The Changing Structure of Corporate Profits

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Abstract

In the half century from 1971 to 2022 US public firms became larger. The largest firms gradually became still larger and more profitable. This was not due to high profit 'Superstar' firms, entry, or exit. We show that the large firm advantage reflects: 1) the reduction of flow costs – a reduction unmatched by average firms, and 2) the long term declining interest rates. The large firm advantage did not create durable protection for top firms. Within 5 years about 30% of them exit. Contrary to claims in the literature, persistence at top profit firms did not increase after 2000.

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1 Introduction

Corporate profits play a critical role in how researchers understand the economy, and in debates over appropriate public policy to regulate and restrict firm actions. Going back at least to the Sherman Antitrust Act (1890) there has been concern about large firm profits due to the exercise of monopoly power at the expense of customers and other businesses. More recently studies such as Basu (2019); Grullon, Larkin and Michaely (2019); De Loecker, Eeckhout and Unger (2020) find rising firm markups over a number of decades. Covarrubias, Gutiérrez and Philippon (2020) report that after about the year 2000 concentration and profits have both been increasing. Kwon, Ma and Zimmermann (2023) show that the top 1% of firms have been accounting for a gradually growing fraction of industry assets. But they show that it is not a new phenomenon limited to recent decades. In contrast, measuring profits somewhat differently, Davis, Sollaci and Traina (2023) report that the profit of publicly traded firms has actually declined since 1980. So in the existing literature there is disagreement about profit trends in recent years, and a lack of systematic investigation of the evolving nature of firm profits.

In this paper the evolution of corporate profits among publicly traded US firms from 1971 to 2022 is studied. To organize our empirical work on firm profits, we use a simple model of a firm with Cobb-Douglas production facing an isoelastic demand curve. Within this model several of the major ideas from the literature emerge naturally: output market power, the changing importance of firm assets relative to flow operating costs, and cost of capital effects. The model is also used to examine the implications of a number of other ideas from the literature, notably the potentially critical role of superstar firms and new firms driving the aggregate data. It has been suggested that in the US after 2000, there was weaker antitrust enforcement; causing an increased output market power and hence greater persistence. So results starting in 2000 are also compared to earlier years.

We document several key facts about firm profits. Some of the facts that we document are novel in the literature as far as we know. These primarily stem from tests that emerge from our theoretical framework. But we also find facts that are contrary to seemingly popular assertions in the literature. Most strikingly, we find no increase in top firm profit persistence after 2000. Indeed, over the decades, there is more firm entry and exit right across the firm size distribution than sometimes recognized. Five facts are crucial to understand the changing structure of firm profits over the decades.

First, on average public firm profits have gradually increased since the mid-1980s, see Figure 1. Since the mid-1980s large firms have been more profitable than the median public firm. The magnitude of the profit gap between large firms and the median firm is fairly stable over time prior to Covid. There is also a decline in the number of loss making public firms, particularly after 2000. Some papers claim firm profit has been increasing, but others claim the reverse. In the Internet Appendix A we show that these conflicting claims in the literature can be explained by the alternative definitions for profits used in various papers. So, using a definition of profits that account for the opportunity cost of assets, profits are found to have increased for public firms over the decades.

Second, on average the total assets of a firm have gradually increased relative to sales - not just at large firms. Several forces appear to have all pushed firms in the same direction. Partly this reflects a lower cost to the firm of holding cash (Kahle and Stulz, 2017). Partly this reflects the growing importance of intangible capital (Crouzet et al., 2022; Ayyagari, Demirgüç-Kunt and Maksimovic, forthcoming). Partly the increased importance of total assets seems to reflect the growing importance of computers and related technologies, largely starting around 1981 with the IBM PC, followed by a range of related technologies including the internet, cell phones, and cloud computing. These may have been less costly for large firms to adapt to (Acemoglu and Restrepo, 2018; Acemoglu et al., 2018). Some of these newer technologies may also be intangible too. The adoption of these newer technologies is not like turning on a light switch with observable precisely timed impact events. It is a gradual process mixing a very large number of events that are not observable to us. So we document the increased total assets trend, but our data does not permit us to measure the relative importance of these more detailed driving forces suggested in the literature.

Third, the median firm had little or no change in the flow costs. Large firms have always had a flow cost advantage relative to other firms. But particularly starting in the 1990s that advantage has grown larger over time. Their gap between sales revenue to flow costs increased. A popular idea is that this might be due to increased output market power (Grullon, Larkin and Michaely, 2019; De Loecker, Eeckhout and Unger, 2020). For example, many people appear willing to pay more for Apple products than for essentially similar products by less well known firms. So Apple charges more, relative to the flow costs of production. However the reduction in flow costs of production is not just relative to sales revenue. We show that it is also relative to other measures of firm size, notably total assets. So this is not just a reflection of the much discussed increased output market power at top firms (Grullon, Larkin and Michaely, 2019; Autor et al., 2020; Covarrubias, Gutiérrez and Philippon, 2020; De Loecker, Eeckhout and Unger, 2020).

Fourth, it is well known that from the mid-1980s until Covid, interest rates on US government debt gradually declined until they became very close to zero. What is not well known is that this macro-trend helped larger firms more than it helped average firms. Large firms have easier access to bond markets than do smaller firms, while smaller firms typically depend more on bank loans (Chodorow-Reich et al., 2022; Frank and Goyal, forthcoming). As a result, we find that the large profitable firms end up with more debt financing than small profitable firms. The large firms also pay a lower interest expense relative to even highly profitable smaller firms. Accordingly, the debt market trend over many decades were particularly helpful to large firms across the profitability distribution. The impact of the long term trend in the debt market as helping large firms relative to other firms has been generally ignored in the literature.

Fifth, do the advantages of large firms that we have documented, mean that the large firms we see today will remain the dominant firms over time? Papers focusing on barriers to entry and market concentration are often written in that tone. But in reality, perhaps not. We show that the large firm advantages do not appear to have offered durable protection for high profit firms. There is a fair bit of churning among firms. Over just 5 years, upwards of 30% of firms in each profit quintile exit.[1] While the exit rate is higher among low profit firms, top profit quintile firms

[1] Frank and Goyal (forthcoming) document that from 1971-2020 more than half of public US firm exits (56%) take the form of a merger or an acquisition. Formal bankruptcy and liquidation are only about 8% of exits. Since bankruptcy can be disruptive and costly this makes sense. If a firm is not performing well, being acquired may put the firm's assets into

also have a high exit rate. What is more, exit is not the only moderating force on observed firm profits. Among the unusually profitable firms that remain public, extreme profit tends to return toward more normal levels in just a few years. Profits are much less persistent than firm size, and less persistent than appears to be commonly recognized in the literature.

There is a more refined version of the large firm advantage persistence hypothesis (Covarrubias, Gutiérrez and Philippon, 2020). The claim is that around the year 2000, due to changes in anti-trust enforcement in the US, large firm and high profit firm advantages became more persistent. Despite the intuitive appeal and assertions in the literature, we find no support for this persistence prediction in the data. The firm exit rates after 2000 are slightly *higher* than they were over the full sample period - not lower.

Consider a firm in the top profit quintile. From 1971-2022 the chance of remaining in the same profit quintile 5 years later was 0.33 and the chance of firm exit was 0.30. From 2000-2022 the chance of remaining in the same quintile 5 years later was 0.33 and the chance of firm exit was 0.32. To a first approximation there is no difference after 2000. Next consider a firm in the top size quintile. From 1971-2022 the chance of remaining in the same size quintile 5 years later was 0.70 and the chance of firm exit was 0.21. From 2000-2022 the chance of remaining in the same quintile 5 years later was 0.67 and the chance of firm exit was 0.21. Again, to a first approximation there is no difference in persistence after 2000. The minor differences in persistence at the top after 2000 even have the wrong sign.

So the increased average profitability of large firms does not necessarily mean that specific dominant firms remain dominant as the years go by. Many once high profile names are barely remembered. Readers of a certain age may recall examples like Blackberry, Blockbuster, Borland, Circuit City, Gateway Computers, Howard Johnson's, Lotus 1-2-3, LTV Corporation, Palm, Polaroid, RadioShack, Saab, Sports Authority, Sears, and Westinghouse. Even among firms that do persist, unusually high profits tend to erode; think of Disney, General Electric, IBM, or Nokia for example. The fact that the growing large firm advantage does not provide durable protection for specific

better use rather than spending the resources on lawyers and related expenses. Furthermore, as we show in Section 5.4 large firms have had a lower cost of debt. So, using debt to acquire even a profitable small firm can pay.

large firms can be viewed in terms of Schumpeterian competition (Schumpeter, 1942; Aghion, Akcigit and Howitt, 2014).

The rest of this paper is organized as follow. Section 2 describes the connection of our work to the prior literature. Section 3 analyzes the model we use as a conceptual framework. Section 4 describes the data. Section 5 provides evidence using the model as the guiding framework. Section 6 provides critical evidence on firm profit dynamics going beyond the static model. The conclusion is in section 7.

2 Literature

Profit is such a central concept, that the number of connected papers is huge. But some papers are more closely connected than others to what we are doing. Our paper is related to the literature on the returns to labor, capital, and profits. Those studies are in turn often motivated to understand the declining labor share (Karabarbounis and Neiman, 2014; Kehrig and Vincent, 2021; Grossman and Oberfield, 2022). Barkai (2020) uses aggregate data to show that increased profits helps to explain the decreasing labor share. Davis, Sollaci and Traina (2023) uses aggregate data and reports that firm profit has actually been declining.

Our paper differs in that we study publicly traded firm accounting data rather than macroeconomic data. The accounting data provides a great deal of information. But it does not routinely report the economic categories of labor, capital, or profits. Managers routinely make use of the accounting data. So it is plausible that firm decisions are based on those data rather than on conceptual categories that are not regularly reported. Thus we ground the analysis in the standard corporate accounts. This matters. Previous studies have adopted different accounting categories as 'profits'. In the Internet Appendix we show that alternative accounting definitions for 'profits' can explain some of the quite different inferences observed across papers.

Much of our evidence is consistent with the general perspective of Kwon, Ma and Zimmermann (2023). Large firms have had particularly strong profits and growth for quite a few decades. In comparison to that paper we do not study industry concentration, nor do we study the top 1%

of firms. We provide results about firm churning that they do not have, and we use a simpler firm-level model to organize the evidence. The firm has Cobb-Douglas technology and faces an isoelastic demand curve. We do not extend the model to an industry equilibrium as they do, nor do we make the model dynamic. The idea is that model simplicity may facilitate interpretation, since less is going on in the model. On the other hand, we show that the simplicity has limitations. It means that some aspects of the evidence go beyond the model.

Among the papers studying the labor share, Kehrig and Vincent (2021) had a particular influence on our approach. They study the declining labor share and track it in terms of both aggregate and firm level data. Since the data and basic questions are different, our evidence is quite different from theirs. We find that large firms are particularly important for aggregate profits. They find that large firms on their own are not critical for the declining labor share. Both their paper and ours find that unusually strong firm performance is rather transitory. There is a significant amount of firm performance churning both in terms of profit rates and even in continued firm existence in just a few years.

Some studies start with a model similar to the one used here (Hsieh and Klenow, 2009; Haltiwanger, Kulick and Syverson, 2018). But they study the impact of imposing an equilibrium condition saying that marginal products ought to be equated across firms. We do not do that. Empirical work in such studies tests whether that equality of marginal products across firms can be rejected, see Hsieh and Klenow (2009), Hopenhayn (2014), Midrigan and Xu (2014), and Whited and Zhao (2021) among many others. According to Haltiwanger, Kulick and Syverson (2018) the results of studies starting with Hsieh and Klenow (2009), can be surprisingly sensitive to detailed functional form assumptions. That line of work is very interesting, but quite different in focus from this paper both in terms of questions asked and in terms of evidence.

The growing importance of large firms that we document, is consistent with Lee, Shin and Stulz (2021) and Kwon, Ma and Zimmermann (2023). Lee, Shin and Stulz (2021) argues that the large, high Q firms, are generating revenue that they use to reward investors. But for such firms the high Q reflects current rents better than it reflects good investment opportunities. This is broadly consistent with our evidence that unusually high current profit is predictably negatively related to profits five years later.

Corporate profits can be generated by output markups (Basu, 2019; De Loecker and Warzynski, 2012; Grullon, Larkin and Michaely, 2019; Bond et al., 2021; Raval, 2022; De Ridder et al., 2022) and by lower payments to labor (Karabarbounis and Neiman, 2014; Barkai, 2020; Grossman and Oberfield, 2022; Yeh, Macaluso and Hershbein, 2022). Consistent with Autor et al. (2020) and Kehrig and Vincent (2021) we find evidence that large firms have generally been more profitable. We do not connect that to a specific model of output market competition. Instead we find that the ability of large firms to lower flow costs was particularly important. The fact that large firms obtain debt financing at a lower cost also plays an important role. We show that these factors have been important over many decades producing a significant shift in the distribution of public firms.

Some scholars argue that how exactly profits are measured can be important for the inferences about firm markups. According to Traina (2018) if you adjust profits to reflect the growth in SG&A much of the estimated increase in markups is already accounted for. This is discussed further by Syverson (2019). Similarly Ayyagari, Demirgüç-Kunt and Maksimovic (forthcoming) find that it is important to adjust profit measures to adequately reflect intangible capital. We share the concerns about measurement. We examine a range of distinct profit definitions that have been used in the prior literature. In the Internet Appendix A we show that properly accounting for the firm's total assets, is much more important than is generally recognized in the literature. Total assets tend to have a fixed cost character which makes their growing impact more challenging for medium and smaller firms.

Frank and Yang (2019) provide evidence that financial flows appear to be connected to common accounting measures. So, following Frank and Yang (2019) and Traina (2018), much of the empirical work in this paper uses three major accounting cost measures: Cost of Goods Sold; Selling, General and Administrative Expenses; and Total Assets. Economists such as Syverson (2019) sometimes express concern that the accounting measures do not match textbook economic categories like labor or capital. On the other hand, this is the information that firm decision makers have ready access to. So it seem plausible that those decisions reflect the actually available data. If other forms of data were really more important for decisions, perhaps that kind of data would be commonly collected and made available.

Overall, this paper contributes novel evidence to the literature regarding the changing nature of public firm profits. The conceptual framework shows how facts about firm profit, large firm advantages, production structure and the cost of capital, fit together to provide a coherent perspective on the evolution of public firm profit. We show that the changing production technology and the lower cost of debt at large firms are particularly important to help explain what we observe. The increased large firm advantage has been used to suggest that top firms have become more persistent, particularly since 2000. We show that this claim in the literature is misleading. The increased large firm advantage is real. But it did not cause the large and high profit firms to have a more persistent advantage compared to earlier decades. The churning of firms right across the decades, seems broadly consistent with the classic Schumpeter (1942) perspective.

3 Conceptual Framework

Profits is a central concept and it is routinely assumed that firms maximize profits. Across papers a vast number of different driving forces are studied. When models include firms, there are normally implications for profits. Notable examples include: growing output market power (De Loecker, Eeckhout and Unger, 2020; Covarrubias, Gutiérrez and Philippon, 2020), changes to the cost of capital (Frank and Shen, 2016), and changes to the production technology (Autor et al., 2020; Ayyagari, Demirgüç-Kunt and Maksimovic, forthcoming). Suitably parameterized, any of these might account for Figure 1. These ideas all seem highly plausible, but they are not entirely equivalent. Which, if any of these ideas, provides a good first order approximation to the data?

To answer this question, it is helpful to start with a unified organizing framework rather than using a model tailored to illustrate a specific hypothesis. Our organizing framework is a Cobb Douglas firm facing an isoelastic demand function (Hsieh and Klenow, 2009; Haltiwanger, Kulick and Syverson, 2018; Kehrig and Vincent, 2021). This is analytically simple and transparent, facilitating interpretation. Within this framework several of the key ideas in the literature emerge naturally thereby connecting a number of key hypotheses.

The firm that chooses total assets A, and flow inputs F, to produce output Y using a Cobb-Douglas production function, $Y = \theta A^{\alpha} F^{1-\alpha}$. The price of A is p_A and the price of F is p_F. For simplicity the firm i and date t subscripts are omitted, except where they are needed for clarity. In the empirical work A will be interpreted as book total assets (AT) and F will be interpreted as the Cost of Goods Sold plus Selling, General and Administrative expenses, $(COGS + SGA)$.

