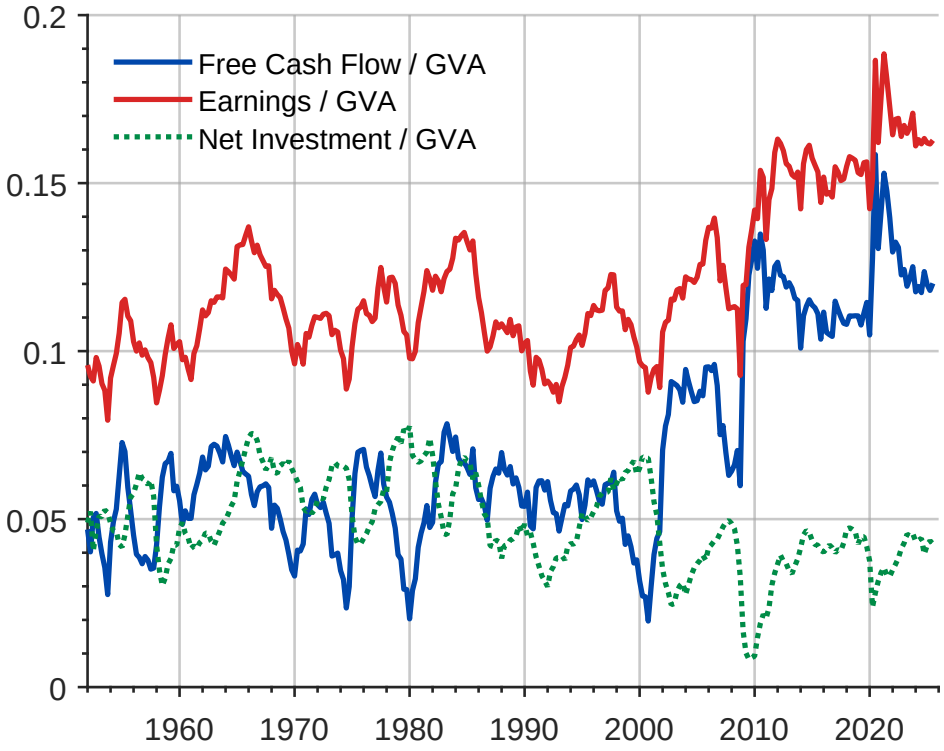

Figure 13: IMA Free Cash Flow, Earnings, and Net Investment over Gross Value Added.

A.8 IMA Free Cash Flow, Earnings and Net Investment over GVA

Figure 13 illustrates the time paths of free cash flow, earnings and net investment as shares of corporate gross value added. (In Figure 4 in the text, free cash flow and earnings are plotted as shares of enterprise value.) 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 14 plots the payout ratio, defined as free cash flow divided by earnings. Note that

$$FCF_t = \underbrace{\frac{FCF_t}{EARN_t}}_{\text{payout ratio}} \times EARN_t.$$

Thus, the growth rate of free cash flow is given by

$$\begin{aligned} \Delta \log (FCF) &= \Delta \log \left(\frac{FCF}{EARN} \right) + \Delta \log (EARN) \\ &= \Delta \log \left(1 - \frac{NETINV/GVA}{EARN/GVA} \right) + \Delta \log (EARN) . \end{aligned}$$

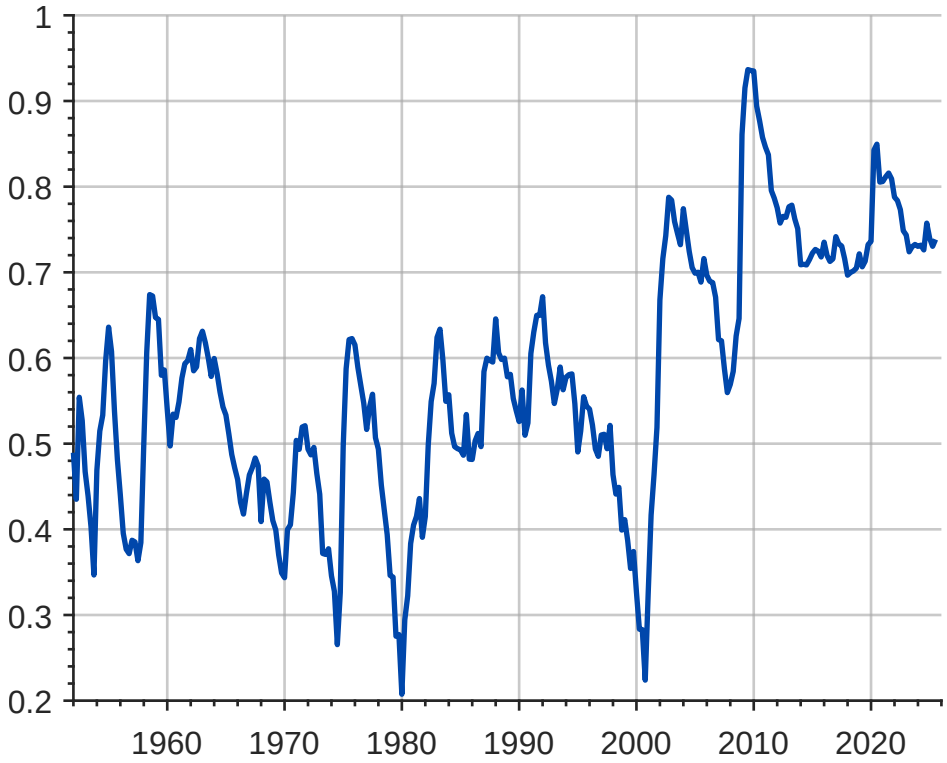

Figure 14: Payout Ratio: Free Cash Flow over Earnings.

From this equation it is easy to see why growth in free cash flow has outpaced growth in earnings. In particular, net investment has declined as a share of value added while earnings has risen sharply as a share of GVA. This has translated into a rising payout ratio, which in turn has translated to cash flow growing at a faster rate than earnings.

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