Churning and Profitability in the U.S. Corporate Sector

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Abstract

This paper establishes that entry and exit regulate the top half of the profitability distribution in the post-1970 U.S. economy. We, first, document stability in the distribution of total profits earned on tangible, intangible, and financial capital. Whereas a narrower measure of returns on tangible capital, instead, suggests rising dispersion, it fails to capture post-1970 growth in intangible and financial assets. Second, we use quantile decompositions to show that churning – specifically, exit for cause – regulates median and top-end profitability. Thus, the process by which competition drives out unprofitable firms acts to stabilize profit rates in the U.S. economy.

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1 Introduction

In this paper, we empirically analyze the extent to which 'churning', defined by firm entry and exit into and out of the nonfinancial corporate sector, stabilizes the distribution of profit rates across firms in the post-1970 U.S. economy. The behavior of the profit rate is an issue of central importance in macroeconomics and political economy. Not only are profits a key driver of capital accumulation, but profitability differentials across firms are also crucial to the dissemination of innovations and the distribution of capital across sectors. Competition, in turn, plays a central role in the across-firm regulation of profitability. On the one hand, competition for above-average profits *within* industries, through the development of new products and cost-saving innovations, generates dispersion in profit rates and, as such, acts as a disequalizing force. On the other hand, differences in profitability *across* industries draw capital into industries where profitability is higher at the expense of those where profitability is lower. These flows and the corresponding changes in relative prices act as an equalizing force that limits dispersion. The classical paradigm emphasizes, in particular, that a stable distribution of profit rates is a key feature of an economy's long-run equilibrium.[1]

Firm entry and exit serve as important mechanisms for the realization of both of these tendencies. When new firms enter an industry with vintages of capital, technologies, or asset compositions that differ from those of incumbent firms, they can disrupt the distribution of profit rates within that industry and generate increased dispersion. At the same time, however, churning can also contribute to profit rate equalization, as less profitable firms are pushed out. At the economy-wide level, these counteracting effects of churning contribute to stabilizing the distribution of the profit rate and regulating its central tendency, while simultaneously adding 'turbulence' around this long-run equilibrium (Shaikh, 2016).

Through an analysis of U.S. firms from 1970 to 2017, we document evidence of long-term stability in the top half of the profit rate distribution across U.S. firms, and highlight the roles of

[1]The interplay of these two aspects of competition, which have led to a large literature in political economy, can be traced to Marx's writings on intra-industry competition in Capital Volume I (see, e.g., Marx, 1867, chs. 12 and 15) and inter-industry competition in Capital Volume III (see, e.g., Marx, 1894, ch. 10). For a recent discussion of the role of competition in Marx's analysis, see Moseley (2019). For recent overviews of Classical and Marxian theories of competition, see Tsoulfidis (2015) and Shaikh (2016).

both churning and changes in firms' asset composition (growth in intangibles and financial assets) in generating this stability. We begin by establishing that there is substantial long-term stability in the profit rate distribution across U.S. firms since 1970. We emphasize a measure of total profitability that describes returns earned on total assets. Specifically, we define total profitability as total flows of both operating and non-operating income relative to the stock of tangible, financial, and intangible capital. Comparing its median and 90th percentiles shows that, even with a modest decline in median total profitability through the 1980s, top firms are approximately twice as profitable as the median firm over the full post-1970 period. This regularity is remarkable, not only because it holds over an almost fifty-year time frame, but also because the post-1970 period is otherwise characterized by considerable change in the nonfinancial corporate sector as reflected, for example, in the 'financialization' of traditionally nonfinancial firms.

In contrast, we also show that there is a marked rise in dispersion when the profit rate is more narrowly defined as operational returns on tangible capital. This rise in dispersion reflects both a well-documented falling rate of operational profit through the 1980s (e.g. Michl, 1988; Shaikh, 1987; Dumenil & Levy, 2002) and, even more strikingly, rapidly rising top-end profitability. To reconcile these concurrent patterns of rising dispersion and stability, we compare the groups of top firms when ranked by total versus operational profitability. We show that the overlap between these two groups of top firms falls rapidly from the mid-1980s. At the same time, their asset compositions diverge: relative to firms with top-end total profitability, top-end operational profit rates increasingly accrue to firms with small shares of tangible capital in total assets and, conversely, large shares of financial and intangible assets. In turn, even as firms at the top of the operational profitability distribution record high (and rising) profits when earnings are evaluated relative to tangible capital, these same firms (increasingly) underperform in returns on total assets. These patterns indicate that, rather than capturing a meaningful rise in dispersion, rising top-end operational profitability reflects a failure to capture post-1970 shifts in firms' asset compositions and sources of funds.

We then analyze how competitive dynamics captured by entry and exit produce this stability in the total profit rate distribution. To do so, we use quantile decompositions that distinguish the contributions of continuing, entering, and exiting firms to the evolution of profitability at different

quantiles of its distribution. Our empirical method, which closely follows that in Davis, de Souza & Hernandez (2021), consists of two steps. First, we use a re-weighting method that draws on DiNardo, Fortin & Lemieux (1996) to disaggregate the contributions made by entering, exiting, and continuing firms to annual changes in the median and 90th percentiles of the profit rate. Second, we consider firms' reasons for exit. A simple measure of total exit obfuscates that, for instance, bankruptcies may have an equalizing effect on profitability by pushing unprofitable firms out of the sector, whereas (as we show below) firms exiting in mergers tend to have similar profit rates to continuing firms. We, therefore, distinguish the impact of three reasons for exit—those that are 'for cause' (i.e. bankruptcies), via mergers, and voluntary—on the evolution of profitability. Because the method in our first step generates path dependencies in more detailed decompositions, we use unconditional quantile regressions (Firpo, Fortin & Lemieux, 2009; Fortin, Lemieux & Firpo, 2011) to distinguish these reasons for exit.

Our decomposition results highlight that churning – and, most notably, exit for cause – plays a key role in maintaining stability at both the median and the 90th percentile of the total profitability distribution, by systematically offsetting declining profitability within continuing firms. Firms exiting for cause are less profitable than incumbent firms, such that profitability measured across the remaining firms rises when they leave the corporate sector. Over time, this effect of exit systematically offsets both declining profitability within continuing firms, and a negative contribution made by entering firms to median profitability. This role of exit for cause highlights a powerful mechanism wherein the process by which inter-firm competition drives out unprofitable firms lends stability to the across-firm distribution of profit rates in the post-1970 U.S. economy.

Our results build on three strands of the existing literature. First, they speak to the large empirical literature on profitability in the U.S. context that uses aggregate data to analyze profitability over both short- and long-term time frames (for example, Dumenil & Levy, 2002; Bakir & Campbell, 2006; Basu & Vasudevan, 2012; Basu & Manolakos, 2013), and sectoral data to analyze tendencies towards profit rate equalization (Tsoulfidis & Tsaliki, 2005). In turn, by analyzing profitability at the firm level, we are able to draw on more detailed data that allows us to identify individual cases of entry and exit, and to analyze distributional statistics away from the mean. Firm-level data,

also, includes granular measures of net income and assets with which we can construct profitability measures that consider tangible, intangible, and financial capital. The ability to build a broad measure of capital addresses a common limitation of aggregate data that often requires restricting analysis to the tangible capital stock (see Basu & Vasudevan, 2012). Notably, firm-level studies motivated by classical theories of competition remain relatively few. An exception is Scharfenaker & Semieniuk (2017), who find that profit rates converge to a stationary distribution, suggesting that – even while preventing equalization – competition lends regularity to their distribution over time.

Second, our results relate to two strands of the literature on firm-level profitability in mainstream finance. This literature establishes evidence of both equalizing and disequalizing effects of competition on the profitability distribution. Consistent with the notion that competition limits dispersion, for example, Fama & French (2000) find that the earnings-to-assets ratio converges to a common mean, conditional on proxies for fundamental differences in earnings potential (see also Beaver, 1970; Nissim & Penman, 2001; Fairfield, Ramnath & Yohn, 2009). On the other hand, Hirshleifer, Hsu & Li (2018) highlight the disruptive potential of technological innovations as tools for gaining competitive advantage. Finally, studies exploring if limits to inter-industry competition such as market concentration or barriers to entry generate persistent profitability differentials have yielded mixed results (Goddard, Tavakoli & Wilson, 2005; Maury, 2018; Davis & Orhangazi, 2021; De Loecker, Eeckhout & Unger, 2020).

A series of papers in the finance literature, also, examine the profitability of firms entering and exiting the corporate sector. Fama & French (2004) find that, during the 1990s, which was a period of fast entry, the profitability distribution among entering firms became more left-skewed and survival rates declined, suggesting that a less profitable and riskier segment of the U.S. economy accessed equity finance (see also Brown & Kapadia, 2007). In turn, Pástor, Taylor & Veronesi (2009) find that profitability tends to fall in the years following a firm's initial public offering, while Doidge, Karolyi & Stulz (2017) show that firms become increasingly likely to delist for cause, rather than through mergers, after the mid-1990s.