Demand is given by an inverse demand curve, $P = P(Y) = \phi Y^{-\mu}$, where ϕ is a demand parameter, and $1/\mu$ is the price elasticity of demand. Notice that the inverse demand function can be rewritten as $\log(Y) = \frac{1}{\mu}(\log \phi - \log P)$. So a higher μ means that demand decreases less when price increases. A higher μ means a rise in the firm's power in the goods market. The elasticity of demand is a negative number when the demand curve slopes down as usual. The elasticity of demand will be greater than 1 in absolute value for an interior profit maximizing solution. So the demand parameter satisfies $\mu \in (0, 1)$ to ensure that the elasticity is greater than 1.

The outside opportunity cost of funds is $\rho \in (0, 1)$. The firm must be able to cover that rate, or else it will not be able to operate. The investors will put their money elsewhere. In textbooks it is common to simplify by assuming that the outside opportunity for the investors is zero. Because we know that there has been a long term decline in interest rates on government bonds, we do not set that rate equal to zero.

The investor represents the entire capital market. She has $W_0 > 0$ which is assumed to be a very large number. To keep the number of cases limited, we assume that W_0 is big enough that it never creates a binding constraint on the firm choices. The firm is small when compared to the capital markets. The return on investing outside the firm is denoted by ρ. The investor payoff is denoted V. If the firm profit is not big enough, the investor puts all of W_0 elsewhere and the firm no longer exists.

The price elasticity of demand is $\frac{1}{\mu}$. Larger μ means more output market power. If demand was insensitive to price, the firm would raise output price. Since the model assumes that demand is isoelastic, let $\mu < 1$ to get an interior solution.

Assume: Let $\phi > 0$, production is reasonable $\theta > 1$, $\alpha \in (0, 1)$, the interest rate is positive $\rho \in (0, 1)$, inputs cost money $p_A > 0$, $p_F > 0$. The choices of inputs must be non-negative, $A \geq 0$, $F \geq 0$.

Out. If all of the investor's money is invested in T-bills she gets,

$$V^{out} = (1 + \rho)W_0. \tag{1}$$

Since $W_0 > 0$ and $\rho \in (0, 1)$ it follows that $V^{out} > 0$.

In. For the firm to operate there is an entry fee of $\kappa > 0$. The entry fee does not come out of the investor's funds. It is a non-monetary cost such as perhaps managerial attention or effort. The entry fee is called a barrier to entry in some papers (Covarrubias, Gutiérrez and Philippon, 2020). The impact of this assumption on the model implications is not large, and the effect is explained when discussing equation 19. Each dollar used to buy A or to buy F does not earn the outside return of $1 + \rho$. Output is produced as $Y = \theta A^{\alpha} F^{1-\alpha}$. The output is sold at a price of $P = P(Y) = \phi Y^{-\mu}$. So firm revenue is $R(A, F) = P(Y(A, F)) \cdot Y(A, F) = \phi(\theta A^{\alpha} F^{1-\alpha})^{-\mu} \theta A^{\alpha} F^{1-\alpha}$.

$$V^{In} = \max_{\{A,F\}} \underbrace{R(A, F) - p_A A - p_F F - \kappa}_{\text{Firm profit, } \Pi} + \underbrace{p_A A + p_F F}_{\text{To the firm}} + \underbrace{(1 + \rho)(W_0 - p_A A - p_F F)}_{\text{Invested elsewhere}} \tag{2}$$

The investor owns the firm as well as the outside wealth. She takes $(p_A A + p_F F)$ out of the money being invested in T-bills, and uses that money in the firm. The firm takes that money and spends all of it to produce output that generates revenue. So in effect, the investor's money finances the firm's costs by reducing outside investment.

The investor chooses between Out and In,

$$V = \max\{V^{out}, V^{In}\} \tag{3}$$

Because $V^{out} > 0$ we know that overall investor payoff V, must also be positive.

Conceptually, ρ controls the size of V^{out} and thus may make it easier or harder for the firm to earn enough to cover κ (external margin). It also controls the size of 'invested elsewhere'. This creates a cost that varies with the size of A and the size of F. For firms that operate ρ will affect the size of the operations (internal margin).

Overall, an increase in ρ is an increase in costs. It will cause the operating firms to be smaller. It will also cause fewer firms to operate. It will cause more of the investor's money to go to T-bills.

To start with, assume that the parameters are such that the firm operates. To maximize the expression in equation 2, find the values of A and F that satisfy the first order conditions, $\frac{\partial V^{In}}{\partial A} = 0$, $\frac{\partial V^{In}}{\partial F} = 0$. Thus,

$$\frac{\partial V^{In}}{\partial A} = \frac{\partial P}{\partial A} Y + P \cdot MP_A - p_A(1+\rho) = 0 \tag{4}$$

$$\frac{\partial V^{In}}{\partial F} = \frac{\partial P}{\partial F} Y + P \cdot MP_F - p_F(1+\rho) = 0 \tag{5}$$

The first order conditions can also be expressed as, $(1-\mu)\alpha\frac{PY}{A} - (1+\rho)p_A = 0$ and $(1-\mu)(1-\alpha)\frac{PY}{F} - (1+\rho)p_F = 0$. From these conditions, the revenue can instead be written as,

$$PY = \frac{(1+\rho)p_F F}{(1-\mu)(1-\alpha)} = \frac{(1+\rho)p_A A}{(1-\mu)\alpha}. \tag{6}$$

Then,

$$\frac{p_A A}{p_F F} = \frac{\alpha}{1-\alpha}. \tag{7}$$

Direct calculation gives the firm choices as,

$$A = \theta^{(1-\mu)/\mu} \left[\frac{p_A(1-\alpha)}{p_F \alpha}\right]^{(1-\alpha)(1-\mu)/\mu} \left[\frac{\phi\alpha(1-\mu)}{p_A(1+\rho)}\right]^{1/\mu}, \tag{8}$$

$$F = \theta^{(1-\mu)/\mu} \left[\frac{p_F \alpha}{p_A(1-\alpha)}\right]^{\alpha(1-\mu)/\mu} \left[\frac{\phi(1-\alpha)(1-\mu)}{p_F(1+\rho)}\right]^{1/\mu}, \tag{9}$$

The components of the payoff are,

$$
\begin{aligned}
V = & \underbrace{(\mu+\rho)(1+\rho)^{-1/\mu}\theta^{(1-\mu)/\mu}(1-\mu)^{-1+\frac{1}{\mu}}\phi^{1/\mu}\left[\frac{1-\alpha}{p_F}\right]^{(1-\alpha)(1-\mu)/\mu}\left[\frac{\alpha}{p_A}\right]^{\alpha(1-\mu)/\mu} - \kappa}_{\Pi,\ \text{Firm profit}} \\
& + \underbrace{(1+\rho)^{-1/\mu}\theta^{(1-\mu)/\mu}(1-\mu)^{\frac{1}{\mu}}\phi^{1/\mu}\left[\frac{1-\alpha}{p_F}\right]^{(1-\alpha)(1-\mu)/\mu}\left[\frac{\alpha}{p_A}\right]^{\alpha(1-\mu)/\mu}}_{\text{Funds to the firm}} \\
& + \underbrace{(1+\rho)W_0 - (1+\rho)^{1-\frac{1}{\mu}}\theta^{(1-\mu)/\mu}(1-\mu)^{\frac{1}{\mu}}\phi^{1/\mu}\left[\frac{1-\alpha}{p_F}\right]^{(1-\alpha)(1-\mu)/\mu}\left[\frac{\alpha}{p_A}\right]^{\alpha(1-\mu)/\mu}}_{\text{Outside Returns}}. \qquad (10)
\end{aligned}
$$

So far it is assumed that the parameters are such that the firm exists. But what restriction on the parameters are needed to justify that assumption? The investor must have enough wealth to cover the firm's needs $p_A A + p_F F \leq W_0$. Recall that it is assumed that W_0 is very large, so $\frac{1-\mu}{1+\rho}PY \leq W_0$. That also means that, $PY \leq \frac{(1+\rho)W_0}{1-\mu}$.

The more interesting restriction is that the firm profits must be large enough to cover their opportunity cost. That means, $V \geq (1+\rho)W_0$. From the first order conditions, $PY - (1+\rho)(p_A A + p_F F) = PY - (1+\rho)(\frac{\alpha(1-\mu)}{1+\rho} + \frac{(1-\alpha)(1-\mu)}{1+\rho})PY$. Thus, $PY - (1+\rho)(p_A A + p_F F) = \mu PY$. This in turn means that, $\mu PY + (1+\rho)W_0 - \kappa \geq (1+\rho)W_0$. In other words, $\mu PY = PY - (1+\rho)(p_A A + p_F F) \geq \kappa$. That is, for firms to enter, the production revenue minus opportunity costs must be large enough so that the fixed cost is covered.

These expressions depend on PY. To get that, replace Y with Equations 7 and 9 to obtain,

$$
PY = \phi(\frac{\alpha p_F}{(1-\alpha)p_A})^{\alpha(1-\mu)}\theta^{(1-\mu)^2/\mu}\left[\frac{\alpha p_F}{(1-\alpha)p_A}\right]^{\alpha(1-\mu)^2/\mu}\left[\frac{\phi(1-\alpha)(1-\mu)}{p_F(1+\rho)}\right]^{(1-\mu)/\mu}. \qquad (11)
$$

Since ρ is the critical return parameter, rewrite the constraint to isolate it,

$$
\rho \leq (1-\mu)\theta^{1-\mu}(\frac{\mu}{\kappa})^{\frac{\mu}{1-\mu}}\phi^{\frac{1}{1-\mu}}\left[\frac{\alpha}{p_A}\right]^{\alpha}\left[\frac{(1-\alpha)}{p_F}\right]^{1-\alpha} - 1. \qquad (12)
$$

Inequality 12 shows that increases in κ, p_A, or p_F will make it less likely that the inequality is satisfied. In other words any of these increases makes it less likely that the firm operates. An increase in demand by increasing ϕ makes it more likely that the inequality holds so the firm operates. Most of the other parameters enter the constraint in relatively complex ways.

If inequality 12 does not hold, the firm does not enter. $A = F = \Pi = 0$ and $V = (1+\rho)W_0$. The firm simply does not exist.

A key motivating question for the model is, what is the effect of an increase in ρ? If the T-bill return is high enough then inequality 12 is violated. The investor puts all funds into T-bills and none into the firm. Then of course, an increase in ρ makes V bigger. Next, consider a firm that operates. Then A and F are both smaller due to ρ. The effect on V is more complex. In order to find the conditions we need for ρ, first combine terms in V,

$$V = (1+\rho)^{1-\frac{1}{\mu}}\theta^{\frac{1-\mu}{\mu}}(1-\mu)^{\frac{1}{\mu}}\phi^{1/\mu}\frac{\mu}{1-\mu}\left[\frac{1-\alpha}{p_F}\right]^{(1-\alpha)(1-\mu)/\mu}\left[\frac{\alpha}{p_A}\right]^{\alpha(1-\mu)/\mu} - \kappa + (1+\rho)W_0. \quad (13)$$

The first two terms (profits plus money from the investor) are decreasing in ρ. The last term is increasing in ρ. Therefore, in order for the total firm value V to be increasing ρ, the outside investment profit needs to be high enough.

$$\frac{\partial V}{\partial \rho} \geq 0 \Leftrightarrow \rho \geq (1-\mu)\theta^{1-\mu}W_0^{-\mu}\phi\left[\frac{1-\alpha}{p_F}\right]^{(1-\alpha)(1-\mu)}\left[\frac{\alpha}{p_A}\right]^{\alpha(1-\mu)} - 1. \quad (14)$$

Will the firm actually operate when ρ changes? Recall from equation 12 that this requires,

$$\rho \leq (1-\mu)\theta^{1-\mu}(\frac{\mu}{\kappa})^{\frac{\mu}{1-\mu}}\phi^{\frac{1}{1-\mu}}\left[\frac{\alpha}{p_A}\right]^{\alpha}\left[\frac{(1-\alpha)}{p_F}\right]^{1-\alpha} - 1. \quad (15)$$

This can also be interpreted as a restriction that says κ is not too large,

$$\kappa \leq W_0^{1-\mu}\phi\left[\frac{1-\alpha}{p_F}\right]^{(1-\alpha)(1-\mu)}\left[\frac{\alpha}{p_A}\right]^{\alpha(1-\mu)}. \quad (16)$$

In principle if ρ is sufficiently low or even negative, the investor would want to put all resources into the firm. In that case the investor budget constraint would bind. The firm is then 'big' relative to the overall capital market. This is logically possible, but does not seem empirically relevant for our purposes.

To understand the meaning of the model consider the sales revenue shares. Compute s_A, s_F and s_Π. From first order conditions,

$$s_A = \frac{\alpha(1-\mu)}{1+\rho}, \tag{17}$$

$$s_F = \frac{(1-\alpha)(1-\mu)}{1+\rho}, \tag{18}$$

$$s_\Pi = \frac{\mu}{1+\rho} + \frac{\rho}{1+\rho} - \frac{\kappa}{PY}, \tag{19}$$

where PY is from equation 11.

As usual, the Cobb Douglas technology parameter α plays a critical role determining the share of sales revenue devoted to each input. Here the inputs are flow costs, and total assets. The sensitivity of sales to price is controlled by parameter μ. When that parameter increases more of the sales revenue goes to firm profits s_Π and less to flow costs and to total assets. When the opportunity cost of funds ρ increases, obtaining funding becomes more costly and so less inputs are used.

The share of sales revenue devoted to covering flow costs is similar to the assets expression. In this case the Cobb Douglas parameter effect is given by $1-\alpha$. But the other factors are the same.

The share of sales revenue devoted to profits s_Π, is slightly different. An increase in market power μ, directly translates to a larger profit share. How strong this affect is depends on the opportunity cost of funds ρ. When outside funds are more expensive, firms are less able to capture the sales revenues that they might otherwise have obtained. This effect is not present in the simplified, self-financing firm model. The cost of capital also has a directly positive impact on firm profit shares.

The final term reflects the operating firm's need to cover the fixed cost of entry, κ. The larger this cost relative to sales revenue PY, the lower the share of sales revenue devoted to profits. It has been assumed that this cost is not a subtraction from the investor's other investments. It could have been assumed that this cost does come out of the investor's other investments. Which version is more realistic seems debatable. If κ is covered by the investor, then in equation 19 the term $-\frac{\kappa}{PY}$ is replaced by $-\frac{\kappa}{PY(1+\rho)}$. This makes little difference to the main inferences.

Within this framework it is easy to recognize the driving forces and how they connect to each other. The cost of the simplicity is that not all potentially important forces are included. The model is static, partial equilibrium, and does not directly include uncertainty. With this framework in hand we now turn to the data to see what aspects fit the model, and what aspect suggest a serious need for greater theoretical complexity.

4 Data

The firm level data is from Compustat, 1971-2022. All observations that are measured in dollars are deflated to year 2017 using the GDP deflator from the FRED database (https://fred.stlouisfed.org/). Following standard practice, regulated firms (utilities, railroads, and telecommunications) and financial firms are excluded on the grounds that there are special factors that affect both their operations and their accounting. Data cleaning follows Frank and Goyal (forthcoming). That paper provides both detailed explanations for the specific steps and Stata code to implement those steps.

By definition a profit is the the money that results from selling products and services, minus the cost of producing these products and services. It can be positive or negative. These simple concepts become slippery when applied to real firms. Issues such as accounting treatment of event timing and accruals, cost allocations, financing, and contingent events, cloud the seeming conceptual simplicity. Accounting systems cannot avoid these problems. Even deciding on a theoretically correct way to handle some of these issues is challenging (Dechow, Ge and Schrand, 2010). So the concept of profits does not precisely match the data provided by real accounting systems. Different papers adopt different accounting measures as profits. In the Appendix A a range of empirical profit definitions are evaluated.

Profits for firm i in year t are defined as,

$$\Pi_{it} = Sales_{it} - COGS_{it} - SGA_{it} - T_{it} - \rho AT_{it}, \tag{20}$$

where Π_{it} is the profit for firm i at date t, $Sales_{it}$ is firm i's sales revenue in period t, $COGS_{it}$ is cost of goods sold, and SGA_{it} is selling general and administrative costs, T_{it} is taxes, ρ is the opportunity cost of funds, TA_{it} is total assets. This definition of profits is sometimes called Economic Value Added (Rogerson, 1997; Grant, 2003; Damodaran, 2007).

The interpretation of equation 20 is simple. Profits is revenue - costs. Revenue is defined as Sales. Costs consist of, the flow costs that directly use up finds, taxes, and the opportunity costs of assets in use. The flow costs has two parts. Part 1 is the Cost of Goods Sold ($COGS_{it}$) are the expenses needed to produce the product including labor, materials, and often include some overhead expenses. Part 2 is the selling, general, and administrative expenses (SGA_{it}) are the overhead expenses needed to run the firm. These typically include things like the costs of advertising and paying the sales force; rent, utilities, office equipment and supplies; accounting, payroll, human resources. The allocation of research and development into these categories varies across firms. Both COGS and SGA directly use up funds. Taxes (T) are a direct cost to the firm. The firm's total assets are AT, and those assets could have been used to do other things. Accordingly they incur an opportunity cost (ρ) which must be recognized when computing the firm's profits. So the opportunity cost of the firm's assets are ρAT.

Table 2 provides summary statistics for all years together as a full panel. The main data is from Compustat, and the magnitudes are quite similar to what is reported in many other studies. For example the average debt ratio is 0.312 and the average market-to-book ratio is 2.294.

Negative profits are remarkably common. In fact the equally weighted average firm profits are negative, with the ratio to total assets of -0.07. However the median firm profits were positive. The negative skewness of the profit to asset ratio is -5.15, so it is not well approximated by a normal distribution. In fact, many of the firm-level variables have absolute values of skewness of more than 1, suggesting that that most of these firm level variables would not be well approximated by a normal distribution. So considerable care is needed when attempting to understand the profit at a typical firm, and how that differs from the aggregate.

Many firm attributes are highly persistent. Firm size is very persistent no matter whether sales or assets are used to measure size. Firm profits are notably less persistent than firm size. This distinction deserves more recognition than it sometimes receives.

Figure 1 shows aggregate profits over time. The solid black line shows $\frac{\Pi}{AT}$ for the median firm year-by-year from 1971 to 2022. The dashed line shows the aggregate, $(\frac{\sum_i \Pi_{it}}{\sum_i AT_{it}})$. The profit and total assets used to calculate the aggregate profit (Compustat) are winsorized at 1st and 99th percentiles to eliminate the impact of outliers. Otherwise, we will see a sudden increase in Compustat aggregate ratio in 1988 which is mostly due to a huge rise in debt. This may reflect mergers and acquisitions.

During the 1970s the two lines were almost identical. In the early 1980s a clear gap emerges. Aggregate profits relative to assets is greater than the median firm value. That gap neither grows nor shrinks all that much, until Covid in 2020. There is not yet enough data post-Covid to be sure if that gap will persist. The lower light grey dashed line shows the first quartile. Before 1980 the first quartile reflected positive profits. After 1980 that lower quartile is always negative, meaning that a substantial proportion of the publicly traded firms operate at a loss.

What forces are responsible for what is depicted in Figure 1? Either the numerators or the denominators could be responsible. Firm heterogeneity could be due to a variety of factors, and distinct pressures could be responsible for the volatility and for the difference between the median and the aggregate. The forces might include: 1) Specific industries might be driving the aggregate, 2) There could be a common trend effect that causes all firms profits to rise or fall. 3) There could be a large firm effect that changes at large firms drive the aggregate. 4) There could be a superstar firm effect such that fast growing, high profit firms drive the aggregate. 5) There could be a rising firm effect in which it is the firms that are both growing rapidly and have increasing profits. 6) There could be entry or exit effects in which entering firms or exiting firms have a major effect on the aggregate.

Does the aggregate trend mask differences in the distribution across firms? Figure 2 shows the distributional change of firm profitability at 10 year intervals starting in 1971. Aggregate profits are positive in each year. But many individual firms have negative profits. The share of profits is shown by the bars. From 1971 through 2001 the distribution is very close to being centered at zero.

Relative to earlier decades, in 2011 and 2021 the center of the profit distribution is clearly shifted towards greater profits. The mass below zero shrinks. The shares of firms are shown by the lines for each year. Through 2001 the peak of the firm distribution is in the cell between zero and 0.06. In 2011 and 2021 the peak is is shifted to the right. So measures by share of profits or by share of firms, the distribution of profits is shifted towards greater profits after 2001.

Figure 3 compares the distributions of several key attributes in 1971 to 2021. As before, the first two lines shows the right shift in the share of profits and the number of firms, in 2021 when compared to 1971. The third line shows that a similar shift in the share of sales takes place. The fourth line shows a corresponding shift in the shares of total assets. So the shift towards more profitable firms is observed across a range of related attributes. This means that it is unlikely to be an accounting artifact for a particular category in the reports. It is more pervasive than that. There does appear to have been a break at some point after 2001.

These distributional shifts to the right are important for interpretation. The increase in profits is not just a function of what happens at the very top firms (Covarrubias, Gutiérrez and Philippon, 2020; Kwon, Ma and Zimmermann, 2023). The entire distributions shifted towards greater profits. This makes it less likely that the shift reflects some sort of policy change that only works in favor of the very largest firms. Instead it makes it more likely that the shift is also connected to the declining number of unprofitable public firms (Kahle and Stulz, 2017).

5 Evidence

This section examines how the data connects to the model. A key to this is provided by equations 17, 18 and 19. These provide sharp predictions about the allocation of sales revenue and how they reflect driving factors. The evolution of these shares over time can help pin down potential factors and the plausibility of the model itself.

Figure 4 provides time series plots showing the evolution of these shares over time. Panel 4a looks very similar to Figure 1, so the normalization by total assets and the normalization by firm sales generate the same basic patterns. Panel 4b shows that the average firm is devoting roughly the same fraction of sales revenue to the flow costs in all decades. But the aggregate exhibits a decline the the share devoted to flow costs. This implies that the larger firms are devoting a lower fraction of sales revenue to the flow costs. Panel 4c shows that both the aggregate and the median firm are devoting an increasing fraction of sales revenue to total assets.

Combining these panels the pattern is that all firms are devoting more resources to total assets. The median firm has essentially constant allocations to flow costs and to profits. Large firms have a declining allocation to flow costs, and much of that resource saving translated into growing firm profits.

The reported profit measurements are ratios. When observing properties of a ratio, it is natural to ask whether interesting properties are due to the numerator, the denominator or both jointly. Is the numerator (Π), or the denominator (AT) more responsible for the aggregate evolution?

If the numerator is more responsible, then high profit firms are largely responsible for the aggregate. Kehrig and Vincent (2021) call this the Superstar scenario in which superstar firms earn much of the aggregate profits. In that view what happens to superstar firms is of particular importance for the economy in the aggregate. It should be noted that the definition of a 'Superstar firm' does differ across papers. They can be defined by profitability, by productivity, or by still other metrics of outstanding performance. In this paper we follow the definition in Kehrig and Vincent (2021).

If the denominator is more responsible, it is large firms that are primarily responsible for the aggregate. This has been called a Big Player scenario (Kehrig and Vincent, 2021). More commonly it would be called a Large Firm effect which is the term we use. In order to measure these effects, suppose that there are J firms. Define the asset weight of firm i on date t as, $\omega_{it} = \frac{TA_{it}}{\sum_{j=1}^{J} TA_{jt}}$. For firm i define the profitability, or the return on assets (ROA) as, $\pi_{it} = \frac{\Pi_{it}}{TA_{it}}$. Let ω_{it} be the asset-weighted value of firm i at date t. Summing across firms, the aggregate return on total assets is, $\pi_t = \frac{\Pi_t}{TA_t} = \omega_{it}\pi_{it}$.

Foster, Haltiwanger and Krizan (2001) discuss several methods of decomposing firm performance. Leaving entry and exit to the side for now, a common idea is to decompose a series into a within effect, a between effect, and an interaction. Within is also called a shift effect, and the between effect is also called a share effect. Let τ be either 1 or 5 depending on whether a change over one year or over a 5 year interval is being considered. For a given firm over a τ year horizon, the change in profits is $\Delta\pi_{it} = \pi_{it} - \pi_{it-\tau}$. Similarly the change in weights is $\Delta\omega_{it} = \omega_{it} - \omega_{it-\tau}$. The decomposition is then,

$$\Delta\pi_t = \underbrace{\sum_i \omega_{it-\tau}\Delta\pi_{it}}_{Within} + \underbrace{\sum_i \Delta\omega_{it}\pi_{it-\tau}}_{Between} + \underbrace{\sum_i \Delta\omega_{it}\Delta\pi_{it}}_{Interaction} . \tag{21}$$

Adapting Kehrig and Vincent (2021) to the current setting, write $\pi_t = \bar{\pi}_{it} + Cov(\omega_{it}, \pi_{it})$, where $\bar{\pi}_{it}$ is the equal weighted average. Ignoring entry and exit they get,

$$\Delta Cov(\omega_{it}, \pi_{it}) = Cov(\Delta\omega_{it}, \pi_{it-1}) + Cov(\omega_{it-1}, \Delta\pi_{it}) + Cov(\Delta\omega_{it}, \Delta\pi_{it}).$$

To help fix ideas their labels are adapted to the current context.

1. The Superstar effect, means that $Cov(\Delta\omega_{it}, \pi_{it-1}) > 0$ is the key driving force for aggregate profits. High profits is associated with greater increase weighting in the aggregate profits.

2. The Large Firm effect, means that $Cov(\omega_{it-1}, \Delta\pi_{it}) > 0$ is the key driving force for aggregate profits. High market share is associated with greater increase weighting in the aggregate profits.

3. The Rising star effect, means that $Cov(\Delta\omega_{it}, \Delta\pi_{it}) > 0$ is the key driving force for aggregate profits. Increased market share and increased profits have a positive covariance.

Figure 1 shows that aggregate profits are rising. Which kind of firm effects are critical to that increase? Both superstar firms (Autor et al., 2020) and large firms (Kahle and Stulz, 2017) have attracted particular attention in the literature. Rising stars and unicorn firms tend to be the subject of studies that are more narrowly focused on the entrepreneurship process itself (Ewens and Farre-Mensa, 2022).

5.1 Superstar Firms

A range of definitions have been applied to the term superstar firm. Kehrig and Vincent (2021) define a superstar firm to be a firm with unusually high profits. This term has been used in a similar manner in other papers such as Autor et al. (2020); Ayyagari, Demirgüç-Kunt and Maksimovic (forthcoming). Some papers define a threshold such as the top 10% of firms (Ayyagari, Demirgüç-Kunt and Maksimovic, forthcoming). Other papers focus on a more broadly based profit weighting (Kehrig and Vincent, 2021). Here the question is: do superstar firm profits drive the aggregate profitability?

To address this question, consider Figure 5. It shows the aggregate profit ratio along with 4 counterfactuals. The firms are restricted to those that neither enter nor exit during the sample period. In each panel the blue dashed line shows the aggregate profitability: $\frac{\sum_i \Pi_{it}}{\sum_i AT_{it}}$, where $t = 1971, ..., 2022$. Each black line fixes the profitability on a specific date $\hat{t}$, where $\hat{t} = 1981$, 1991, 2001, 2011 respectively. On a given t date, each firm is assigned its profitability at time $\hat{t}$: $\frac{\Pi_{i\hat{t}}}{AT_{i\hat{t}}}$. So for each date $t = 1971, ..., 2022$ a counterfactual aggregate profitability ratio is $\sum \omega_{it} \frac{\Pi_{i\hat{t}}}{AT_{i\hat{t}}}$. Thus the observations are weighted to the fixed profitability for the $\hat{t}$ date. Firms that were very profitable on that date, are thus given a correspondingly large profitability value on every other date in the reweighted version.

Suppose that Superstar firms were key drivers of aggregate profits. Then in Figure 5 the fixing of profitability weights on a specific date would be unimportant. The blue dashed lines would be very close to the black lines. That is clearly not what happened. It does not matter which year is taken as a reference year. In no case are the lines moving in tandem. The aggregate profits is much more volatile. The fixed weight profits lines are very smooth. The high profit superstar firms do not drive the aggregate.

The black line defined in 1981 has almost no net drift. The black lines defined in 1991, 2001, and 2011 all seem to exhibit a very slow upward drift. In other words these firms seem to have very gradually improved their profits.

A natural concern is that Figure 5 uses a balanced panel. Is firm entry and exit somehow critical to the idea that high profit firms drive the aggregate? To address this in the Internet Appendix we provide a version that includes all firms that exist in a given year are included. This permits firms that enter or exit to matter. It depicts results for an unbalance panel of annual data, so the data includes all firms that exist in a given year, whether or not the firm exists in any other year. As before, in each panel the blue dashed line shows the aggregate profitability: $\frac{\sum_i \Pi_{it}}{\sum_i AT_{it}}$, where $t = 1971, ..., 2022$. Each black line fixes the profitability on a specific date $\hat{t}$, where $\hat{t} = 1981, 1991, 2001, 2011$ respectively. On a given t date, each firm is assigned its profitability at time $\hat{t}$: $\frac{\Pi_{i\hat{t}}}{AT_{i\hat{t}}}$. So for each date $t = 1971, ...2022$ a counterfactual aggregate profitability ratio is $\sum \omega_{it} \frac{\Pi_{i\hat{t}}}{AT_{i\hat{t}}}$. Thus the observations are weighted to the profitability for the $\hat{t}$ date.

Because the data is unbalanced, adjustments are required. If a firm did not exist on a date $\hat{t}$ the weight is zero. Suppose that a firm exists on a year $\hat{t}$ but not on some other date s. On date s that firm's profitability ratio is not defined since the assets are zero. Instead it is redefined to be 0 on that date s. This permits entering and exiting firms to be included. As before, the blue dashed line is not tightly connected to the solid black line. The high profit superstar firms do not drive the aggregate profits. Allowing firm entry and exit does increase the volatility of the black line somewhat. Similar to Figure 5, the black line defined in 1981 has no net drift. The black lines defined in the subsequent years all show greater profits in more recent years when compared to earlier years. Since an essentially similar pattern is observed across both Figures, this pattern is not fundamentally due to firm entry and exit.

5.2 Large Firms

So far is has been established that high profit Superstar firms are not the key driver of the aggregate profit fluctuations and trends. From the decomposition structure, the natural next question is whether large firms are responsible.

Figure 6 is similar to Figure 5. The difference is that in this case it is firm size that is used to define the critical date weights $\hat{t}$. The figure shows that fluctuations in the profitability of large firms can account for most of the fluctuations in aggregate profitability of the publicly traded corporate firms. The within effect is powerful.

Figure 1 shows that the median firm profits have evolved quite differently from aggregate profits. The median firm has often had negative profits while the aggregate is positive. From the Internet Appendix it is clear the high profit firms are not the key. They also show that neither firm entry nor firm exit is the key force driving the aggregate. Figure 6 shows that large firms seem to have a growing advantage over more moderately sized firms. Large firms are also key to the evolution of aggregate profits. Thus it is important to allow for firm heterogeneity.

The Superstar firm effect is very small. The Large firm effect in the data is powerful. The strength of the Large firm effect is sufficiently powerful that there is little room left for the Rising firms to have much effect either.

5.3 Operating Cost Structure

According to the model in Section 3 firm profits ought to reflect the elasticity of demand, the firm's expenditures on flow costs, and the firm's use of assets. From Figure 4 it is clear that as a fraction of sales, these things have evolved over time and the large firms have performed somewhat differently from the other firms.

Did the normalization by sales affect the interpretation? To deal with this Figure 7 shows the ratio of flow costs to total assets. As before the solid black line is for the median firm, and the dashed blue line is for the aggregate. The light grey dashed lines show the first and third quartile locations within each year.

Figure 7 shows clearly that over time flow costs have been declining for both the median firm and in the aggregate. Whether that process starts in the late 1970s or the mid 1980s is debatable. But in either case there has been a long term decline in the importance of flow costs relative to book total assets. In a Cobb-Douglas framework this means that the exponent (α) has not been a constant over recent decades.

The role of fixed costs or total assets appears to have become increasingly important. This appear to have been a first order change in the economy. The current data does not partition out labor costs separately, but this is consistent with the literature on decreasing labor shares (Karabarbounis and Neiman, 2014; Kehrig and Vincent, 2021; Grossman and Oberfield, 2022). This is also consistent with the hypothesis that computerization and the internet have caused a growing importance of fixed costs for the typical firm. Because this is a long term trend, it is not the sort of change that can be readily identified in a typical causality test.

Do some components of profits play a particularly important role at the high profit firms? Recall that profits are,

$$\Pi_{it} = Sales_{it} - COGS_{it} - SGA_{it} - T_{it} - \rho AT_{it},$$

and $EBITDA = VA - SGA = Sales - COGS - SGA$. For any variable x_t, define $\Delta x_t = x_t - x_{t-1}$. Taking a first time difference of the profit definition and then dividing,

$$\frac{\Delta \Pi_{it}}{AT_{it-1}} = \frac{\Delta EBITDA_{it}}{AT_{it-1}} - \frac{\Delta T_{it}}{AT_{it-1}} - \frac{\Delta \rho AT_{it}}{AT_{it-1}}. \tag{22}$$

To determine whether any particular component is particularly crucial for high profit firms, use a simple regression. Step 1, in each year sort firms into profit quintiles, and let I_{it}^{HIGH} be an indicator that a given firm-year observation is in the high profit quintile. Step 2, define y_{it} to be $\frac{\Delta EBITDA_{it}}{AT_{it-1}}$, $\frac{\Delta T_{it}}{AT_{it-1}}$, $\frac{\Delta \rho AT_{it}}{AT_{it-1}}$, $\frac{\Delta VA_{it}}{AT_{it-1}}$, $\frac{\Delta Int_{it}}{AT_{it-1}}$, and $\frac{\Delta^2 D_{it}}{AT_{it-1}}$. Then run simple regressions,

$$y_{it} = \beta_0 + \beta_1 I_{it}^{HIGH} + \beta_2 X_{it} + \varepsilon_{it}, \tag{23}$$

where X_{it} is a vector of industry and year dummies used as controls. Equation 23 is run both equally weighted and weighted by the firm/year share of aggregate profits.