Third, the divergence we document between top firms' total and operational profitability speaks

to the literatures on financialization and intangibles, which emphasize a weakening link between (operational) profitability and tangible investment (Stockhammer, 2005; Van Treeck, 2008; Davis, 2017) as firm portfolios have shifted towards financial and intangible assets (Davis, 2016; Orhangazi, 2019). One explanation for this investment-profit puzzle suggests that financial and intangible assets have enabled firms to capture rising profits without making corresponding investments in tangible capital (Orhangazi, 2019). In turn, our finding that firms with high and rapidly rising operational profitability hold large stocks of intangible and financial assets, but *underperform* in total profits suggests additional avenues for exploration. For example, intangibles may reflect growth strategies wherein highly profitable firms in operational terms expand into new activities via mergers and, in turn, mergers create balance sheet intangibles that depress overall profitability.

The rest of this paper is organized as follows. In Section 2, we introduce our data and measures of the profit rate, and in Section 3 we describe the evolution of the post-1970 profitability distribution. In Section 4 we introduce the decomposition method that we use to analyze if churning stabilizes the total profitability distribution, and we present results in Section 5. Section 6 concludes.

2 Data

2.1 The profit rate

We begin by using the CRSP/Compustat Merged (CCM) database, which describes all publicly-listed nonfinancial corporations in the United States, to construct firm-level measures of the profit rate from 1971 to 2017. We emphasize total profits earned on a broad measure of capital that includes productive capital, commodity capital (e.g. inventories of finished goods), and financial capital (money and financial assets) (see Basu & Vasudevan, 2012, p. 64). At the firm level, this broad definition of capital is captured by total assets (at), which include fixed capital, financial capital, and intangible capital.

Intangible capital, in particular, includes assets such as brandnames, trademarks, patents or copyrights, as well as goodwill. Compustat estimates of intangibles fall, more specifically, into two categories: 'identifiable' intangibles, which include items such as customer lists and technology-

based intangibles like patents, and estimates of goodwill (which include all other intangibles not otherwise classifiable as identifiable). Notably, both categories are primarily generated through the the acquisition of other firms, rather than internal accumulation (Crouzet & Eberly, 2019). As such, the evolution of balance sheet intangibles is closely linked to mergers and acquisitions.[2] In turn, financial assets include cash and other short-term investments, investments and advances, receivables, and other miscellaneous assets.[3] As we discuss below, firms' growing stocks of financial and intangible capital in recent decades makes the ability to capture these two asset categories key for describing the evolution of overall profitability in this period. In fact, an important advantage of firm-level accounting data lies in that the asset categories needed to analyze a broad measure of capital are available over an extended time frame.

We measure profit flows as the sum of operating income before depreciation (*oibdp*) and non-operating income (*nopi*). Operating income records a firm's total sales after the cost of goods sold (such as labor costs), and after general and administrative expense. Non-operating income accounts for income derived from all other activities, including, for example, interest income, dividend income, and gains (or losses) on sales of marketable securities (Compustat, 2000). Both are net income concepts that, together, account for a firm's total earnings, whether on fixed, intangible, or financial assets. To more directly capture the net flow of funds available to the firm, we also deduct both income taxes (*txt*) and interest expense (*xint*) from total profits.[4] Notably, while nonoperating income includes interest income, neither operating nor nonoperating income is net of interest expense. Finally, we normalize by total assets, thereby yielding a measure of profit flows relative to all capital advanced in the production process, independently of how that capital is financed (i.e. by equity, debt, or retained earnings).[5]

[2]See Lev (2000) for a discussion of measurement error in intangibles accounting, including in how firms capitalize intangible assets and due to mis-valuation of goodwill. Also note that, while Compustat's fixed capital measures are at historical rather than replacement cost, Basu (2013) suggests that the choice of capital stock valuation is largely irrelevant for much of our time frame (through 2010).

[3]Cash and short-term investments are CCM item *che*; investments and advances are CCM items *ivaeq* and *ivao*; and other assets include both other current assets *aco* and other assets *ao* (see Davis, 2016).

[4]Dumenil & Levy (2002), for example, argue that deducting taxes on profits from total income is necessary to accurately measure total profits accruing to firms.

[5]Thus, we do not deduct liabilities from total assets. Given an increase in external borrowing and rising equity repurchases over the post-1970 period, however, the intersection between profitability and borrowing also raises interesting questions for future analysis. For examples of work that also normalize by total (gross) assets see Scharfenaker & Semieniuk (2017) in the classical literature and Kahle & Stulz (2017) in the mainstream finance literature.

There is, of course, substantial variation in the political economy literature surrounding measurement of the profit rate. In particular, many researchers utilize a profit rate in which the stock of capital is defined by fixed assets (see, for example, the discussion and analysis in Basu, 2013). In contrast, we emphasize the total profit rate as our primary measure so as to capture firms' total profit flows relative to the overall stock of capital used to generate these profits. In doing so, we are also able to account for changing composition of capital over post-1970 period, wherein tangible capital has become a declining share of firms' overall assets. However, we also compare the total profit rate to a narrower measure, which we call operational profitability, that is defined by a firm's income from operations relative to the stock of tangible capital used to generate that income. To define this measure, we again define operational profit flows as operational income after depreciation, less income taxes, and less interest expense. We normalize these income flows by tangible assets, defined as the sum of fixed capital (property, plant and equipment net of depreciation, *ppent*) and inventories (*invt*).[6]

2.2 Identifying entry and exit

Our final CCM sample includes all observations describing nonfinancial firms incorporated in the United States with reported profitability data, and non-negative sales and total assets.[7] We use *fic* to identify country of incorporation, and SIC codes (6000-6799) to identify and exclude financial firms. To avoid conflating industry switches with cases of entry and exit, we also drop firms whose industrial classification switches into or out of finance (41 firms). Finally, we trim each profitability measure at the 1st and 99th percentiles.

The second main part of our data identifies instances of firm entry and exit, and exiting firms' reasons for exit. Information describing firms' fiscal year of exit and reason for exiting the nonfinancial corporate sector (delisting codes) is available in the Center for Research in Security Prices

[6]The trends in operational profitability we show below are insensitive to various measurement choices, such as excluding inventories from the fixed capital stock; including taxes and interest expense in operating income; and measuring operating income as 'income before extraordinary items' (*ib*). Like operating income before depreciation, income before extraordinary items measures a firm's income after expenses, income taxes, and interest. However, this measure also nets out depreciation, which reduces the level of profits but does not change the time trends. We choose not to emphasize *ib* because changes in depreciation allowances – when used, for example, as a policy tool to encourage investment in certain industries – may suggest artificial changes in profitability.

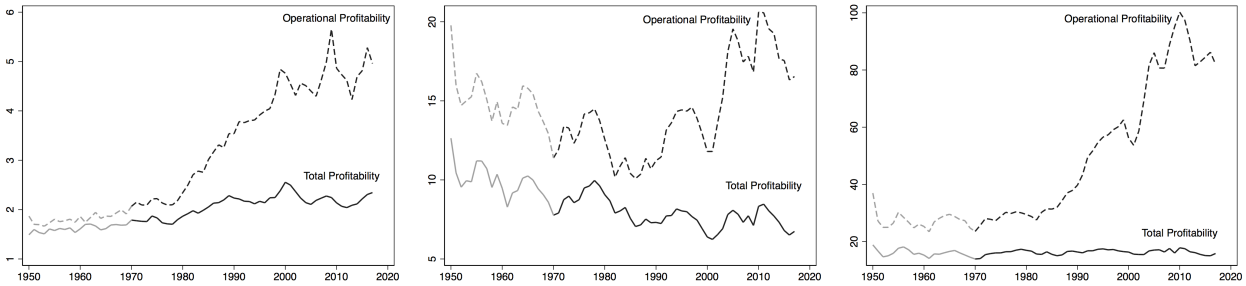
[7]We also limit the sample to primary issues (*linkprim* equal to P or C), covering over 99% of observations.

(CRSP) dataset. Following the classification of delisting codes in Fama & French (2004), we distinguish three reasons for exit. First, firms may exit 'for cause' (*dlstcd* greater than 400, excluding 570 and 573). Exit for cause implies a firm is (involuntarily) delisted by an exchange because it no longer meets listing requirements, because it has been unprofitable for several years, its market capitalization is too small, or its stock price is too low (Doidge et al., 2017; Martinez & Serve, 2017). Exits for cause are conceptually akin to bankruptcy or liquidation. Second, a firm may delist because it is acquired in a merger (*dlstcd* between 200 and 399). Third, firms may voluntarily delist (*dlstcd* equal to 500 or 573), for example in going-private transactions. Because CRSP is reported at the security level, a firm can have multiple securities that delist at different times. To describe a *firm's* reason for exit, we therefore use CRSP to identify the fiscal year and delisting code for a firm's final security to delist.[8] We merge this delisting information with CCM on fiscal year and firm (*permco*), thereby matching the reason for exit (among firms that do exit) to the corresponding observation for profitability.

Finally, we use the CCM-CRSP merged sample to identify instances of entry and exit. We, first, classify a firm as entering in the fiscal year it joins the sample and as exiting in the fiscal year it disappears with a delist code, conditional on that it also reports profitability data in those years. Thus, a firm that first appears in CCM and also reports profits in 1982 enters in 1982, whereas a firm that reports both a delisting code and profitability in 1982 exits in 1982. Second, we also allow for cases in which profitability reporting lags a firm's entry by one year or leads a firm's exit by one year. For instance, a firm may appear in CCM in fiscal year t, but not report profitability until fiscal year $t + 1$, or it may cease reporting profit data the fiscal year prior to delisting. In these cases, we consider the first (last) year the firm reports profitability to be the year of entry (exit). This single year of lags and leads accounts for timing discrepancies between a firm's month of entry (or exit) and the first (or last) full fiscal year for which it reports balance sheet and income

[8]For example, if a firm has two securities, one of which delists in June 2000 due to a merger, and one of which delists for cause in September 2002, we classify this firm as exiting for cause in September 2002. There are 383 firms with multiple securities that delist at different times. An additional eleven firms have multiple securities delist in the same month and year, but for different reasons. Because we cannot distinguish the firm's reason for exit in these cases, we drop these eleven firms.

Figure 1: Trends in selected quantiles of total and operational profitability, 1950-2017



(a) 90-50 ratio (b) Median (c) 90th Percentile

Notes: The figure shows trends in the 90th and 50th percentiles of total and operational profitability between 1950 and 2017. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. Operational profitability is operating income before depreciation minus taxes and interest payments, relative to fixed capital and inventories. Both profit rates are trimmed at the 1st and 99th percentile separately for the 1950-1969 and 1970-2017 periods, and are expressed in percentages. See Section 2 for details describing the data and sample.

data.[9] However, we exclude any firm for which the length of this lag or lead exceeds one year.[10] Finally, we exclude firms with gaps in reported profitability, to ensure that firms cannot contribute to the decompositions as entering firms in multiple years.[11] The final sample describes 16,056 firms (174,731 observations) between 1971 and 2017.

3 Regularity in the profitability distribution

In Figure 1 we plot the median and 90th percentile of the total and operational profitability distributions, as well as the ratio between them (the 90-50 ratio), over time. We show each series between 1950 and 2017; however, because delisting information is only available after 1970, our

[9]For instance, a firm enters in April and reports fiscal year-end information in May is unlikely to report income and balance sheet information in the fiscal year it first appears in CCM, given that it is only in operation for one month prior to its first fiscal year's end. By allowing a one year lag/lead, we avoid dropping firms like these from our analysis.

[10]Thus, a firm enters in year t under two conditions: (1) it appears in CCM for the first time in t and also reports profit data in t (97.7% of entering firms), or (2) it appears in CCM in $t-1$ but first reports profitability in t. Similarly, a firm exits in year t if: (1) it leaves CCM with a delisting code from CRSP in t and also reports profitability in t (96.8% of exiting firms), or (2) it reports a delisting code in year $t+1$, but only reports profitability through t. Our decomposition results are robust to both a more restrictive assignment of entry and exit, which excludes firms where entry or exit is not contemporaneous with reported profitability, and to a more expansive assignment, in which we allow for two lags or leads of missing profit rate information. Finally, a small share of firms (0.13% of observations) leave the sample before it ends in 2017 without a delisting code. We exclude these firms to ensure that we link all exits to a delisting code.

[11]We exclude firms with gaps for each profit measure independently.

discussion emphasizes the post-1970 period.

To begin, consider the solid lines in each figure, which describe total profitability. Figure 1a, which plots plots the 90-50 ratio, highlights that the total profit rate of highly-profitable firms relative to those at the median is largely stable since 1950, wherein firms at the 90th percentile are approximately twice as profitable as the median firm. More specifically, the 90-50 ratio rises from an average of 1.77 during the 1970s to 2.05 during the 1980s, before settling at 2.22 since 1980. Thus, notwithstanding a modest rise during the 1980s, Figure 1a captures substantial long-term regularity in the profitability of top firms relative to those at the median in post-1970 U.S. economy.

In turn, the solid lines in Figures 1b and c plot the median and 90th percentiles of total profitability independently. Figure 1b shows that a fall in the median, from an average of 9.6% between 1950 and 1979 to 7.3% by 1989, drives the rise in the 90-50 ratio through the 1980s. This decline in median profitability is consistent with previous evidence of a falling rate of profit in the U.S. through the early 1980s (Shaikh, 1987; Michl, 1988; Dumenil & Levy, 2002).[12] Since 1990, however, the median total profit rate is largely steady. Concurrently, profitability at the 90th percentile hovers close to its average of 16.2% over the full period (averaging 15.8% in the 1970s, 16.0% in the 1980s, 16.8% in the 1990s, and 16.3% since 2000). Thuse, even while profitability has not equalized around a uniform rate, these patterns suggest remarkable regularity in its distribution over time (see also Scharfenaker & Semieniuk, 2017).[13]

3.1 Reconciling the total and operational profitability distributions

At the same time, however, Figure 1 also captures a marked increase in the dispersion of operating profit rates across firms. In fact, the 90-50 ratio for operational profitability more than doubles

[12] In fact, these studies emphasize operational, rather than total, profitability. As discussed in Section 3.1 below, median operational profitability also falls (and more dramatically) over this time frame.

[13] These conclusions are corroborated by disaggregating growth in the 90-50 ratio between two years into the sum of three terms: the rate of change in the 90th percentile, the rate of change in the inverse of the median, and the cross-product of the first two terms. Letting $p_{90,t}$ and $p_{50,t}$ denote the 90th percentile and the median at time t; $r_t = \frac{p_{90,t}}{p_{50,t}}$ denote the 90-50 ratio; and carets denote rates of change between years $t-1$ and t, then algebraic manipulation yields: $\widehat{r_t} = \widehat{p_{90,t}} + \widehat{p_{50,t}^{-1}} + \widehat{p_{90,t}} \times \widehat{p_{50,t}^{-1}}$. The top panel of Table A1, which focuses on total profitability, shows that in the 1970s and again since 1990, year-to-year changes in the 90th and 50th percentiles approximately offset one another, such that firms at the top remain approximately twice as profitable as those at the median. During the 1980s, the 90-50 ratio grows an average of 2.44 percent per year due to an annual average fall in median profitability of 2.94 percentage points that is only slightly offset by an average annual decline in the 90th percentile.

between 1970 and 2017, as profits at the 90th percentile rise from 2.1 times median profits in the 1970s to almost five times median profits by 2017. This increase is, in particular, concentrated during the 1980s and 1990s, when the 90-50 ratio rises from 2.2 in 1979 to reach 4.8 by 1999.[14]

In turn, Figures 1b and c show that, while both rising top-end and falling median operational profitability contribute to rising dispersion during the 1980s, the continued post-1990 increase reflects rapidly rising top-end profitability. Most strikingly, operational profitability at the 90th percentile rises nearly monotonically from the early 1980s, with the fastest expansions occurring during the 1980s and 1990s, as top-end profitability rises from an average of 32% during the 1980s to 75% from 2000-2009. During the 1980s, falling median profitability, which declines from an average of 13.2% in the 1970s by 10.7% in 1989, also drives up dispersion. Save for the Dotcom crisis, however, median operational profitability recovers from the early 1990s, reaching an average of 18.5% since 2010. As such, the post-1990 rise in dispersion is due to rising top-end profit rates.[15]

The differences in the evolution of total and operational profitability raise a key question: Does rising top-end operational profitability capture a meaningful increase in dispersion, or does the stability in the total profitability distribution better describe this period? If the same firms sit at the top of both distributions, then rising top-end operational profit rates would suggest that financial and intangible capital — even while depressing total relative to operational profitability by increasing the denominator against which profits are measured — allow top firms to achieve rapidly rising returns on operational activities. This conclusion would suggest that intangible assets like brand names have enabled firms to capture profits without increasing fixed investment (Orhangazi, 2019), and indicate that the dominant pattern is one of rising dispersion.

We show, however, that this is not the case: Not only is it decreasingly likely that a firm

[14]We show cumulative distribution functions in the appendix, which show these observations regarding both total and operational profitability apply to the top half of both distributions more broadly. Figure A1a shows that dispersion in total profitability is stable across the top half of the distribution, although it increases in the bottom half. Figure A1b shows that the operational profitability distribution rotates clockwise around the 40th percentile, with operational profitability rising at each quantile above the median (with the largest increases at the very top) and declining below the median.