Table 4 provides the regression results. Panel (a) is equal weighted. Panel (b) is value weighted. As might be expected, most components are statistically significant, and have the expected signs.

The main exception is the tax term. Presumably the positive sign is a direct reflection of the endogeneity of taxes. This highlights the fact that these are descriptive regressions. Both measures that reflect sales revenue are positive and statistically significant. The debt and interest rate terms are negative and significant. The opportunity cost of funds is strongly significant in the value weighted regressions, but is statistically insignificant when equally weighted.

Earlier result show that the structure of profit has evolved over time. Is this also true of the relative importance of the components of profits? Table 5 decomposes the data into earlier years (1971-1989), middle years (1990-1999) and more recent years (2000-2022). The strongest observation is the essential stability of the result over time. Clearly there is some variation. But the fact that sales and change in debt are the strongest forces is found across time periods. There is some decline in the importance of net working capital. There is also a trend towards a reduced impact of the change in interest. The interest effect makes sense in a declining interest rate environment, as illustrated in Figure 8.

5.4 Cost of Debt

When the opportunity cost of funds (ρ) increases, some projects are no longer profitable. Such projects tend not to take place. In theory the interest rate on a project depends on the risk of that project. In practice individual projects are not always apparent to lenders, and the borrowing rate differs across firms in predictable ways that are not always easily interpreted as risk. Commonly we use interest rates on US government bonds to approximate the risk-free rate. Most firms then face a markup on that rate.

Figure 8 shows the time series for both the 10-year Treasury rate, and the Corporate BAA bond yield. Both are reported after-inflation. Until about 1981 both rates had no net trend and the gap between the rates was small. Then over a period of about a year both rates jump very sharply. The BAA rate jumped more than did the 10-year Treasury rate. So the gap between the rates got bigger. Over the next 40 years both rates gradually declined, and the gap between the rates was consistently larger than it had been prior to 1981. Firms that were less credit-worthy than BAA faced an even larger gap.

How does this evolution affect the interest rates that firm's pay? Kahle and Stulz (2017) observe that it makes debt less expensive for firms in general. How does it affect the cross-section of interest rates that firm's pay? This has not been a major focus in the literature. Table 6 provides evidence on the connections between profitability, firm size, the amount of debt, and the interest rate on debt. To do this firms are sorted into profit quintiles and size quintiles. That gives 25 cells. Since the sorts are done independently, the number of observations in various cells can differ. This process is carried out first of all for the full data from 1971-2022. It is then carried out for the data from 2000-2022. It has been suggested that the most recent decades might differ from the longer period results.

Panel 6a reports the Debt/Sales ratios. For all firm sizes, low profit firms have a larger Debt/Sales ratio. For high profit firms, larger firms use more debt. For low profit firms the use of debt is not monotonic in firm size. The very smallest and the very largest low profit firms use more debt than do moderate sized firms. These results are true for the full sample, and they are also true for the period since 2000.

Panel 6b reports the Interest/Sale ratio. A high value means that the firm is devoting a relatively large proportion of sales revenue to paying interest. This could reflect a large amount of debt, a high interest rate, or low sales revenue. For firms of all sizes, low profit firms have a larger interest/sales ratio. For high profit firms the ratio is essentially the same for firms of all sizes. For low profit firms, the smallest category of firms have the highest interest/sales ratio. These results are true for the full sample, and they are also true for the period since 2000.

Panel 6c reports the Interest/Debt ratio. A high value means that the firm is paying a relatively high rate on each dollar of debt that it issues. The lowest profit firms generally have the highest interest/debt ratio. The effect is strongest for the small firms. For large firms the gradation is rather mild. For firms or all profitability rates, larger firms pay a much lower interest rate. In many cases the rate for the largest firms is half the rate for the smallest firms.

These results show that firm size has a particularly strong effect on the debt burden. This large firm advantage is somewhat stronger during 2000-2022 than it is in the full sample. The small low profit firms pay more in the recent period (0.35 versus 0.26), while the large low profit firms pay slightly less (0.10 versus 0.12). A similar change is observed for the high profit firms. The small high profit firms pay more in the recent period (0.19 versus 0.18), while the large low profit firms pay slightly less (0.07 versus 0.09).

Overall, in recent years the debt market appear to have offered better terms to large firms than to small firms. Accordingly it makes sense that in recent years large firms seem to be using more debt than large firms used to use.

How do these facts connect to the model? The declining ρ implies that the distortion relative to the unconstrained model was falling. Since the distortion makes firms smaller, reducing the distortion should have resulted in firms getting bigger. Declining ρ should increase s_A, and s_F but tend to reduce s_Π. In the data s_A was getting bigger. In the data s_Π got bigger at large firms, but did not change much at median firms. So other forces must have been more important. In Equation 19 says that this must have been due to increasing μ or falling κ. Empirically falling κ ought to have had a bigger impact on small firms, but it seem that large firms were the main beneficiaries. So increasing μ is probably at work. The drop in ρ probably helped large firms more. They make greater use of bonds.

In a given year a firm may or may not generate enough sales revenue to cover the promised interest. As long as the firm has other resources that can be used, it need not be in default. Furthermore, the firm's profit in a given year may or may not be equal to the expected future annual profits. A currently unprofitable firm may be expected to become profitable in the future.

The picture that emerges is that for firms with sales revenue that does not cover ρ they appear to be struggling. It should be born in mind that this is not a structural comparative static type result. It is simply a data description along with an interpretation through the lend of the model. It does not say whether it is a change in ρ or a change in Sales is the critical factor. Since ρ is common across firms, there is reason to think that it reflects the firm Sales at least to a significant extent.

Table 6 presents the opportunity costs for firms with different size and profitability. As expected, large and profitable firms tend to have low debt costs. Large firms have less debt relative to sales revenue. They pay a lower interest rate relative to sales. They also pay a lower interest rate relative to the book value of debt. Small firms have to pay much more. Even high profit small firms pay an elevated interest rate.

Since the mid-1980s the after-inflation GS 10 has been generally falling. That means that ρ was falling. The declining ρ implies that the distortion relative to the unconstrained model was falling. Since the distortion makes firms smaller, reducing the distortion should have resulted in firms getting bigger. Declining ρ should increase s_A, and s_F but tend to reduce s_Π. In the data s_A was getting bigger. In the data s_Π got bigger at large firms, but did not change much at median firms. So other forces must have been more important. In Equation 19 says that this must have been due to increasing μ or falling κ. Empirically falling κ ought to have had a bigger impact on small firms, but it seem that large firms were the main beneficiaries. So increasing μ is probably at work. The drop in ρ probably helped large firms more. They make greater use of bonds. Bond yields seem to have fallen by more than bank rates.

6 Firm Profit Dynamics

The model in Section 3 is static. The growing importance of large firms is sometimes interpreted to mean that the currently large firms will become increasingly large and increasingly immune to challenges to their profitable position. For example Covarrubias, Gutiérrez and Philippon (2020) high light the role of concentration and reduced antitrust enforcement. Farboodi and Veldkamp (2023) examine the idea that data can serve as a barrier to competition. Of course, the growing importance of lager firms need not imply that the large firms are well protected. Even large firms can enter and exit. It is therefore important to examine the transitions among firms. To avoid misinterpretation, some aspects of profit require consideration of dynamics. In this section we provide such evidence.

6.1 Superstar Firms

Recall that the superstar firms are those with unusually high profits. If a firm has unusually high profits in year t how likely is that same firm to have unusually high profits 5 years later? The answer to this question is important to the nature of competition. If the superstar firms are persistently at the top, then policy concerns (Covarrubias, Gutiérrez and Philippon, 2020) are sharper than if the process is more like (Schumpeter, 1942) suggests.

Table 7 divides firms into profit quintiles and show the transitions 5 year later. In addition to the quintiles, new entry and firm exit are permitted categories. The biggest single fact is that over the 5 year horizon roughly $\frac{1}{3}$ of firms exist and a roughly similar fraction of firms enter. While these transitions are strongest for the lowest profit quintile, they are not restricted to low profit firms. Even the top profit firms have roughly a 30% exit rate over 5 years. Firms in the top profit quintile are more likely to have exited within 5 years, than they are to still be in the top quintile. There is a very slight increase in profit persistence after 2000, below the top, in quintiles 1, 3, and 4.

There is much less persistence of profits at the top, than generally recognized. Firms in the top quintile are roughly as likely to have exited 5 years late as they are to have remained in the top quintile. There is true over the full period 1971-2022, and it is also true for 2000-2022. Profits at top firms did not become more persistent.

High firm profit is remarkably weakly correlated within firm over just a few years. According to Covarrubias, Gutiérrez and Philippon (2020) anti-trust enforcement in the USA is very weak. Assuming that this claim is correct, this evidence shows that in the USA, market forces erode firm profit remarkably strongly and rapidly.

Table 8 considers firm profit evolution in a regression format where industry and year fixed effects are included. Columns 1 to 4 run regressions for initially high profit firms, including industry and year fixed effects. Columns 1 and 2 are equally weighted. Columns 3 and 4 are value weighted. Columns 1 and 3 show that the high profit firms had lower profit 5 years earlier. Columns 2 and 4 show that the high profit firms will on average have lower profit 5 years later. Columns 5 to 8 are corresponding regression results for initially low profit firms. The low profit firms had been higher profit previously, and are predicted to have higher profit 5 years later.

In each case there is a statistically significant and economically very strong movement of profits away from the abnormally high or low, and towards the more typical profit levels. Among firms that still exist 5 years later, extreme profits erode quite strongly, and in both directions.

6.2 Large Firms

The previous section showed that extreme profits do not seem to last. What about firm size? Does it also move fairly rapidly towards more typical firm size? If economies of scale imply a uniquely optimal firm size, then such a force might be expected. Table 9 provides a quintile transition table. Again firm entry and exit categories are also included. Since this is for the same set of firms, it is not surprise that the entry and exit results are very similar to Table 7. The very largest firms are somewhat less likely to exit than are the very largest profit firms.

Table 9 shows much stronger persistence for size than does Table 7 does for profits. That is persistence is particularly strong among the largest quintile of firms. Large firms tend to remain large. Large firms are more likely to exit than they are to become small firms. Small firms are more likely to exit than they are to become large.

Table 10 provides corresponding size regression results including firm and year fixed effects. Columns 1 to 4 run regressions for initially large firms. Columns 1 and 2 are equally weighted. Columns 3 and 4 are value weighted. Columns 1 and 3 show that the large firms may or may not have been smaller earlier. It depends on whether the estimates are equal weighted as in column 1, or value weighted as in column 3. However, in either case, columns 2 and 4 show that the large firms will on average be smaller 5 years later. Apparently it is hard to remain on top. Columns 5 to 8 are corresponding regression results for initially small firms. The small firms had been larger previously, and if they survive, they are predicted to be larger 5 years later.

6.3 Cost of Debt

In theory the cost of capital is critical for investments (Frank and Shen, 2016) as it determines which projects are positive NPV. The model in Section 3 reflects this idea in a particularly simple manner. The evidence in Section 5.4 provides support for the idea. Here we ask, how persistent are the cost of debt effects?

Table 11 divides the firms into three categories. The value of ρ is proxied using the BAA rate after inflation. G1 are firms with profits below the ρ proxy. G2 are firms that have profits roughly equal to the proxy. G3 have profits above ρ. Over one year there is a fair degree of persistence, and almost no difference in the exit rates. Over 5 years the exit rate is greater among the firms that are earning less than ρ. But there is also quite a bit of exit among the other groups as well. As in earlier tests, the profit persistence is not strong over a 5 year horizon.

Within each year all existing firms are divided into three groups based on the distance of their profitability to ρ which is proxied by Moody's seasoned Baa corporate bond yield (FRED BAA) after inflation (FRED A191RI1Q225SBEA), denoted by $dist_{it} = \frac{\Pi_{it}}{AT_{it}} - \rho_t$. In each fiscal year, we first drop observations whose excess profitability $dist_{it}$ is close to zero in order to avoid ambiguity. Specifically, we drop observations for which $abs(\frac{dist_{it}}{\rho_t})$ is smaller than 5%.

Then we divide firms into those with non-negative and negative excess profitability. For those with negative excess profitability, they are further equally divided into three groups. Firms with the lowest excess profitability go to group 1, the second lowest to group 2 and the rest of the firms with negative excess profitability go to group 3. Similarly, for those with positive excess profitability, they are further equally divided into two groups. Firms with the lower excess profitability go to group 4, the rest to group 5.

Panel 11a reports the associated transition probabilities on the 1-year horizon. Panel 11b reports the associated transition probabilities on the 5-year horizon. The 'enter' category tabulates the number of firms that did not exist on date t but did exist on date $t+1$ ($t+5$) in a given group divided by the total number of firms on date t. The 'exit' category tabulates the number of firms that existed on date t in a given group but did not exist on date $t+1$ ($t+5$) divided by the total number of firms on date t.

For each year during the period from 1971 to 2021 in panel 11a and from 1971 to 2017 in panel 11b, we calculate the transition probability, then average across years. The (mean) categories report the average $dist_{it}$ for all firm-years in that category. The 'mean' in the last row of each panel displays the average $dist_{it}$ of firms who belong to the four groups in year $t+1$ ($t+5$) respectively. Groups 1, 2, 3, 4 and 5 account for 19.1%, 19.1%, 19.1%, 21.4% and 21.4% of all firm-year observations respectively.

During the declining period the the rates for high credit borrowers declines more rapidly than does the rate for less credit worthy borrowers. As a result a gap tends to open up between the creditworthy borrowers and the less credit worthy. This gap favors large firms. Annecdotal evidence suggests that the gap might have been larger still for sub-prime bank lending to firms.

Recall that G1 are firms with profits well below the ρ proxy and G5 have profits well above ρ. Over one year there is a fair degree of persistence, and almost no difference in the exit rates. Over 5 years the exit rate is greater among the firms that are earning less than ρ. But there is also quite a bit of exit among the other groups as well. As in earlier tests, the profit persistence at the top is not strong over a 5 year horizon.

7 Conclusion

Firm profit drives firm decision and hence plays a critical role in the economy. Given the central role that profit plays, our empirical knowledge of firm profitability is surprisingly limited. This paper provides evidence on public firm profit over a half century to help fill that gap in the literature.

Since the 1980s large firms have been more profitable than the median public firm. Large firms have been better able to reduce flow costs when compared to other firms. Large firms have been able to obtain debt financing at a lower cost when compared to other firms.

The large firm advantage does not appear to provide strong protection for individual large firms. Even among the very large firms about 20% of them exit within 5 years. Even among the very profitable firms about 30% exit within 5 years. Among the firms that continue to operate, unusually high profit is much less persistent than firm size as it moves predictably towards more typical profit rates. Claims that profit persistence has increased after 2000 due to greater output market power do not match the data. Neither large firm size nor high firm profit are more persistent after 2000 when compared to earlier decades.