[15]Table A1 reiterates this conclusion. During the 1980s, growth in the 90-50 ratio averages 5.0% per year, with the 90th and 50th percentiles contributing nearly equally to this growth (2.44 and 2.82 percentage points, respectively). During the 1990s and first decade of the 2000s, the 90th percentile pushes up the 90-50 ratio by annual averages of 5.21 and 4.70 percentage points – even as rising median profitability partially offsets the impact of rising top-end profit rates on dispersion (by annual averages of 1.72 in 1990-1999 and 2.21 percentage points in 2000-2009).

Figure 2: Percent overlap between top 20% of firms by total and operational profitability

Notes: This figure shows the share of firms in the top 20% when ranked by operational profitability that are also in the top 20% when ranked by total profitability. This share is shown in percent per year. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. Operational profitability is operating income minus taxes and interest payments, relative to fixed capital and inventories. See Section 2 for details describing the data and sample.

with top-end operational profitability also lies at the top of the total profitability distribution since the mid-1980s, but firms with the highest operational profit rates also rely proportionally *less* on tangible capital than those with the highest total profit rates. Thus, for a growing share of firms with rising operational profitability, high operational profit rates are an artifact of growing stocks of financial and intangible assets that depress profitability by inflating a firm's total assets (i.e. the denominator of the profit rate) without generating a commensurate increase in net income (i.e. the numerator).

In Figure 2, we plot the share of firms in the top quintile of operational profitability that also lie in the top quintile of the total profitability distribution. These calculations show that, while almost 70% of firms in the top quintile of operating profitability are also in the top quintile of total profitability during the 1970s, this overlap falls rapidly from the mid-1980s to only 39.6% since 2000. This decline coincides with both the years when top-end operational profitability rises rapidly and also with years of rapid entry into the nonfinancial sector (Kahle & Stulz, 2017), suggesting that new entrants have been relatively more likely to record high operational than high total profitability, thereby driving up top-end operational profitability during the 1990s and early 2000s.

As the overlap between these groups of top firms declines, their characteristics also diverge. Of particular note here is a post-1980 expansion in intangible and financial capital, which is markedly more pronounced among top firms when ranked by operational profitability. Much of this rise reflects intangibles. As in the full sector (Orhangazi, 2019), the intangible asset holdings of highly profitable firms first rise during the 1990s and accelerate thereafter. Among firms in the top quintile of operational profitability, intangibles account for 4.7% of total assets in the 1970s; 10.6% in the 1990s; and more than a third (34.9%) of assets since 2010.[16] In contrast, among top firms by total profitability, the rates of increase are similar but the levels are substantively lower, with intangibles rising from 2.5% of assets in the 1970s to reach 18.1% after 2010.

Thus, while intangibles are increasingly important for both sets of top firms, their weight is greater (and increasingly so) for firms with top operational profit rates. Similar patterns characterize the evolution of financial assets, albeit with an earlier peak. On average, 47.2% of the assets of top firms by operational profitability are financial during the 1970s. This share rises during the 1970s and 1980s to an average of 62.2% during the 1990s, before settling at an average of 50.5% since 2000. Among top firms by total profitability, these shares are again lower, averaging 37.9% in the 1970s, 48.2% in the 1990s, and 41.4% since 2010.

As such, firms at the top of the operational profitability distribution rely proportionally *less* on tangible capital and *more* on financial and intangible assets to generate income than those with top-end total profitability, and this distinction grows in recent decades.[17] However, the fact that these firms are decreasingly likely to also have high total profitability indicates that they fail to earn commensurate overall returns once accounting for their relatively large stocks of financial and intangible assets. In fact, the post-2010 share of net nonoperating income in total profits for

[16] These calculations refer to mean shares, and are also summarized in appendix Table A2. To avoid introducing missing observations that change our sample of firms, we impute zeros for any subcomponent of financial assets or for intangibles observations that are missing in a given year, although the conclusions are not sensitive to instead dropping these missing observations. The qualitative patterns in Table A2 also hold for median shares.

[17] While rising top-end operational profit rates could also reflect small firm size, these firms are not disproportionately small by total assets in recent decades. If there were no systematic relation between high operational profitability and firm size we would expect roughly 10% of the most profitable firms to also lie in the top decile of the firm-size distribution (i.e. to also be large firms). Since 1970, the share of firms in the top deciles of both operating profitability and total assets approaches and reaches this 10% benchmark (equal to 3.7% in 1970-1979, 8.2% in 2000-2010, and 10.9% since 2010). In turn, while a disproportionate number of firms with high operational profitability are small when only considering tangible capital, this distinction only reiterates that intangible and financial assets are a growing share of total assets for firms with top operational profit rates.

firms in the top quintile of operational profitability falls from an average of 9.5% in the 1980s to become *negative* since 2010 (-2.4%). In contrast, this post-2010 share of nonoperating income in total profits for firms in the top quintile of total profitability averages 3.4%. Together, these trends indicate that — rather than helping top firms pull away from the rest of the sector — financial and intangible assets *stabilize* the distribution over this period, such that the most salient pattern is one of substantial regularity in profitability distribution after 1970.

Why might firms with high operational profitability acquire financial and intangible assets, when these assets depress their overall profit rates? Intangible assets may, for example, complement operational activities, allowing firms that make heavy use of intangibles to capture high operational returns — even as these intangibles inflate the denominator of the profit rate and reduce total profitability (Orhangazi, 2019). Large stocks of intangibles may, alternatively, reflect growth strategies, wherein firms with high operating profitability expand into new activities or product markets by acquiring other firms, rather than through internal accumulation. Such acquisitions generate balance sheet intangibles, which depress the total profit rate. Finally, the fact that financial asset holdings include large stocks of cash (Bates, Kahle & Stulz, 2009; Davis, 2016) suggests that growth in financial assets may simply reflect a lack of opportunities to invest these funds in tangible capital. While a full delineation between these hypotheses lies outside the scope of this paper, considering these mechanisms is an important focus for future research.

4 Quantile decomposition method

Does churning play a central role in producing this regularity in the distribution of profit rates across the U.S. nonfinancial corporate sector? We, next, turn to distinguishing the contributions that entering, exiting, and continuing firms make to the evolution of profitability using quantile decompositions, which allow us to analyze distributional statistics away from the mean (where, following Section 3, we emphasize the median and the ninetieth percentile). The discussion of the quantile decomposition method in this section draws heavily on the exposition in Davis et al. (2021), which analyzes the relative importance of churning versus within-firm behavior for the evolution of firm balance sheet structure after 1980, but does not distinguish between firms' reasons for exit.

The method consists of two steps. We, first, draw on the re-weighting method in DiNardo et al. (1996) to disentangle the impact of changes within *continuing* firms from the impact of churning (i.e. *entering* and *exiting* firms) on the median and 90th percentile of the profitability distribution. Second, we use unconditional quantile regressions (Firpo et al., 2009; Fortin et al., 2011) to disaggregate the total effect of exit into the contributions made by exits for cause, mergers, and voluntary delists. In each case, we conduct rolling decompositions between adjacent years. This choice is important: as the interval over which we perform the decomposition lengthens, the fact that are fewer continuing firms and more entering/exiting firms makes the interpretation of the results increasingly arbitrary.[18]

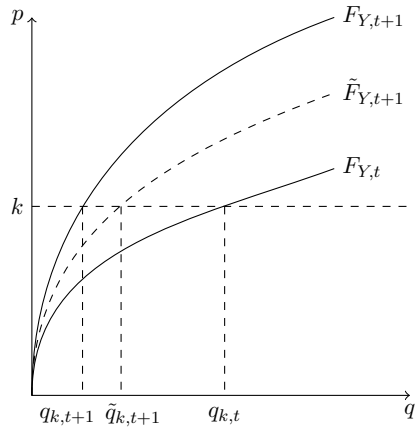
4.1 Step 1: Continuing, entering and exiting firms

The first step of our decomposition method follows the re-weighting approach in DiNardo et al. (1996) and the application of this method to firm data in Davis et al. (2021) to decompose the change at a quantile (k) of the profit rate distribution into the contributions of continuing, entering and exiting firms. We illustrate this decomposition in Figure 3, where F is the cumulative distribution function of a variable Y at times t and $t+1$. Each function is defined as $F_{Y,t}(q) = \text{Prob}[Y \leq q]$, such that quantile k at time t is $q_{k,t} = F^{-1}_{Y,t}(k)$.