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Table 1: Variable Definition

Level variables	Compustat
AT	at
Debt	dltt+dlc
Interest	xint
Sale	sale
Tax	txt
CapEx	capx
COGS	cogs
SGA	xsga
EBITDA	oibdp
Π (EVA)	oibdp-txt-ρat
ρ	Baa corporate bond yield (BAA from FRED) deflated using the GDP deflator (GDPDEF from FRED)
VA (value added)	sale - cogs
NOPAT	oibdp-txt
OIADP	oiadp
NI (net income)	ni
DWC	-(recch+invch+apalch+txach+aoloch) if scf =7 wcapch if scf=1, -wcapc if scf=2 or scf=3
FCF (free cash flow)	oibdp - txt - capx - DWC
FCFE (free cash flow to equity)	oibdp - txt - xint - capx - DWC + ΔDebt
Ratios	
s	$\frac{cogs+sga}{at}$
s_F	$\frac{cogs+sga}{sale}$
s_A	$\frac{at}{sale}$
s_Π	$\frac{oibdp-txt-\rho at}{sale}$
$\frac{at_i}{\sum_{j=1}^{J} at_j}$	
ω_{sale}	$\frac{sale_i}{\sum_{j=1}^{J} sale_j}$
MTB	$\frac{mva}{at}$, where mva =at+mve-seq, mve = prcc_f*csho, = mkvalt if prcc_f*csho is missing & $mkvalt$ is not missing mva is set to be missing if mva<0 or mva $<$ Debt

Table 2: Summary Statistics: All Years

All variables are deflated using the GDP deflator using the year 2017 as the base year. All variables, except for the weights ω_{sale} and ω_{AT} are then winsorized at 1st and 99th percentiles in each year. Variable sources are in Table 1. By definition, AT is total assets, MTB is market to book ratio, Sale is sales revenue, Π is profits, EBITDA is Earnings before interest and taxes depreciation added, Debt is long term debt plus short term debt (*dltt+dlc*), Δ is the change from year t-1 to year t, Tax is the taxed paid by a firm, Interest is the firm's interet expense, CapEx is the capital expenditure, $s = \frac{COGS+SGA}{AT}$, $\omega_{AT} = \frac{AT_i}{\sum_{j=1}^{J} AT_j}$, and $\omega_{sale} = \frac{Sales_i}{\sum_{j=1}^{J} Sales_j}$. The ω_{sale} and ω_{AT} are the original numbers multiplied by 1000.

	N	mean	median	sd	min	max	skewness	AR(1)
AT	216845	1511.97	136.68	4598.37	0.40	32011.03	5.04	0.99
MTB	192789	2.29	1.37	3.40	0.53	29.70	5.76	0.77
Sale	216845	1387.09	149.70	3868.59	0.07	25811.53	4.62	0.99
Sale/AT	216845	1.29	1.12	0.95	0.01	5.48	1.68	0.90
Π/AT	216845	-0.07	0.04	0.42	-3.22	0.30	-5.15	0.77
Π/Sale	216845	-0.85	0.03	5.29	-52.13	0.42	-8.25	0.71
EBITDA/AT	216845	0.01	0.11	0.44	-3.18	0.44	-4.96	0.78
Debt/AT	216845	0.31	0.24	0.36	0.00	2.55	3.31	0.82
ΔDebt/AT	216845	0.00	0.00	0.18	-0.83	0.64	-0.72	0.03
Tax/AT	216845	0.02	0.01	0.04	-0.08	0.17	0.97	0.63
Interest/AT	216845	0.03	0.02	0.06	0.00	0.49	5.36	0.77
Interest/Debt	194186	0.14	0.09	0.26	0.00	2.14	6.15	0.34
CapEx/AT	216845	0.06	0.04	0.07	0.00	0.44	2.51	0.65
s	216845	1.30	1.06	1.09	0.07	7.05	2.48	0.86
ω_{AT}	216845	0.24	0.03	0.74	0.00	13.67	6.56	0.99
ω_{Sale}	216845	0.24	0.03	0.67	0.00	9.61	5.09	0.99

Table 3: Summary Statistics By Decade

All variables are measured in 2017 dollars deflated using the GDP deflator. All variables except for the weights ω_{sale} and ω_{AT} are winsorized at 1st and 99th percentiles in each year. Averages are taken over the firm-year observations. In panel (a) observations are equally weighted and in panel (b) observations are value weighted. N is the number of firm-year observations, AT is the firm total assets deflated using the GDP deflator (GDPDEF from FRED). Sale is the firm sales revenue deflated by GDP deflator. $\frac{\Pi}{AT}$ is the average profit-asset ratio. med ($\frac{\Pi}{AT}$) is the median value of the profit-asset ratio. $\frac{Debt}{AT}$ is the average debt-book asset ratio (book leverage). $\frac{Int}{AT}$ is the average interest to asset ratio. MTB is the market-to-book ratio and for this variable the number of observations for each decade are 25529, 39815, 48072, 41063, 29990, 8320. $s = \frac{COGS+SGA}{AT}$ is the flow cost to asset ratio. $\omega_{AT} = \frac{AT_i}{\sum_{j=1}^{J} AT_j}$ is the asset concentration ratio multiplied by 1000. $\omega_{sale} = \frac{Sales_i}{\sum_{j=1}^{J} Sales_j}$ is the sales concentration ratio multiplied by 1000.

(a) Equal weighted

	N	AT	$Sale$	$\frac{\Pi}{AT}$	med($\frac{\Pi}{AT}$)	$\frac{Debt}{AT}$	$\frac{Int}{AT}$	MTB	s	ω_{AT}	ω_{Sale}
1971-1979	32980	764.69	974.53	0.07	0.08	0.29	0.03	1.25	1.50	0.27	0.27
1980-1989	45133	889.56	978.12	-0.05	0.01	0.30	0.04	1.78	1.33	0.22	0.22
1990-1999	53860	1114.03	1084.30	-0.06	0.03	0.30	0.03	2.26	1.28	0.19	0.19
2000-2009	44331	1782.46	1576.57	-0.14	0.03	0.33	0.04	2.75	1.31	0.23	0.23
2010-2019	31898	2913.34	2322.94	-0.13	0.05	0.34	0.04	3.07	1.18	0.31	0.31
2020-2022	8643	3534.20	2558.07	-0.08	0.06	0.37	0.03	3.13	0.91	0.35	0.35

(b) Asset Value weighted

	N	AT	$Sale$	$\frac{\Pi}{AT}$	med($\frac{\Pi}{AT}$)	$\frac{Debt}{AT}$	$\frac{Int}{AT}$	MTB	s	ω_{AT}	ω_{Sale}
1971-1979	32980	10038.27	10023.87	0.09	0.09	0.26	0.02	1.22	1.17	3.61	2.84
1980-1989	45133	12349.14	11061.23	0.03	0.03	0.28	0.03	1.26	1.02	3.11	2.52
1990-1999	53860	14334.47	11471.01	0.05	0.05	0.31	0.03	1.81	0.86	2.43	1.99
2000-2009	44331	16043.32	12087.45	0.06	0.06	0.30	0.02	1.83	0.82	2.03	1.73
2010-2019	31898	17581.01	12570.93	0.08	0.07	0.34	0.02	1.89	0.75	1.89	1.70
2020-2022	8643	18249.69	12429.50	0.11	0.11	0.38	0.01	2.36	0.66	1.79	1.69

Table 4: Profit Component Importance For High Profit Firms

This table reports the results from the following. Step 1, in each year sort firms into profit quintiles, and let I_{it}^{HIGH} be an indicator that a given firm-year observation is in the high profit quintile ($Q5$ in Table 7). Step 2, define y_{it} to be $\frac{\Delta EBITDA_{it}}{AT_{it-1}}$, $\frac{\Delta T_{it}}{AT_{it-1}}$, $\frac{\Delta \rho AT_{it}}{AT_{it-1}}$, $\frac{\Delta VA_{it}}{AT_{it-1}}$, $\frac{\Delta Int_{it}}{AT_{it-1}}$, and $\frac{\Delta^2 D_{it}}{AT_{it-1}}$. Then run simple regressions, $y_{it} = \beta_0 + \beta_1 I_{it}^{HIGH} + \beta_2 X_{it} + \varepsilon_{it}$, where X_{it} is a vector of industry and year dummies used as controls. Panel 4a shows the results for equally weighted firm/year regressions. Panel 4b shows the results where each observation is weighted according to the share of total assets within the year.

(a) Equally weighted

	(1) $\frac{\Delta VA_{it}}{AT_{it-1}}$	(2) $\frac{\Delta EBITDA_{it}}{AT_{it-1}}$	(3) $\frac{\Delta T_{it}}{AT_{it-1}}$	(4) $\frac{\Delta Int_{it}}{AT_{it-1}}$	(5) $\frac{\Delta^2 D_{it}}{AT_{it-1}}$	(6) $\frac{\Delta(\rho AT)_{it}}{AT_{it-1}}$
β_1	0.085***	0.083***	0.009***	-0.004***	-0.033***	-0.001
Mean	0.046	0.013	0.003	0.003	0.028	0.009
N	198305	198305	198302	195614	181020	198308
R^2	0.046	0.033	0.018	0.019	0.007	0.143

(b) Value weighted

	(1) $\frac{\Delta VA_{it}}{AT_{it-1}}$	(2) $\frac{\Delta EBITDA_{it}}{AT_{it-1}}$	(3) $\frac{\Delta T_{it}}{AT_{it-1}}$	(4) $\frac{\Delta Int_{it}}{AT_{it-1}}$	(5) $\frac{\Delta^2 D_{it}}{AT_{it-1}}$	(6) $\frac{\Delta(\rho AT)_{it}}{AT_{it-1}}$
β_1	0.029***	0.028***	0.002*	-0.002***	-0.027***	-0.004***
Mean	0.022	0.010	0.002	0.002	0.017	0.004
N	198305	198305	198302	195614	181020	198308
R^2	0.077	0.073	0.033	0.060	0.020	0.359

Table 5: Profit Components: Early Years and Recent Years

Does the importance of the various components change over time? This table reports the results from the following. Step 1, in each year sort firms into profit quintiles, and let I_{it}^{HIGH} be an indicator that a given firm-year observation is in the high profit quintile ($Q5$ in Table 7). Step 2, define y_{it} to be $\frac{\Delta EBITDA_{it}}{AT_{it-1}}$, $\frac{\Delta T_{it}}{AT_{it-1}}$, $\frac{\Delta \rho AT_{it}}{AT_{it-1}}$, $\frac{\Delta VA_{it}}{AT_{it-1}}$, $\frac{\Delta Int_{it}}{AT_{it-1}}$, and $\frac{\Delta^2 D_{it}}{AT_{it-1}}$. Then run simple regressions, $y_{it} = \beta_0 + \beta_1 I_{it}^{HIGH} + \beta_2 X_{it} + \varepsilon_{it}$, where X_{it} is a vector of industry and year dummies used as controls. Firm/years are equally weighted. $\Delta\Pi$ in % reports the change in profits measured in percentage terms. Panel 5a shows the results for 1971-1989. Panel 5c shows the results for 2000-2022.

(a) Results from 1971-1989

	(1) $\frac{\Delta VA_{it}}{AT_{it-1}}$	(2) $\frac{\Delta EBITDA_{it}}{AT_{it-1}}$	(3) $\frac{\Delta T_{it}}{AT_{it-1}}$	(4) $\frac{\Delta Int_{it}}{AT_{it-1}}$	(5) $\frac{\Delta^2 D_{it}}{AT_{it-1}}$	(6) $\frac{\Delta(\rho AT)_{it}}{AT_{it-1}}$
β_1	0.095***	0.080***	0.020***	-0.003***	-0.029***	0.001
Mean	0.042	0.016	0.004	0.002	0.026	0.010
N	61116	61116	61115	60598	55482	61119
R^2	0.067	0.045	0.054	0.031	0.004	0.196

(b) Results from 1990-1999

	(1) $\frac{\Delta VA_{it}}{AT_{it-1}}$	(2) $\frac{\Delta EBITDA_{it}}{AT_{it-1}}$	(3) $\frac{\Delta T_{it}}{AT_{it-1}}$	(4) $\frac{\Delta Int_{it}}{AT_{it-1}}$	(5) $\frac{\Delta^2 D_{it}}{AT_{it-1}}$	(6) $\frac{\Delta(\rho AT)_{it}}{AT_{it-1}}$
β_1	0.095***	0.099***	0.011***	-0.005***	-0.041***	-0.005**
Mean	0.064	0.012	0.005	0.002	0.037	0.016
N	53236	53236	53235	52598	47473	53236
R^2	0.068	0.048	0.019	0.039	0.008	0.080

(c) Results from 2000-2022

	(1) $\frac{\Delta VA_{it}}{AT_{it-1}}$	(2) $\frac{\Delta EBITDA_{it}}{AT_{it-1}}$	(3) $\frac{\Delta T_{it}}{AT_{it-1}}$	(4) $\frac{\Delta Int_{it}}{AT_{it-1}}$	(5) $\frac{\Delta^2 D_{it}}{AT_{it-1}}$	(6) $\frac{\Delta(\rho AT)_{it}}{AT_{it-1}}$
β_1	0.072***	0.077***	-0.000	-0.005***	-0.031***	-0.001**
Mean	0.039	0.011	0.002	0.003	0.025	0.003
N	83933	83933	83932	82399	78045	83933
R^2	0.030	0.024	0.004	0.011	0.006	0.161

Table 6: Debt Costs by Size and Profitability Groups

This table compares the debt financing costs for firms with different sizes and profitability. In each year, firms are sorted into quintiles based on their total assets AT_{it} and profitability $\frac{\Pi_{it}}{AT_{it}}$ separately. Panel 6a, 6b and 6c show the average $\frac{Debt}{Sale}$, $\frac{Interest}{Sale}$ and $\frac{Interest}{Debt}$ for the twenty five size-profitability groups respectively.

(a) Debt/Sale

	1971-2022					2000-2022				
	Small	2	3	4	Large	Small	2	3	4	Large
Low profitability	1.86	1.23	1.23	1.32	1.49	2.85	1.72	1.87	2.79	2.32
2	0.47	0.41	0.46	0.68	0.82	0.62	0.44	0.53	0.91	1.20
3	0.26	0.23	0.32	0.42	0.57	0.24	0.22	0.36	0.54	0.74
4	0.24	0.23	0.27	0.38	0.45	0.23	0.24	0.32	0.50	0.58
High profitability	0.23	0.21	0.29	0.35	0.41	0.21	0.22	0.38	0.45	0.48

(b) Interest/Sale

	1971-2022					2000-2022				
	Small	2	3	4	Large	Small	2	3	4	Large
Low profitability	0.31	0.15	0.13	0.13	0.13	0.52	0.22	0.18	0.22	0.23
2	0.05	0.04	0.04	0.06	0.07	0.08	0.05	0.04	0.07	0.09
3	0.03	0.02	0.03	0.03	0.04	0.02	0.02	0.03	0.04	0.04
4	0.02	0.02	0.02	0.03	0.03	0.02	0.02	0.02	0.03	0.03
High profitability	0.03	0.02	0.03	0.03	0.03	0.03	0.02	0.03	0.03	0.03

(c) Interest/Debt

	1971-2022					2000-2022				
	Small	2	3	4	Large	Small	2	3	4	Large
Low profitability	0.26	0.19	0.15	0.13	0.12	0.35	0.22	0.15	0.10	0.10
2	0.15	0.15	0.13	0.11	0.10	0.16	0.15	0.15	0.11	0.10
3	0.14	0.13	0.12	0.10	0.09	0.14	0.12	0.12	0.09	0.07
4	0.15	0.14	0.13	0.10	0.09	0.16	0.12	0.13	0.09	0.07
High profitability	0.18	0.17	0.15	0.12	0.09	0.19	0.15	0.13	0.10	0.07

Table 7: Profit Transitions

Within each year all existing firms are sorted into quintiles according to $\frac{\Pi}{AT}$. Five years later the quintile for each firm that still exists is identified. The use of a 5 year interval helps define medium run effects. The 'enter' category tabulates the number of firms that did not exist on date t but did exist on date $t+5$ in a given quintile divided by the total number of firms on date t. The 'exit' category tabulates the number of firms that existed on date t in a given quintile but did not exist on date $t+5$ divided by the total number of firms on date t. For each year during the period from 1971 to 2017, we calculate the transition probability, then average across years. The (mean) categories report the equally weighted average $\frac{\Pi}{AT}$ for all firm-years in that category. The 'mean' in the last row of each panel displays the average $\frac{\Pi_{it}}{AT_{it}}$ of firms who belong to the 1st, 2nd, 3rd, 4th, 5th quintile in year t+5 respectively.

(a) 1971-2022

	$Q1_{t+5}$	$Q2_{t+5}$	$Q3_{t+5}$	$Q4_{t+5}$	$Q5_{t+5}$	exit	(mean)
$Q1_t$	0.24	0.13	0.05	0.04	0.05	0.49	-0.56
$Q2_t$	0.09	0.22	0.16	0.09	0.06	0.38	-0.03
$Q3_t$	0.04	0.14	0.24	0.18	0.08	0.31	0.04
$Q4_t$	0.03	0.09	0.18	0.26	0.16	0.28	0.07
$Q5_t$	0.04	0.07	0.09	0.18	0.33	0.30	0.15
enter	0.57	0.37	0.28	0.27	0.34		
(mean)	-0.33	-0.02	0.03	0.05	0.06		

(b) 2000-2022

	$Q1_{t+5}$	$Q2_{t+5}$	$Q3_{t+5}$	$Q4_{t+5}$	$Q5_{t+5}$	exit	(mean)
$Q1_t$	0.27	0.10	0.02	0.01	0.03	0.56	-0.90
$Q2_t$	0.08	0.21	0.14	0.08	0.06	0.44	-0.05
$Q3_t$	0.02	0.13	0.26	0.18	0.08	0.33	0.04
$Q4_t$	0.01	0.08	0.18	0.27	0.17	0.30	0.08
$Q5_t$	0.02	0.07	0.09	0.17	0.33	0.32	0.16
enter	0.45	0.27	0.18	0.15	0.20		
(mean)	-0.65	-0.06	0.03	0.06	0.07		

Table 8: Before and After Extreme Profits

This table presents the coefficient β estimated from the following OLS regressions $g_{it,t-5} = c_1 + \beta_{-5} I_{P_{it}} + \gamma X_{it} + \mu_{1it}$, and $g_{it,t+5} = c_2 + \beta_{+5} I_{P_{it}} + \gamma X_{it} + \mu_{2it}$. Profits is measured by $\frac{\Pi_{it}}{AT_{it}}$, and $I_{P_{it}}$ is a dummy variable. In the top panel the dummy is 1 if the firm is in the top quintile of profits. In the bottom panel the dummy is 1 if the firm is in the bottom quintile of profits. Change in firm profitability is measured as $g_{it,t-5} = \frac{\Pi_{it}}{AT_{it}} - \frac{\Pi_{it-5}}{AT_{it-5}}$, and $g_{it,t+5} = \frac{\Pi_{it+5}}{AT_{it+5}} - \frac{\Pi_{it}}{AT_{it}}$. X_{it} contains the year and industry (4-digit NAICS) fixed effects. Standard errors are clustered at the 4-digit NAICS industry level. In columns 1 and 2 firm-year observations are weighted equally. In columns 3 and 4 firm-year observations are value-weighted using the Stata command *aweight*, with the weight being $\frac{AT_{it}}{\sum AT_{it}}$. The R^2 is the overall value.

	High Profit Firms				Low Profit Firms			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	$g_{it,t-5}$	$g_{it,t+5}$	$g_{it,t-5}$	$g_{it,t+5}$	$g_{it,t-5}$	$g_{it,t+5}$	$g_{it,t-5}$	$g_{it,t+5}$
β_{-5}	0.114***		0.048***		-0.239***		-0.137***	
	(15.96)		(19.42)		(-15.13)		(-5.85)	
β_{+5}		-0.093***		-0.043***		0.178***		0.082***
		(-16.83)		(-16.60)		(19.01)		(9.33)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Weighting	equal	equal	value	value	equal	equal	value	value
N	122027	122111	122027	122111	122027	122111	122027	122111
Within R^2	0.020	0.014	0.069	0.055	0.061	0.037	0.048	0.027
R^2	0.045	0.038	0.260	0.259	0.085	0.060	0.243	0.236

Table 9: Size Transitions

Within each year all existing firms are sorted into quintiles according to AT. Five years later the quintile for each firm that still exists is identified. The use of a 5 year interval helps define medium run effects. The 'enter' category tabulates the number of firms that did not exist on date t but did exist on date $t+5$ in a given quintile divided by the total number of firms on date t. The 'exit' category tabulates the number of firms that existed on date t in a given quintile but did not exist on date $t+5$ divided by the total number of firms on date t. For each year during the period from 1971 to 2017, we calculate the transition probability, then average across years. The (mean) categories report the equally weighted average AT for all firm-years in that category. The 'mean' in the last row of each panel displays the average AT_{it} of firms who belong to the 1st, 2nd, 3rd, 4th, 5th quintile in year t+5 respectively.

(a) 1971-2022

	$Q1_{t+5}$	$Q2_{t+5}$	$Q3_{t+5}$	$Q4_{t+5}$	$Q5_{t+5}$	exit	(mean)
$Q1_t$	0.36	0.13	0.04	0.01	0.00	0.47	9.4
$Q2_t$	0.10	0.31	0.15	0.03	0.00	0.40	54.5
$Q3_t$	0.01	0.11	0.33	0.17	0.01	0.37	200.9
$Q4_t$	0.00	0.01	0.10	0.44	0.13	0.31	687.0
$Q5_t$	0.00	0.00	0.00	0.08	0.70	0.21	6611.4
enter	0.54	0.46	0.38	0.28	0.16		
(mean)	15.7	62.6	206.3	634.7	6002.1		

(b) 2000-2022

	$Q1_{t+5}$	$Q2_{t+5}$	$Q3_{t+5}$	$Q4_{t+5}$	$Q5_{t+5}$	exit	(mean)
$Q1_t$	0.38	0.07	0.01	0.00	0.00	0.54	10.8
$Q2_t$	0.11	0.33	0.09	0.01	0.00	0.46	86.6
$Q3_t$	0.01	0.12	0.37	0.10	0.01	0.40	360.4
$Q4_t$	0.00	0.01	0.14	0.45	0.08	0.33	1257.5
$Q5_t$	0.00	0.00	0.00	0.11	0.67	0.21	10220.8
enter	0.36	0.34	0.26	0.19	0.10		
(mean)	20.8	110.3	410.1	1320.3	10150.9		

Table 10: Before and After Extreme Size

This table presents the coefficient β estimated from the following OLS regressions $g_{it,t-5} = c_1 + \beta_{-5} I_{P_{it}} + \gamma X_{it} + \mu_{1it}$, and $g_{it,t+5} = c_2 + \beta_{+5} I_{P_{it}} + \gamma X_{it} + \mu_{2it}$. Size is measured by the real total asset (winsorized at 1st and 99th percentiles), and $I_{P_{it}}$ is a dummy variable. In the top panel the dummy is 1 if the firm is in the top quintile of profits. In the bottom panel the dummy is 1 if the firm is in the bottom quintile of profits. Change in firm size is measured as $g_{it,t-5} = \frac{AT_{it} - AT_{it-5}}{AT_{it-5}}$, and $g_{it,t+5} = \frac{AT_{it+5} - AT_{it}}{AT_{it}}$. X_{it} contains the year and industry (4-digit NAICS) fixed effects. Standard errors are clustered at the 4-digit NAICS industry level. In columns 1 and 2 firm-year observations are weighted equally. In columns 3 and 4 firm-year observations are value-weighted using the Stata command *aweight*, with the weight being $\frac{AT_{it}}{\sum AT_{it}}$. The R^2 is the overall value.

	Large Firms				Small Firms			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Dependent variable	$g_{it,t-5}$	$g_{it,t+5}$	$g_{it,t-5}$	$g_{it,t+5}$	$g_{it,t-5}$	$g_{it,t+5}$	$g_{it,t-5}$	$g_{it,t+5}$
β_{-5}	0.222***		-0.090		-0.778***		-0.512***	
	(5.61)		(-1.13)		(-11.92)		(-7.35)	
β_{+5}		-0.489***		-0.396***		0.740***		0.680***
		(-13.82)		(-12.38)		(14.93)		(13.55)
Year fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Industry fixed effects	yes	yes	yes	yes	yes	yes	yes	yes
Weighting	equal	equal	value	value	equal	equal	value	value
N	122027	122111	122027	122111	122027	122111	122027	122111
Within R2	0.002	0.011	0.000	0.024	0.021	0.020	0.000	0.001
R2	0.052	0.063	0.125	0.083	0.070	0.071	0.125	0.061

Table 11: Distance-to-Constraint Transitions

Profitability is defined relative to the value of ρ which is defined as Moody's BAA corporate bond yield. Firms are categorized as having negative or positive excess profitability. Firm-years with negative excess profitability, they are further equally divided into three groups. Firms with the lowest excess profitability go to group 1, the second lowest to group 2 and the rest of the firms with negative excess profitability go to group 3. Firm-years with positive excess profitability are equally divided into two groups. Firms with the lower excess profitability go to group 4, the rest to group 5. These categories serve to keep the groups of roughly similar size while distinguishing high and low profit firms relative to the cost of debt. Groups 1, 2, 3, 4 and 5 account for 19.1%, 19.1%, 19.1%, 21.4% and 21.4% of all firm-year observations respectively.

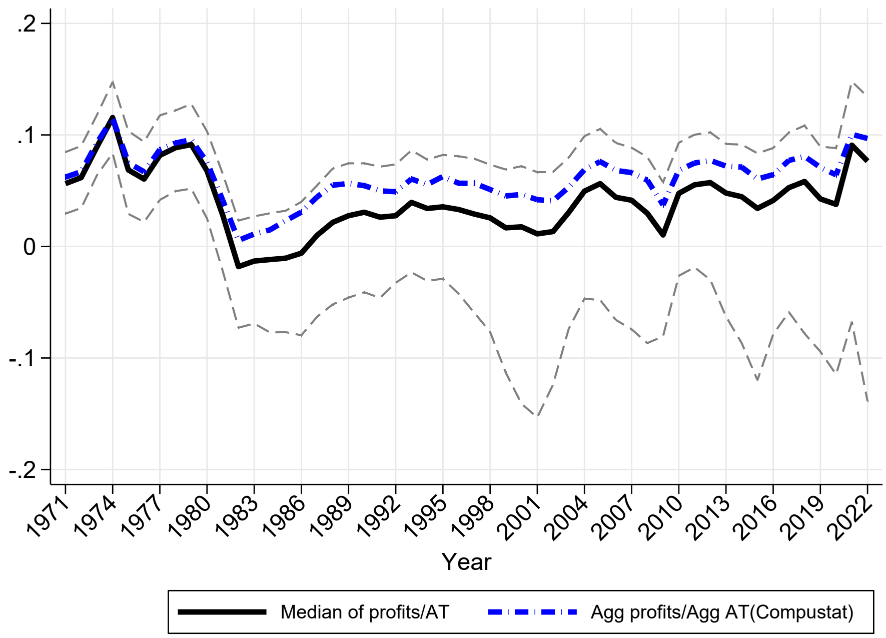
(a) One year

	$G1_{t+1}$	$G2_{t+1}$	$G3_{t+1}$	$G4_{t+1}$	$G5_{t+1}$	exit	(mean)
$G1_t$	0.56	0.15	0.04	0.04	0.03	0.17	-0.66
$G2_t$	0.16	0.41	0.18	0.10	0.04	0.11	-0.11
$G3_t$	0.05	0.19	0.36	0.24	0.05	0.11	-0.03
$G4_t$	0.02	0.07	0.17	0.43	0.20	0.10	0.03
$G5_t$	0.02	0.03	0.07	0.17	0.60	0.10	0.11
enter	0.28	0.19	0.17	0.14	0.12		
(mean)	-0.53	-0.11	-0.04	0.02	0.07		

(b) Five years

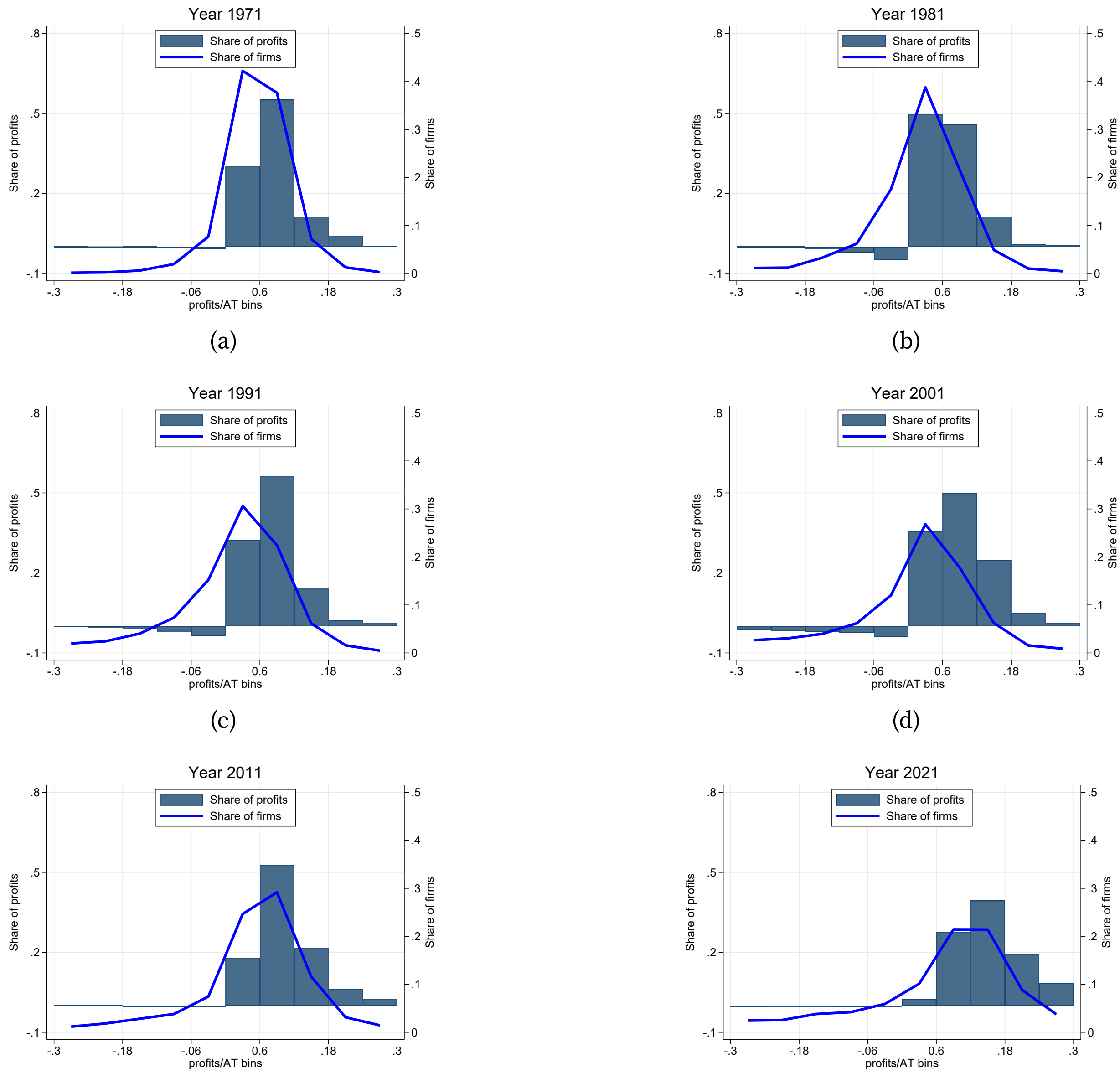
	$G1_{t+1}$	$G2_{t+1}$	$G3_{t+1}$	$G4_{t+1}$	$G5_{t+1}$	exit	(mean)
$G1_t$	0.23	0.11	0.05	0.05	0.05	0.50	-0.66
$G2_t$	0.11	0.17	0.15	0.10	0.06	0.41	-0.11
$G3_t$	0.06	0.12	0.18	0.20	0.09	0.35	-0.03
$G4_t$	0.04	0.09	0.13	0.24	0.19	0.31	0.03
$G5_t$	0.04	0.07	0.11	0.14	0.32	0.32	0.11
enter	0.84	0.58	0.50	0.55	0.65		
(mean)	-0.36	-0.09	-0.03	0.00	0.02		

Figure 1: Aggregate Profits Over Time ($\frac{\Pi}{AT}$)



Profit is defined as $\Pi_{it} = Sales_{it} - COGS_{it} - SGA_{it} - T_{it} - \rho TA_{it}$, where Sales is revenue, COGS is cost of goods sold, SGA is selling general and administrative expenses, T is tax, ρ is the outside rate of return and TA is total assets. The blue dash-dot line shows the ratio between aggregate profit and aggregate total assets ($\frac{\sum_i \Pi_{it}}{\sum_i AT_{it}}$) for each year t. The black solid line shows for each date t the median over firm i's $\frac{\Pi_{it}}{AT_{it}}$. The gray dash lines are the first and third quartiles over $\frac{\Pi_{it}}{AT_{it}}$ for each year t. The data are publicly traded U.S. firms from Compustat, excluding firms in financial and regulated industries.