We begin by disaggregating the change in the profit rate at quantile k between two years into the contribution of changes within continuing firms and a total contribution from churning. To do so, we construct a counterfactual distribution for $t+1$ ($\tilde{F}_{Y,t}$) that holds the composition of firms between t and $t+1$ constant. This counterfactual includes the observations of Y for continuing firms in $t+1$ and for exiting firms in t, and excludes all new firms entering in $t+1$. Using this counterfactual distribution, we can decompose the change in quantile k between t and $t+1$ ($q_{k,t+1} - q_{k,t}$) into two components. The first component ($\tilde{q}_{k,t+1} - q_{k,t}$) is the *within-firm effect*, which measures the contribution of changes within the set of continuing firms to changes in the distribution of Y between t and $t+1$, while holding the composition of firms in period t

[18] If, for example, we were to use a decade-long interval (e.g. 1990-1999), then a firm that enters in 1991 and stays in the sample until 1999, such that it is in the sample for all years but one, would be classified as entering—even though it is a continuing firm for the majority of the decade (Davis et al., 2021).

Figure 3: Illustration of the Decomposition Procedure



Notes: This figure is drawn from Davis et al. (2021).

constant. The second component $(q_{k,t+1} - \tilde{q}_{k,t+1})$ is the *composition effect*, which measures the total contribution of changes made by entering and exiting firms. To isolate this compositional component, we hold the distribution of continuing firms (observed in $t+1$) constant, and replace the distribution of Y across exiting firms with its distribution across entering firms. Thus, this decomposition uses exiting firms as the reference group against which to assess the contribution made by continuing firms to the change in Y over time.[19]

We, similarly, decompose the compositional effect into the independent contributions of entering and exiting firms, by building a second counterfactual sample of only continuing firms in $t+1$ ($\tilde{q^C}_{k,t+1}$):

$$q_{k,t+1} - \tilde{q}_{k,t+1} = (q_{k,t+1} - \tilde{q}^C_{k,t+1}) + (\tilde{q}^C_{k,t+1} - \tilde{q}_{k,t+1}) \tag{1}$$

where the first term in parentheses measures the contribution of entering firms and the second term measures the contribution of exiting firms, with each effect evaluated relative to the reference group of continuing firms. For example, a positive value for the first term – which gives the change in the profit rate at quantile k for $t+1$, when new firms enter and after exiting firms have left – implies that (relative to firms that continue in $t+1$) entering firms *raise* profitability at quantile k.

[19]We can, instead, use entering firms as the reference group by computing a counterfactual distribution for period t (rather than $t+1$) that replaces the observations for exiting firms with those of entering firms. Our results are robust to changing the reference group (see appendix Table A3).

Similarly, the second term defines the change in the profit rate at quantile k and time $t+1$, when exiting firms leave the sample, before they are replaced by entering firms. A positive value indicates that (relative to the firms that continue in $t+1$) exiting firms would have lowered profitability at quantile k if they had stayed in the sample with the same profit rate as in period t. By exiting, these firms *raise* the profit rate at quantile k.

4.2 Step 2: Distinguishing between reasons for exit

The re-weighting method in Section 4.1 cannot be used to distinguish between the effects of different reasons for exit. This limitation occurs because accounting for different reasons for exit generates a path-dependent decomposition, wherein the results are sensitive to the order in which we compute the effect of each group of exiting firms.[20] We, therefore, use unconditional quantile regressions (Firpo et al., 2009) to estimate the individual effects of reasons for exit on quantile k, relative to a counterfactual of continuing firms in $t+1$. In doing so, we decompose the total effect of exit into three terms – describing exit for cause, due to mergers, and voluntary exits – each of which has the same interpretation as the terms in the first step of the decomposition above.

Specifically, we estimate the following unconditional quantile regression:

$$RIF(\tilde{Y}, k)_{t+1} = \alpha + \beta E^C_{t+1} + \gamma E^M_{t+1} + \lambda E^V_{t+1} + \epsilon_{t+1} \tag{2}$$

where $RIF(\tilde{Y}, k)_{t+1}$ is the recentered influence function of $\tilde{Y}$ at quantile k of the distribution of $\tilde{Y}$ in $t+1$, and $\tilde{Y}$ denotes the counterfactual sample for $t+1$. In turn, E^C_{t+1}, E^M_{t+1}, and E^V_{t+1} are dummy variables capturing whether exiting firms delist for cause (E^C), in a merger (E^M), or voluntarily (E^V). The expectation of $RIF(\tilde{Y}, k)_{t+1}$ is the unconditional quantile k of $\tilde{Y}$. Estimating Equation (2) using OLS, therefore, gives the effect of changes in the composition of each group on $\tilde{q}_{k,t+1}$.[21] By estimating Equation (2), we obtain fitted values for the coefficients which, when evaluated at

[20] In particular, the fact that the effect of each reason for exit would be assessed against a different counterfactual sample depending on the order in which the effect is computed compromises comparability (see Fortin et al., 2011; Davis et al., 2021).

[21] The influence function at quantile k of a random variable yields the effect of an individual observation on that quantile, and the recentered influence function is a transformation of the influence function such that its expected value is equal to the quantile k (see Firpo et al., 2009).

the sample means of the covariates, yield the observed value of quantile k in the counterfactual sample:

$$\tilde{q}_{k,t+1} = \hat{\alpha} + \hat{\beta}\bar{E}^{C}_{t+1} + \hat{\gamma}\bar{E}^{M}_{t+1} + \hat{\lambda}\bar{E}^{V}_{t+1} \tag{3}$$

where bars denote sample means (i.e. the observed shares of exiting firms by reason for exit).

Finally, we obtain the complete decomposition by combining Equations (1) and (3):

$$\tilde{q}^{C}_{k,t+1} - \tilde{q}_{k,t+1} = -\hat{\beta}\bar{E}^{C}_{t+1} - \hat{\gamma}\bar{E}^{M}_{t+1} - \hat{\lambda}\bar{E}^{V}_{t+1} - e \tag{4}$$

where Equation (4) decomposes the contribution of exiting firms into the individual effects of exit for cause, due to mergers, and due to voluntary delisting. Each effect is the product of two terms: the estimated partial effect of increasing the number of firms exiting for cause ($\hat{\beta}$), due to mergers ($\hat{\gamma}$), or voluntarily ($\hat{\lambda}$), and the observed shares of firms exiting for each reason ($\bar{E}^{C}_{t+1}$, $\bar{E}^{M}_{t+1}$, and $\bar{E}^{V}_{t+1}$). Note that, because each term describes firms that are leaving the sample, these contributions enter with the opposite sign of the regression output. Finally, the residual ($e = \tilde{q}^{C}_{k,t+1} - \hat{\alpha}$) reflects that $RIF(Y, k)$, which is computed over the full distribution of Y, has an expectation conditional on specific covariate values that generally differs from the value of Y at k, conditional on these same values.[22] In our analysis, the magnitude of these residuals is generally small and moves in the same direction as the estimated effects, such that they do not affect interpretation of our results.

5 Results

We use this quantile decomposition method to disentangle the contribution of continuing firms from that of churning created by entry and exit to the evolution of the 50th and 90th percentiles of profitability in the U.S. nonfinancial corporate sector. Following the descriptive discussion, we focus on explaining the stability of the median and the 90th percentile of total profitability; however, we also comment on the main differences in operational profitability at the end of the section. These decompositions highlight that the regularity of both the median and the 90th percentile of total profitability shown in Section 3 is produced by churning: At both quantiles, churning – and,

[22] For further discussion, see Davis et al. (2021).

in particular, exit for cause – has regulated profitability by compensating for falling profitability within continuing firms and, at the median, for the negative impact of new entry on profitability.

In each set of results in this section we show the results averaged by decades and, following the presentation in Section 4.1, use exiting firms as the reference group. In the appendix, we also show results that use entering firms as the reference group (Tables A3), which reiterate our main findings about the role of churning in maintaining stability at both the median and the 90th percentile of the profitability distribution.

5.1 Median profitability

In Table 1, we show results decomposing continuing, entering, and exiting firms' contributions to the evolution of median total profitability between 1971 and 2017. The first column reports the average annual percentage point change in the median profit rate by decade, and the next two columns use Step 1 of our decomposition method to distinguish the contribution of continuing firms (*the within-firm effect*) from that of churning (*the composition effect*).[23] We, also, use Step 1 to distinguish the contributions of entering and exiting firms. In turn, the final four columns use Step 2 of our decomposition method to disaggregate the total effect of exit into the independent contributions of exits that are for cause, due to mergers, and voluntary.

Table 1: Decomposing average annual changes in median total profitability

	Median								
	Annual	Within	Composition	Entering Firms	Exiting Firms				
	Change			Total	Total	For Cause	Mergers	Voluntary	Resid.
1971-1979	0.20	0.16	0.04	0.04	0.01	0.03	-0.02	0.00	-0.00
1980-1989	-0.26	-0.24	-0.02	-0.13	0.11	0.19	-0.06	0.01	-0.02
1990-1999	-0.07	-0.17	0.10	-0.14	0.24	0.28	-0.02	0.00	-0.03
2000-2009	0.02	-0.13	0.15	-0.12	0.27	0.30	-0.00	0.02	-0.05
2010-2017	-0.07	0.01	-0.07	-0.19	0.11	0.09	0.01	0.01	0.00

Notes: The first column measures the average annual change in the median of total profitability. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. The reference group for the counterfactual sample is outgoing firms. See Section 2 for details describing the data and sample.

These decompositions of the median produce two key results. First, both within-firm trends

[23] When comparing these average annual changes to the trends in Section 3 note that we compute this change for each pair of adjacent years. As such, it generally differs from the total change between the first and last year divided by the number of years in the period.

and the entry of new firms push down the median profit rate since 1980. Second, and by contrast, exit for cause concurrently raises median profitability. Thus, as median profitability falls within continuing firms over time, the exit of less profitable firms offsets this decline for much of the post-1980 period, suggesting that between-firm competition, by driving out less profitable firms, has stabilized the median profit rate in the U.S. economy.

More specifically, within-firm changes push down median profitability by an average of 0.14 percentage points per year after 1980. As such, if we could ignore changes in the composition of firms, median profitability would have *fallen* after 1980. Likewise, the contribution of new entry after 1980 is also negative (averaging -0.14 percentage points per year), indicating that the median profit rate among entering firms is on average lower than that of continuing firms, such that entering firms further push down median profitability.

In contrast, firms that exit for cause make large, positive contributions to median profitability, averaging 0.22 percentage points per year after 1980. This positive contribution highlights that firms exiting for cause drive up median profitability when they exit, such that their profitability is low relative to the reference group of continuing firms. Exit for cause, furthermore, dominates the total impact of exiting firms on the median profit rate, whereas the contributions made by exit due to mergers and voluntary delists are negligible. While the positive effect of exit for cause fails to offset the negative effects of continuing and entering firms during the 1980s, such that median profitability does decline during this decade (as shown in Section 3), exit for cause is key in the following two decades for stabilizing median profitability.

What explains exiting and entering firms' impacts on the evolution of median profitability? Recall from Section 4 that the contributions of exiting and entering firms reflect both their weights in the sample and their partial impacts on the median, evaluated relative to continuing firms. Thus, an increase in the (positive) impact of exit for cause on median profitability, for example, can either reflect a decline in median profitability among firms exiting for cause relative to continuing firms, or that a larger share of firms exits for cause (or both). To provide intuition for the decomposition results we, therefore, compare average total profit rates at the median and the 90th percentile among entering, continuing, and exiting firms by decade in Table 2, and summarize average rates

of entry into and exit out of the nonfinancial corporate sector in Table 3.[24]

Table 2: Quantiles of total profitability, by group (period averages).

	Median			
	Entering	Continuing	Exiting	
			For Cause	Merger
1971-1979	9.43	9.06	2.67	10.00
1980-1989	6.11	8.11	-13.94	8.87
1990-1999	5.72	8.02	-12.72	7.84
2000-2009	4.31	7.58	-10.96	7.00
2010-2017	1.74	7.78	-10.42	7.39
	90th Percentile			
	Entering	Continuing	Exiting	
			For Cause	Merger
1971-1979	18.36	15.80	12.45	17.64
1980-1989	16.72	16.06	8.38	16.06
1990-1999	16.71	16.96	7.15	17.09
2000-2009	16.57	16.56	6.46	15.31
2010-2017	14.84	16.28	10.56	15.78

Notes: This table shows the average annual level of the median and the 90th percentile of total profitability across entering, exiting and continuing firms. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. Excludes voluntary delists. See Section 2 for details describing the data and sample.

In the case of exit for cause, both low and falling profitability relative to continuing firms and a relatively high propensity to exit for cause during the 1990s produce its sizable positive contribution to median profitability. The profitability comparisons in Table 2 highlight that median profitability among firms exiting for cause is not only consistently lower than among continuing firms, but is also *negative* since 1980. Given the large difference in total profitability between the median continuing firm and the median firm that exits for cause (averaging 20 percentage points between 1990 and 2009), it is is unsurprising that exit for cause makes large, positive contributions to median profitability. In turn, Table 3 shows that relatively high rates of exit for cause during the 1980s and 1990s reinforce this effect. While an average of 3.5% of firms exit for cause each year during the 1980s and 1990s, the average propensity to exit for cause declines to 2.4% per year since 2000. Since 2000, for cause exits have also become a smaller share of total exits, falling from 44.6% of

[24] Because voluntary exits make up a small share of exiting firms and contribute little to the evolution of profitability, we omit them from Table 2. We, also, include figures showing annual comparisons of continuing firms' profitability relative to that of entering and exiting firms at the 50th and 90th percentiles in the appendix (Figure A2).

exits during the 1980s and 1990s to 34.5% since 2000.[25]

Table 3: Entry and exit rates

			Types of exit		
	Entry rate	Exit rate	Cause rate	Merger rate	Voluntary rate
1971-1979	10.6%	3.9%	1.1%	2.8%	0.0%
1980-1989	8.7%	8.0%	3.4%	4.4%	0.1%
1990-1999	8.9%	8.6%	4.0%	4.5%	0.2%
2000-2009	3.7%	7.7%	3.1%	4.2%	0.4%
2010-2017	5.1%	5.9%	1.5%	4.4%	0.1%

Notes: The table shows entry and exit rates, calculated as the number of entering (exiting) firms in a year, divided by the total number of firms in the previous year. See Section 2 for details describing the data and sample.

In contrast, the first two columns of Table 2 highlight that new entry's negative contribution to median profitability reflects that the median entering firm tends to be less profitable than the median continuing firm after 1980. Median profitability among entering firms averages 4.6% between 1980 and 2017, as compared to 7.87% among continuing firms. In contrast, Table 3 captures that, while new entry rates during the 1980s and 1990s are high (averaging 8.8% per year), entry falls by more than half since 2000, to an average of 4.3% per year. Thus, the negative impact of entry on median profitability increases between 2000 and 2017 *despite* declining entry, because entering firms' profitability falls relative to continuing firms (with the average gap between them rising from 2.15 percentage points during the 1980s and 1990s to 4.65 percentage points since 2000). Finally, Table 2 also shows that, in stark contrast to firms that exit for cause, the profitability of the median firm exiting in a merger is comparable to that of continuing firms, especially since 1980. As such, the contribution of mergers to changes in median profitability is modest (averaging only -0.01 percentage points per year since 1980). This difference in the profitability of firms exiting for cause versus in a merger reiterates the importance of distinguishing between reasons for exit.

Finally, the last years of our analysis, from 2010 to 2017, exhibit two differences with the patterns characterizing most of the post-1980 period. First, continuing firms' contribution becomes neutral, averaging only 0.01 percentage points since 2010. Second, while exit for cause continues driving up median profitability, the magnitude of this effect falls 0.21 percentage points between

[25] Doidge et al. (2017), whose analysis extends through 2012, find a substantive increase in exit rates after a 1997 peak in the number of listed firms that is driven by merger activity. Our calculations differ from theirs only in time frame: While we obtain the same pattern when excluding 2013-2017, exit rates decline between 2012 and 2017.

2000-2009 and 2010-2017. This decline primarily reflects a falling rate of exit for cause: As shown in Table 3, firms' propensity to exit for cause falls to less than half its 2000-2009 average since 2010 (from 3.5% to 1.5%), during which time the profitability differential between continuing firms and those exiting for cause is stable. These two changes offset one another, such that median profit rate remains stable, averaging 7.2% from 2000-2009 and 7.5% from 2010-2017. These changes in the contributions of churning and within-firm changes raise the question of if these years mark a circumstantial or lasting change in how median profitability is regulated.

5.2 Profitability at the 90th percentile

Exit for cause, also, explains stability at the top of the total profitability distribution. Table 4, which turns to the 90th percentile, reiterates the patterns at the median, wherein falling profitability within continuing firms is offset by positive contributions of firms exiting for cause between 1980 and 2009. Between these years, continuing firms reduce profitability at the 90th percentile by an average of 0.2 percentage points per year, while firms exiting for cause increase it by an annual average of 0.12 percentage points. The bottom panel of Table 2 also shows that, like at the median, the most profitable firms exiting for cause are not only less profitable than the most profitable continuing firms, but that the profitability gap between them also rises over time. Specifically, continuing firms are an average of 7.7 percentage points more profitable than exiting firms during the 1980s and 1990s, and this differential rises to 10.1 percentage points in the first decade of the 2000s. Accordingly, the contribution of exit for cause to the 90th percentile of the profitability distribution rises from 0.08 to 0.15 between these periods. In turn, the contributions of both continuing firms and those exiting for cause is nearly neutral after 2009.