Figure 2: Profit Distribution by Decade



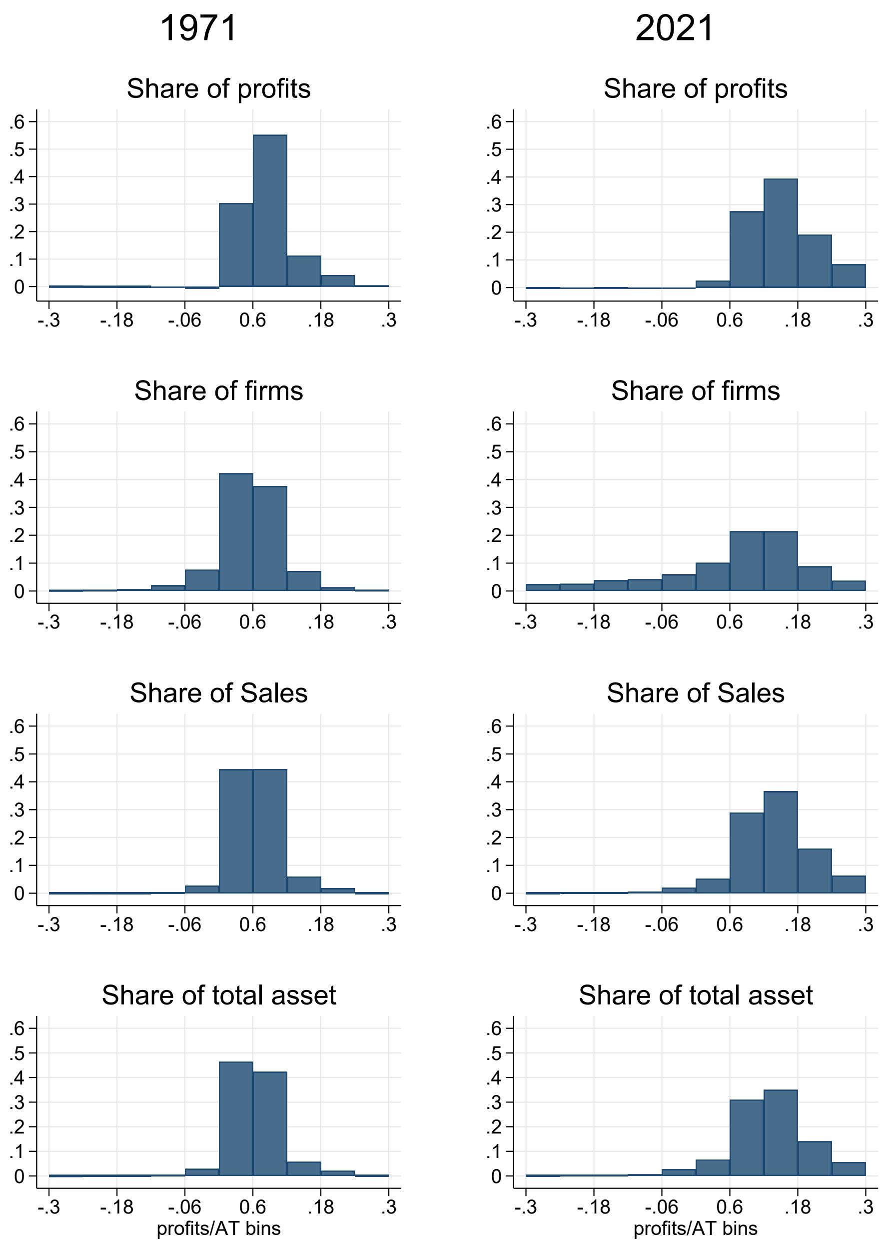
(a) (b)

(c) (d)

(e) (f)

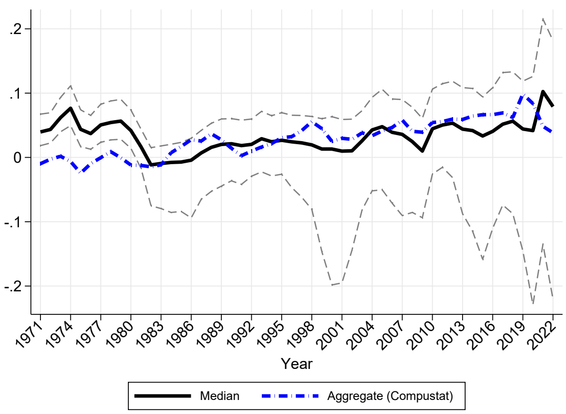
Both profits and $\frac{\Pi}{AT}$ are winsorized at 1st and 99th percentiles across years. We divide [-0.3,0.3] into 10 bins. To calculate the share of profits, in each year we first calculate the total profits across all firms, then for each bin, we calculate the total profits for firms in that bin. Then the share of profits of each bin is the ratio of these two numbers. Similarly, for the share of firms, in each year we first calculate the total number of firms, then for each bin, we calculate the number of firms in that bin. Then the share of firms for each bin is the ratio of these two numbers.

Figure 3: Key Firm Attributes Sorted by Profits

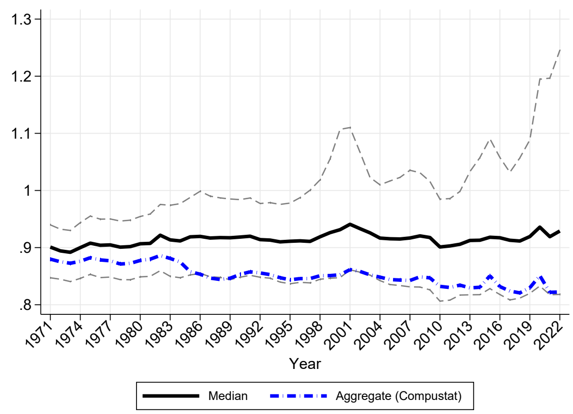


This figure compares the distributions of profits, number of firms, sales, and total assets over 10 profitability bins ($\frac{\Pi_{it}}{AT_{it}}$) in fiscal years 1971 (left column) and 2021 (right column). As before, profits, sales and assets are winsorized at 1st and 99th percentiles over years to avoid the impact of outliers.

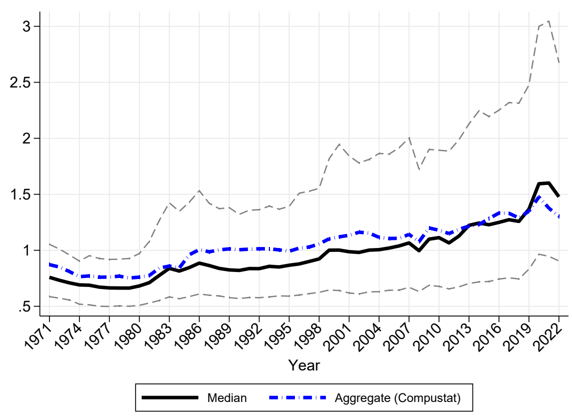
Figure 4: Sales Revenue Shares Over Time



(a) Profit share, s_Π



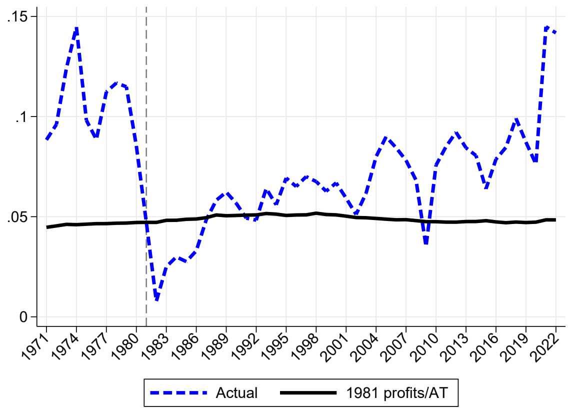
(b) Flow cost share, s_F



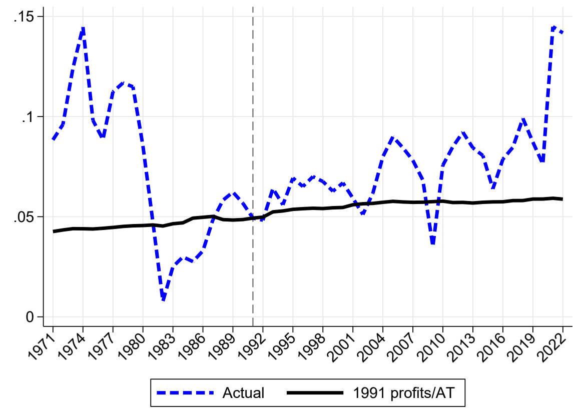
(c) Total asset share, s_A

This figure plots s_F, s_A, s_Π over time. Panel 4b shows the flow cost share $s_F = \frac{COGS+SGA}{Sales}$. Panel 4c shows the total asset share $s_A = \frac{AT}{Sales}$. Panel 4a shows the profit share $\frac{\Pi}{Sales}$. In each panel the solid black line shows the median value among the firms in each years. The dashed blue line shows the aggregate across firms within a given year. Light grey show the locations of the first and third quartile for each year. The data used to calculate all these measures is U.S. firms in Compustat, excluding those from financial and regulated industries. s_F, s_A and s_Π are all winsorized at 1st and 99th percentiles across years.

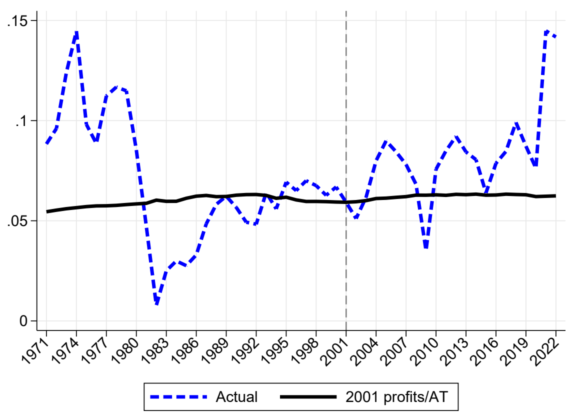
Figure 5: Superstar Firms



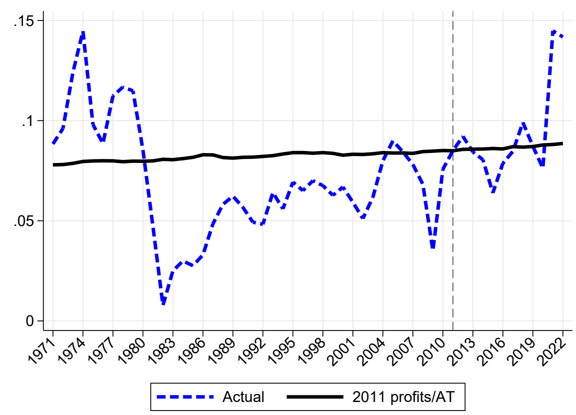
(a) Baseline year 1981



(b) Baseline year 1991



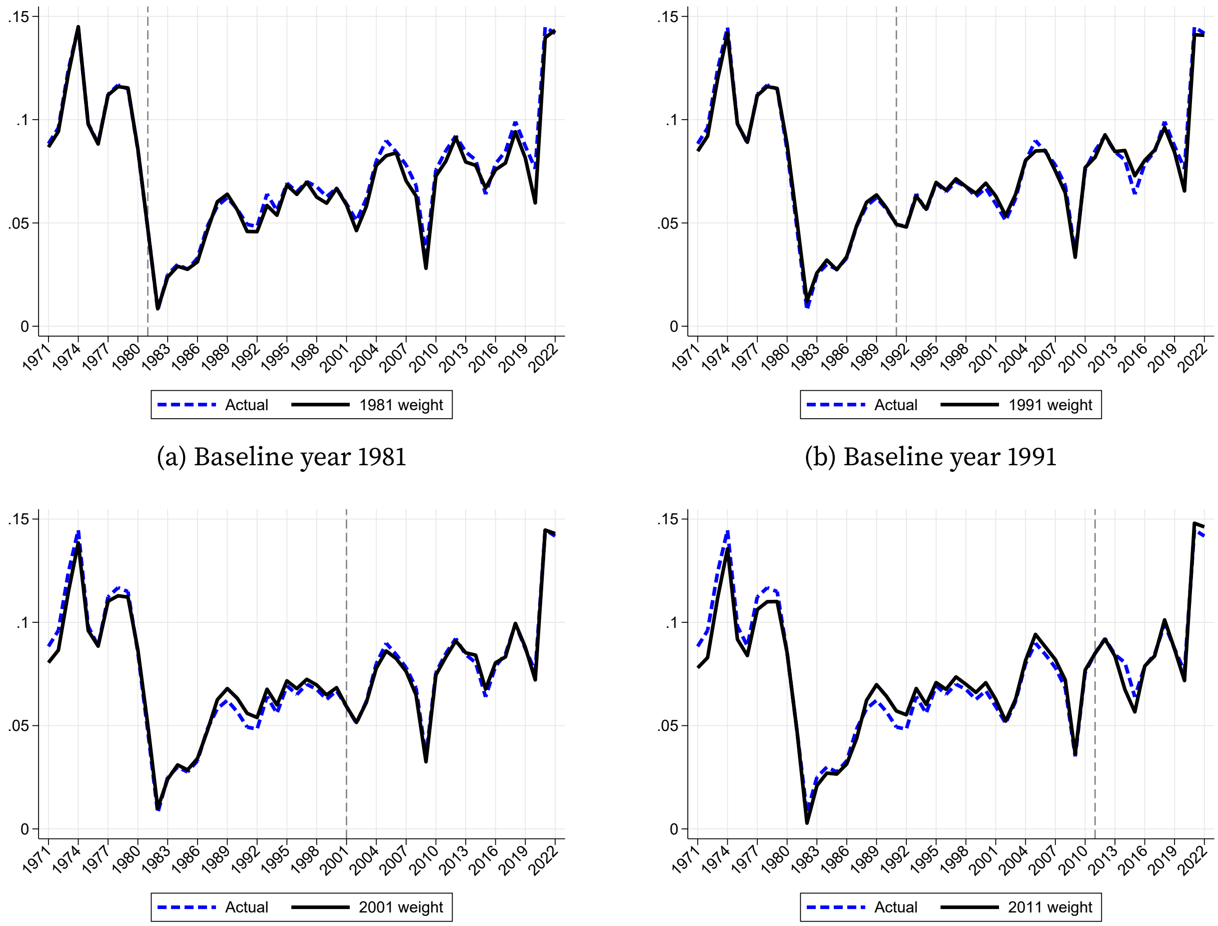
(c) Baseline year 2001



(d) Baseline year 2011

This depicts results for a balance panel of annual data, so only firms that exist for each year 1971-2022 are included. In each panel the blue dashed line shows the aggregate profitability: $\frac{\sum_i \Pi_{it}}{\sum_i AT_{it}}$, where $t = 1971, ..., 2022$. Each black line fixes the profitability on a specific date $\hat{t}$, where $\hat{t} = 1981, 1991, 2001, 2011$ respectively. On a given t date, each firm is assigned its profitability at time $\hat{t}$: $\frac{\Pi_{i\hat{t}}}{AT_{i\hat{t}}}$. So for each date $t = 1971, ...2022$ a counterfactual aggregate profitability ratio is $\sum \omega_{it} \frac{\Pi_{i\hat{t}}}{AT_{i\hat{t}}}$. Thus the observations are weighted to the fixed profitability for the $\hat{t}$ date. Firms that were very profitable on that date, are thus given a correspondingly large profitability value on every other date in the reweighted version. For robustness see the Internet Appendix. In the Internet Appendix there is a version of this panel that includes all public firms that existed at any point during our time period. There is also a version that separates out the impacts of entry and exit in 2000 and 2001.