The main difference in the decomposition results of the median and the 90th percentile lies in entering firms' neutral contribution to profitability at the 90th percentile, which averages only 0.01 percentage points per year since 1980. The almost-zero contribution of entering firms reflects that – unlike at the median, where entering firms are less profitable than continuing firms – entering firms at the top of the distribution are approximately as profitable as their continuing counterparts, as shown in the bottom panel of Table 2. Finally, like at the median, Table 4 shows that firms exiting

Table 4: Decomposing average annual changes in median total profitability

	90th percentile								
	Annual	Within	Composition	Entering Firms	Exiting Firms				
	Change			Total	Total	For Cause	Mergers	Voluntary	Resid.
1971-1979	0.41	0.19	0.21	0.22	-0.00	0.02	-0.04	-0.00	0.01
1980-1989	-0.08	-0.24	0.15	0.07	0.08	0.08	-0.00	0.00	0.00
1990-1999	-0.02	-0.17	0.15	0.02	0.13	0.12	-0.02	0.00	0.02
2000-2009	-0.01	-0.19	0.18	0.00	0.18	0.15	0.03	0.01	-0.01
2010-2017	0.01	0.03	-0.02	-0.06	0.04	0.03	0.01	0.00	-0.01

Notes: The first column measures the average annual change in the 90th percentile of total profitability. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. The reference group for the counterfactual sample is outgoing firms. See Section 2 for details describing the data and sample.

through mergers and voluntary delists make negligible contributions to the evolution of profitability at the 90th percentile.

As with the median, the years since 2010 again exhibit different patterns than the rest of the post-1980 period. First, the contribution of exit for cause falls to 0.03 percentage points since 2010, due both to rising profitability at the 90th percentile among firms exiting for cause (from 6.36% to 10.56%), and declining rates of exit for cause. Also like the median, continuing firms' contribution after 2010 becomes effectively neutral (0.03 percentage points), and declining profitability at the 90th percentile among entering firms (from 16.57% to 14.84%) reduces their previously neutral contribution to -0.06 percentage points. As a result of these three trends, the 90th percentile of the total profitability distribution is stable in this period. Again, it remains to be seen if this new pattern marks a lasting change from that of the three decades before 2010.

5.3 Operational profitability

Similar decompositions of operational profitability further reconcile the differences in the total and operational profitability distributions described in Section 3.[26] These decompositions, first, confirm the two main patterns underlying the evolution of total profitability: for most of the post-1980 period, falling profitability within continuing firms reduces both the median and the 90th percentile of operational profitability, while for cause exits by less profitable firms offset this trend.

The key difference with respect to the decompositions above lies in new entry, which is responsi-

[26] We show the decomposition results and the quantiles of operational profitability in appendix Tables A4 and A5.

ble for the rapid increase in the 90th percentile of operational profitability that has generated rising dispersion. This effect is especially important during the 1990s, during which time profitability at the 90th percentile rises most quickly and entry rates are high, and subsequently declines as entry rates fall. The key role of new entry in increasing dispersion in operational profitability ties closely to the fact that the most profitable firms have come to constitute different groups when ranked by total versus operational profits, as discussed in Section 3. In fact, the overlap between the most profitable *entering* firms by total versus operational profitability, similarly, declines after 1980 – and more dramatically than in the full sample.[27] Entering firms at the 90th percentile of the operational profitability distribution, also, hold larger shares of financial and intangible assets during the 1990s than both continuing and exiting firms.[28] Thus, while many entering firms do not have high *total* profit rates relative to the most profitable continuing firms, they appear significantly more profitable when income flows are evaluated relative to tangible capital, rather than total assets.

6 Conclusions

The results above establish new firm-level empirical evidence that churning among the group of firms comprising the nonfinancial corporate sector stabilizes relative profitability at the median and the top of the profitability distribution in the post-1980 U.S. economy. Most importantly, the decomposition results highlight the importance of exit for cause — and, accordingly, the process through which between-firm competition pushes out unprofitable firms — for stabilizing the profit rate distribution. Thus, even in the absence of profit rate equalization, competitive forces create stability in the distribution of profits over time.

We also show that, when profits are limited to operational profits on tangible capital, there appears to be a dramatic increase in dispersion driven largely by growth in top firms' profitability. This rise in top-end operational profitability is closely tied to both the financialization of nonfinancial corporations after 1970, and to post-1990 growth in intangible asset holdings. Notably,

[27] In the 1990s, for example, 55% of firms in the top 20% of the total profitability distribution are also in the top 20% of the operational profitability distribution, but this share is only 44.6% among entering firms. After 2010, these match percentages decline to 37.8% and 29.6%.

[28] During the 1990s, the median share of financial and intangible assets in total assets among the top 20% of firms by operational profitability is 75.1%, but 82.5% for entering firms in this group.

however, the same firms that record rapidly rising profitability when profits are restricted to operational earnings on tangible capital *underperform* relative to the rest of the sector when considering returns on their total asset holdings. As such, these firms are also decreasingly likely to also be ranked as top firms by their total profit rates. Intangible and financial capital have, therefore, moderated an increase in dispersion that appears when only considering tangible capital.

The results in this paper also suggest directions for future research. First, the analysis highlights a role for further firm-level analyses of profitability. In particular, firm-level data allows analysis of distributional statistics beyond the mean, making it particularly well-suited to analyzing competitive dynamics. The capacity to distinguish tangible, financial, and intangible capital is, also, increasingly important in recent decades. Second, the results raise a series of further questions regarding firm characteristics and the evolution of corporate profitability. We show that differences in portfolio composition help explain a growing divergence between total and operational measures of the profit rate. However, a series of additional characteristics — including firm size, financial asset composition, and industry — lay outside the scope of this analysis.

Finally, the divergence we document between total and operational profitability raises questions about the roles of financial and intangible capital on firms' balance sheets. For example, insofar as financial assets reflect cash, growth in financial capital may suggest constrained opportunities for profitable fixed investment. The fact that firms with top operational profit rates also hold particularly large stocks of intangible assets, furthermore, raises the possibility that that these firms' growth strategies increasingly center on acquisitions of existing firms. Our results suggest that the intangible capital generated by acquisitions tends to yield low returns relative to tangible capital generated through internal accumulation, limiting dispersion. While our decompositions show that firms acquired in mergers do not differ in profitability from incumbent firms, the pricing of their intangible assets may subsequently depress the total profitability of acquiring firms. Thus, mergers and acquisitions, may be another important mechanism through which inter-firm competition has stabilized the profit rate distribution.

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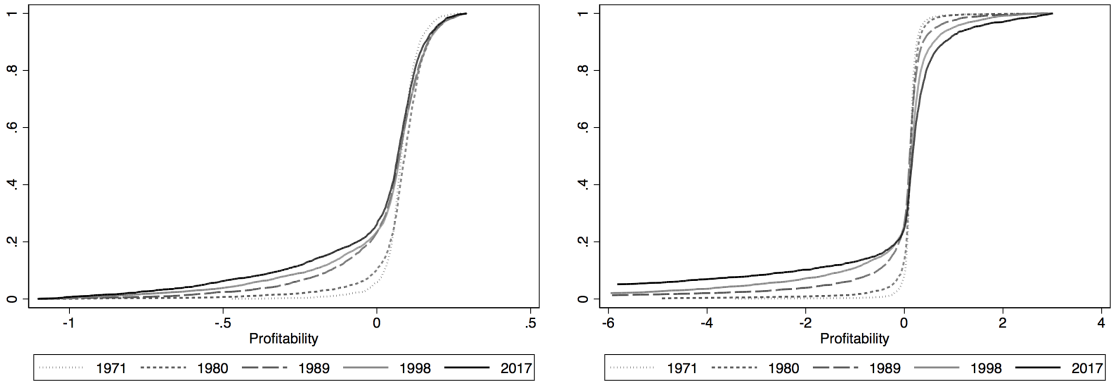
A Additional tables and figures

Table A1: Decomposition of changes in the 90-50 ratio
(Averages of year-to-year decompositions)

	Total Profitability			
	Δ 90-50 ratio	Decomposition (in p.p.)		
	(avg/year, %)	90th Percentile	Median	Interaction
1971-1979	0.12	2.51	-2.25	-0.13
1980-1989	2.44	-0.29	2.94	-0.21
1990-1999	0.46	-0.09	0.61	-0.06
2000-2009	-0.51	-0.17	-0.07	-0.27
2010-2017	0.60	0.00	0.93	-0.33
	Operational Profitability			
	Δ 90-50 ratio	Decomposition (in p.p.)		
	(avg/year, %)	90th Percentile	Median	Interaction
1971-1979	0.67	2.83	-1.90	-0.26
1980-1989	5.00	2.44	2.82	-0.25
1990-1999	3.25	5.21	-1.72	-0.24
2000-2009	1.74	4.70	-2.21	-0.74
2010-2017	-1.30	-1.71	0.56	-0.14

Notes: The table shows annual decompositions averaged over 10-year intervals of the change in the 90-50 ratio between two years into the rate of change in the 90th percentile, the rate of change in the inverse of the median, and the cross-product of the first two terms.Algebraic manipulation yields the following decomposition: $\widehat{r_t} = \widehat{p_{90,t}} + \widehat{p_{50,t}^{-1}} + \widehat{p_{90,t}} \times \widehat{p_{50,t}^{-1}}$. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. Operational profitability is operating income before depreciation minus taxes and interest payments, relative to fixed capital and inventories. Both profit rates are trimmed at the 1st and 99th percentile, and are expressed in percentages. See Section 2 for details describing the data and sample.