Figure 6: Large Firms



(a) Baseline year 1981

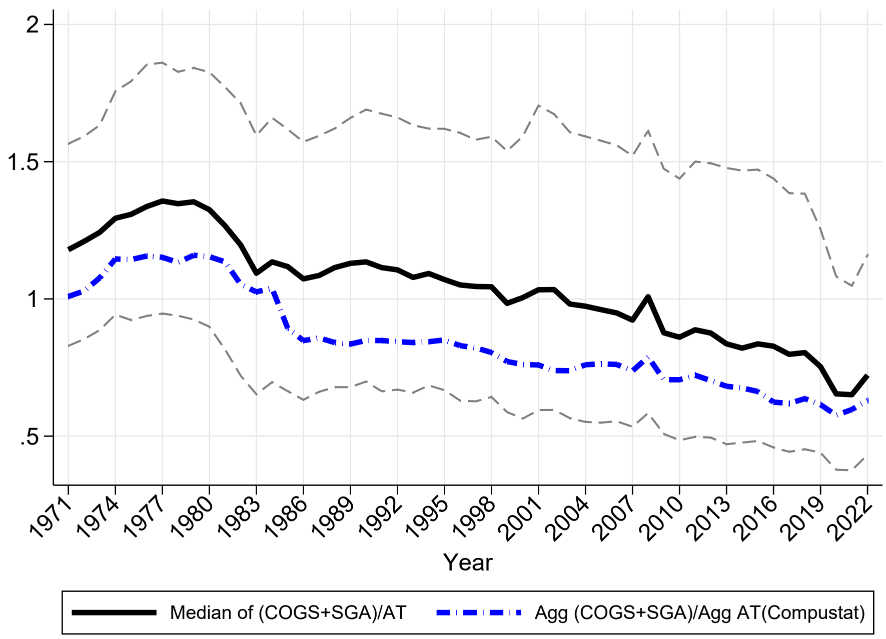
(b) Baseline year 1991

(c) Baseline year 2001

(d) Baseline year 2011

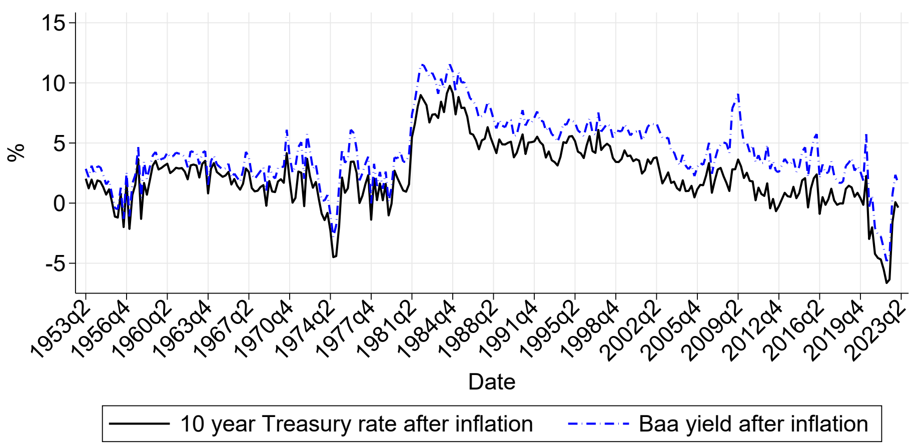
This figure plots the actual profitability, $\sum \omega_{it} \frac{\Pi_{it}}{AT_{it}}$, against the counterfactual profitability under the Large firm scenario, $\sum \omega_{i\hat{t}} \frac{\Pi_{it}}{AT_{it}}$, where the weight $w_{i\hat{t}} = \frac{AT_{i\hat{t}}}{\sum AT_{i\hat{t}}}$. The weights are fixed at $\hat{t}$ for the counterfactual throughout the whole sample period from 1971 to 2022. The time point is chosen because Fig 1 suggests after around $\hat{t}$, the aggregate profitability tends to increase over time. This figure shows that firms that initially large drive a most of the variation in overall firm profitability. These figures show results for a sample of firms that only includes firms that exist throughout 1971-2021. For robustness in the Internet appendix there is a corresponding figure for a full panel that includes firms that enter and exit.

Figure 7: Flow Costs to Total Assets ($\frac{COGS+SGA}{AT}$)



The blue dash-dot line shows the ratio between aggregate flow costs and aggregate total assets ($\frac{\sum_i (COGS_{it}+SGA_{it})}{\sum_i AT_{it}}$) over time, the black solid line shows for each date t the median over firm i's $\frac{(COGS_{it}+SGA_{it})}{AT_{it}}$, and the gray dash lines are the first and third quartiles over $\frac{(COGS_{it}+SGA_{it})}{AT_{it}}$ for each date t. The sample used to calculate all these statistics includes U.S. firms from Compustat excluding those from financial and regulated industries. For the calculation of $\frac{\sum_i (COGS_{it}+SGA_{it})}{\sum_i AT_{it}}$, both $COGS_{it} + SGA_{it}$ and AT_{it} are winsorized at 1st and 99th percentiles across years.

Figure 8: 10-year Treasury rate and Baa corporate bond yield after inflation.



Average value 2.35%. From April 1953 to the end of 1980, the average was 1.45%. From January 1981 to April 2023, the average was 2.94%. Data is from https://fred.stlouisfed.org, GS10. The Market Yield on U.S. Treasury Securities at 10-Year Constant Maturity, Quoted on an Investment Basis, Percent, Annual, Not Seasonally Adjusted. Baa corporate bond yield: BAA. Moody's Seasoned Baa Corporate Bond Yield. GDP deflator. A191RI1Q225SBEA Gross Domestic Product: Implicit Price Deflator, Percent Change from Preceding Period, Quarterly, Seasonally Adjusted Annual Rate. The plot shows both series with inflation subtracted.

Table 12: Correlation Among Profit Proxies

Profit definitions: $VA_{it} = Sales_{it} - COGS_{it}$, $EBITDA_{it} = Sales_{it} - COGS_{it} - SGA_{it}$, $NOPAT_{it} = EBITDA_{it} - T_{it}$, $OIADP_{it} = EBITDA_{it} - Depr_{it}$, $NI = EBITDA_{it} - T_{it} - Depr_{it} - Int_{it}$, $EVA_{it} = EBITDA_{it} - T_{it} - \rho TA_{it}$, $FCF_{it} = EBITDA_{it} - T_{it} - CAPX_{it} - \Delta NWC_{it}$, $FCFE_{it} = EBITDA_{it} - T_{it} - CAPX_{it} - \Delta NWC_{it} - Int_{it} + \Delta D_{it}$. For each firm in each year, each of the profit proxies are calculated. All firm years are equally weighted. So each firm/year observation has a weight $w_{it} = 1$. ρ is the Baa corporate bond yield after inflation (BAA and A191RI1Q225SBEA from FRED). In the Internet appendix, value (AT_{it}) weighted correlations among the measures are reported.

	VA	EBITDA	NOPAT	OIADP	NI	EVA	FCF	FCFE
VA	1.000							
EBITDA	0.945	1.000						
NOPAT	0.937	0.991	1.000					
OIADP	0.929	0.978	0.959	1.000				
NI	0.820	0.864	0.840	0.902	1.000			
EVA	0.883	0.940	0.949	0.923	0.832	1.000		
FCF	0.765	0.785	0.798	0.795	0.700	0.791	1.000	
FCFE	0.562	0.572	0.576	0.594	0.550	0.576	0.702	1.000

Internet Appendix

A Alternative Profit Measures

The word profit has a clear meaning within a model. When it is applied to real firms, a variety of complications are unavoidable. As a result, there are quite a few closely related accounting measures that make a range of adjustments. Whether any particular adjustment is appropriate depends on the context and on the intended purpose. None of them are perfect matches for the theoretical concept of profits, in all settings. In academic papers, several different measures have been adopted (Mitton, 2022). These papers typically contain very little discussion of the relative merits of the profit definition adopted.

It turns out that the choice of which accounting measure to define as profits is not innocuous. In this appendix we review a number of these measures and show that many common measures such as the popular EBITDA, ignore the cost to the firm of using assets. This turns out to matter for inferences. The accounting choice is normally given with little or no discussion or justification. Some parts of profits are easy to measure with reasonable reliability but not all. A sufficiently noisy measure may create more problems than it solves so a number of accounting measures choose to exclude certain aspects. Dropping an aspect can also alter the interpretation. Bushman, Lerman and Zhang (2016) observe that accrual accounting is intended to smooth out the effect of noise on earnings. This implies that accruals and cash flows should be negatively correlated contemporaneously. This is observed, but it has sharply diminished over time. Rouen, So and Wang (2021) consider alternative measures of corporate earnings. GAAP earnings focus attention on core earnings, but they find that non-core earnings are of growing importance. These papers help explain why so many adjustments to accounting data are observed in various papers.

In this section we consider the impact of a number of related measures. Since their definitions differ, the extent to which they generate different results can itself be informative. Often these are divided by total assets when used. The following measures are examined,

VA (Value Added). Formula: $VA_{it} = Sales_{it} - COGS_{it}$. VA is the value added by a company from core operations. It is the difference between its sales revenue and the cost of goods sold (COGS). Also called Gross Profit. Data from income statement. Example of use Kehrig and Vincent (2021).

EBITDA (Earnings Before Interest, Taxes, Depreciation, and Amortization). Formula: $EBITDA_{it} = Sales_{it} - COGS_{it} - SGA_{it}$. EBITDA is a measure of a company's operating performance before considering interest, taxes, depreciation, and amortization. It is the earnings generated from its core operations. Data from income statement. Example of use Davis, Sollaci and Traina (2023).

NOPAT (Net Operating Profit After Tax). Formula: $NOPAT_{it} = EBITDA_{it} - T_{it}$. NOPAT is also called Earnings After Tax (EAT) and Operating Income Before Depreciation (OIBDP). It starts with EBITDA and subtracts taxes (T). Data from income statement. Example of use Grullon, Larkin and Michaely (2019).

OIADP (Operating Income After Depreciation and Taxes). Formula: $OIADP_{it} = EBITDA_{it} - Depr_{it}$. OIADP represents a company's operating income after accounting for depreciation expenses. Data from income statement. Example of use Covarrubias, Gutiérrez and Philippon (2020).

NI (Net Income). Formula: $NI = EBITDA_{it} - T_{it} - Depr_{it} - Int_{it}$. NI represents a company's net income and accounts for taxes, depreciation, and interest expenses. Data from income statement. Example of use Kwon, Ma and Zimmermann (2023).

EVA (Economic Value Added). Formula: $EVA_{it} = EBITDA_{it} - T_{it} - \rho TA_{it}$. EVA measures a company's economic profit after deducting a charge for the use of assets (ρTA_{it}). It is EBITDA adjusted for tax and the cost of capital. Data from income statement, balance sheet, and the opportunity cost measure comes from from elsewhere. ρ is the opportunity cost of capital. Requires an empirical proxy for ρ such as the cost of debt or WACC (Frank and Shen, 2016). Example of use Grant (2003).

FCF (Free Cash Flow). Formula: $FCF_{it} = EBITDA_{it} - T_{it} - CAPX_{it} - \Delta NWC_{it}$. FCF measures the cash generated or available for distribution to investors after considering taxes, capital expenditures (CAPX), and changes in net working capital (NWC). Data from income statement, balance sheet and statement of cash flows. Example of use Jensen (1986).

FCFE (Free Cash Flow to Equity). Formula: $FCFE_{it} = EBITDA_{it} - T_{it} - CAPX_{it} - \Delta NWC_{it} - Int_{it} + \Delta D_{it}$. FCFE is a measure of cash available to be distributed to equity holders after accounting for taxes, capital expenditures, changes in net working capital, interest, and changes in debt (D). Data from income statement, balance sheet and statement of cash flows. Example of use Damodaran (2007).

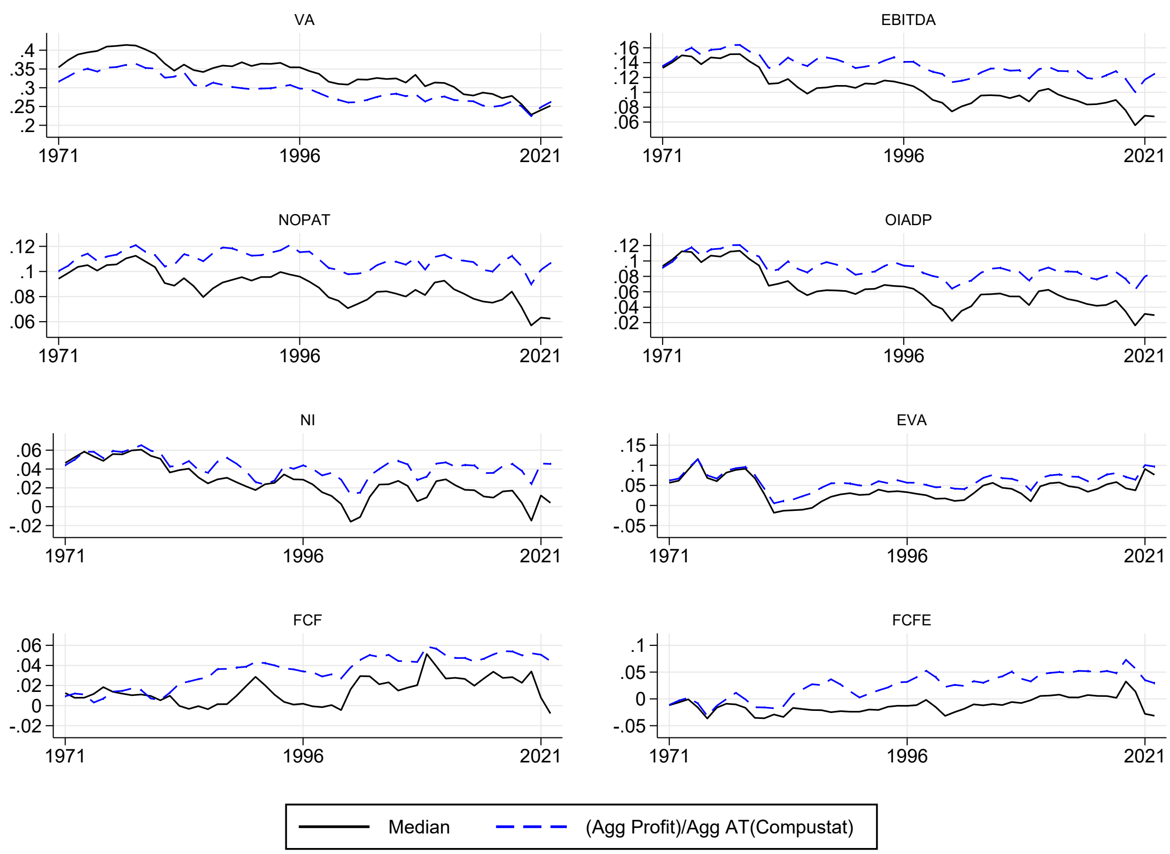
In the listed formulas the variable $Depr_{it}$ is the sum of depreciation and amortization. As with many other aspects of accounting, one could distinguish them and adjust the formulas accordingly. The listed definitions are standard.

Broadly speaking there we can distinguish two groups of profit definitions, depending on whether they subtract a cost of capital expense or not. First group: VA, EBITDA, NOPAT, OIADP, NI. This first group does not subtract the expense of obtaining and using assets. Second group: EVA, NI, FCF, FCFE. This second group does adjust to reflect the cost of using assets.

The first group generally shows profit declining over time. The second group generally show profit rising since about 1985. This difference suggests strongly that a key difference is that the cost of using assets has been declining for a number of decades. This makes sense since the interest rate environment has generally been declining over that same period.

Since accounting has several definitions, it is possible to start the calculations in different

Figure 9: Alternative Profit Measures



Each plot is a version of Figure 1 for a measure that has been used as a proxy for profits in previous academic studies. In each panel, the solid black line shows the median value across firms in each year. The dashed blue line shows the profits in a year aggregated across firms and dividend by total assets also aggregated across firms in that year. The data are for US firms in Compustat excluding financials and regulated firms. When calculating EVA, Moody's Seasoned Baa Corporate Bond Yield after inflation is used as a proxy for ρ. The measures are defined as follows: $VA_{it} = Sales_{it} - COGS_{it}, EBITDA_{it} = Sales_{it} - COGS_{it} - SGA_{it}, NOPAT_{it} = EBITDA_{it} - T_{it}, OIADP_{it} = EBITDA_{it} - Depr_{it}, NI = EBITDA_{it} - T_{it} - Depr_{it} - Int_{it}, EVA_{it} = EBITDA_{it} - T_{it} - \rho TA_{it}, FCF_{it} = EBITDA_{it} - T_{it} - CAPX_{it} - \Delta NWC_{it}, FCFE_{it} = EBITDA_{it} - T_{it} - CAPX_{it} - \Delta NWC_{it} - Int_{it} + \Delta D_{it}$.

places and still get the same accounting measure in the end, provided the corresponding adjustments are used. For instance consider EBITDA. According to Mitton (2022) EBITDA is the most widely used measure of profits in the academic literature. Some papers use EBITDA as a measure of cash flows, but not necessarily as profits (Lian and Ma, 2021). In this paper, following Compustat start with sales and then subtracts costs. But EBITDA is not a standardized measure. There are various ways to calculate it and in some cases various expenses or adjustments are used even beyond those listed here.[2] So EBITDA described by one scholar may differ from EBITDA described by another. Many common measure of profits start with EBITDA. So variation in the method to calculate EBITDA will generate corresponding differences in the subsequent measures.

There is also some variation across accountants in how they interpret the instructions for how to apply the definitions to particular circumstances at particular firms. This can also create variability that is not readily measurable. All of the measures need to be inflation adjusted to a common year. The the GDP deflator is used, based in 2017 dollars.

[2]Some methods: 1) Starting with Net Income (NI): EBITDA = Net Income (NI) + Interest + Taxes + Depreciation + Amortization; 2) Starting with Operating Income (OI): EBITDA = Operating Income (OI) + Depreciation + Amortization; 3) Starting with Earnings Before Tax (EBT): EBITDA = Earnings Before Tax (EBT) + Depreciation + Amortization; 4) Starting with Earnings Before Interest (EBI): EBITDA = Earnings Before Interest (EBI) + Taxes + Depreciation + Amortization; 5) Starting with Gross Profit: EBITDA = Gross Profit + Operating Expenses excluding depreciation and amortization.