Figure A1: Cumulative distribution functions



(a) Total profitability

(b) Operational profitability

Notes: Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. Operational profitability is operating income minus taxes and interest payments, relative to fixed capital and inventories. Both profit rates are trimmed at the 1st and 99th percentile. See Section 2 for details describing the data and sample.

Table A2: Mean shares of Financial and Intangible Assets in Total Assets

	Financial and Intangible Assets		Financial Assets		Intangible Assets	
	Top 20% by Operational Profitability	Top 20% by Total Profitability	Top 20% by Operational Profitability	Top 20% by Total Profitability	Top 20% by Operational Profitability	Top 20% by Total Profitability
1971-1979	51.8	40.4	47.2	37.9	4.7	2.5
1980-1989	58.8	45.9	54.7	43.5	4.1	2.4
1990-1999	72.8	53.7	62.2	48.2	10.6	5.5
2000-2009	81.5	57.0	56.3	44.1	25.2	12.8
2010-2017	85.1	59.6	50.5	41.4	34.6	18.1

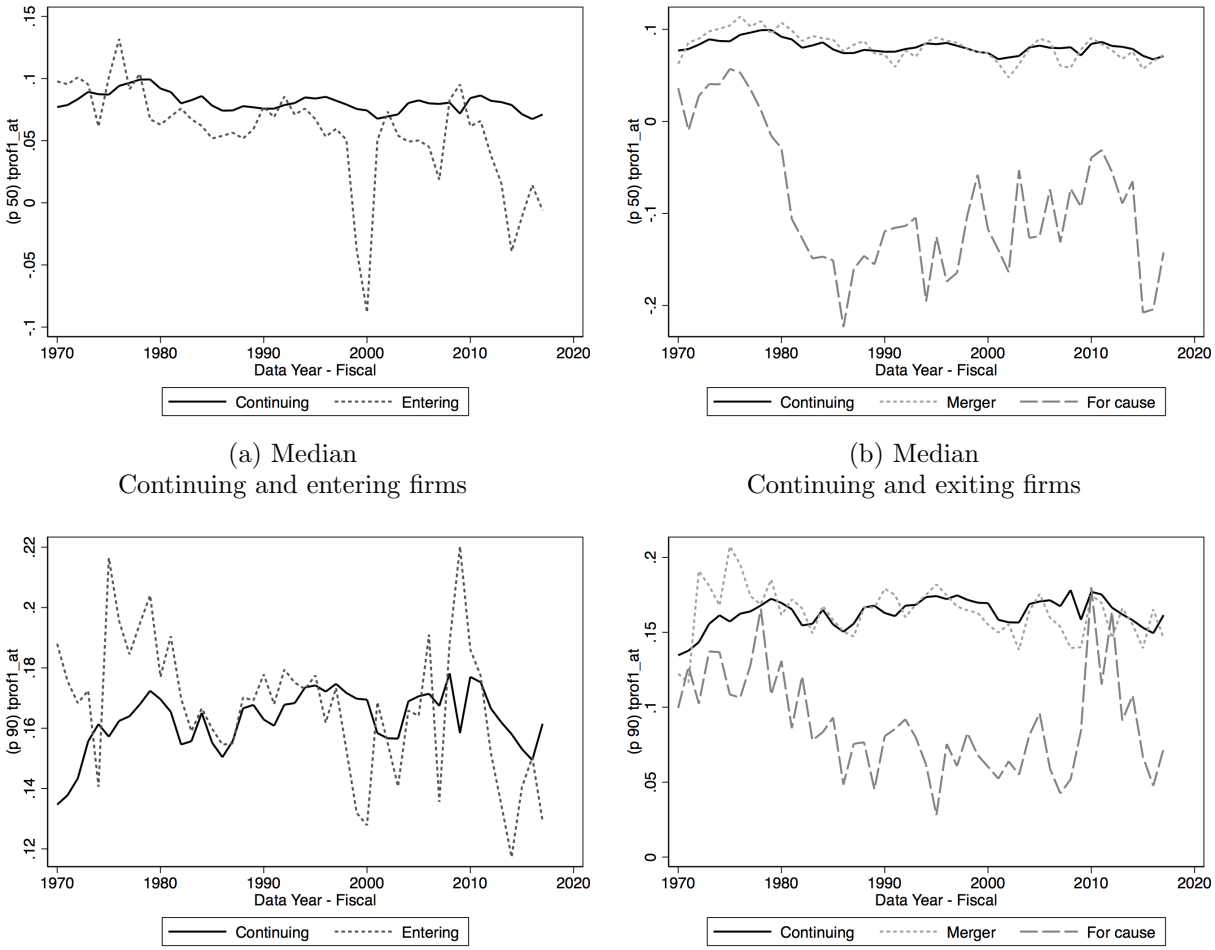
Notes: The table shows the % shares of financial and intangible assets, by decade, for firms in the top 20% of profits when ranked by operational profitability and when ranked by total profitability. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. Operational profitability is operating income minus taxes and interest payments, relative to fixed capital and inventories. Financial assets are the sum of cash and short-term investments (*che*), investments and advances (*ivaeq* and *ivao*), receivables (*rect*), current assets (*aco*) and other assets (*ao*). See Section 2 for details describing the data and sample.

Table A3: Decompositions of total profitability with incoming firms as reference

				Median					
	Annual	Within	Composition	Entering Firms	Exiting Firms				
	Change			Total	Total	For Cause	Mergers	Voluntary	Resid.
1971-1979	0.20	0.15	0.05	0.05	0.00	0.03	-0.02	0.00	-0.00
1980-1989	-0.26	-0.24	-0.02	-0.16	0.14	0.19	-0.05	0.01	-0.01
1990-1999	-0.07	-0.17	0.10	-0.15	0.26	0.28	-0.00	0.00	-0.03
2000-2009	0.02	-0.17	0.19	-0.11	0.30	0.30	0.01	0.02	-0.03
2010-2017	-0.07	0.03	-0.09	-0.18	0.09	0.09	0.01	0.01	-0.02
				90th percentile					
	Annual	Within	Composition	Entering Firms	Exiting Firms				
	Change			Total	Total	For Cause	Mergers	Voluntary	Resid.
1971-1979	0.41	0.17	0.24	0.26	-0.02	0.02	-0.05	-0.00	0.00
1980-1989	-0.08	-0.22	0.13	0.04	0.10	0.09	0.00	0.00	0.01
1990-1999	-0.02	-0.15	0.13	0.00	0.13	0.13	-0.01	0.00	0.01
2000-2009	-0.01	-0.21	0.20	-0.01	0.21	0.15	0.04	0.01	0.00
2010-2017	0.01	0.02	-0.01	-0.07	0.06	0.02	0.02	0.00	0.00

Notes: The first column measures the average annual change in the median and 90th percentiles of total profitability. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. The reference group for the counterfactual sample is incoming firms. See Section 2 for details describing the data and sample.

Figure A2: Comparison of total profitability between continuing, entering and exiting firms
At the median and 90th percentile



(a) Median
Continuing and entering firms

(b) Median
Continuing and exiting firms

(c) 90th percentile
Continuing and entering firms

(d) 90th percentile
Continuing and exiting firms

Notes: These figures compares the annual level of the median and 90th percentile of total profitability among continuing firms to that of entering and exiting firms. Total profitability is the sum of operating and nonoperating income, less income taxes and interest payments, relative to total assets. For comparability with Table 2, we exclude voluntary delists. See Section 2 for details describing the data and sample.

Table A4: Decompositions of operational profitability with outgoing firms as reference

	Annual Change	Within	Composition	Entering Firms Total	Exiting Firms Total	For Cause	Mergers	Voluntary	Resid.
Median									
1971-1979	0.31	0.23	0.08	0.06	0.02	0.06	-0.04	0.00	0.00
1980-1989	-0.33	-0.42	0.09	-0.16	0.25	0.40	-0.13	0.01	-0.03
1990-1999	0.25	-0.24	0.49	-0.10	0.60	0.71	-0.10	0.01	-0.03
2000-2009	0.40	-0.18	0.58	-0.19	0.77	0.90	-0.05	0.07	-0.15
2010-2017	-0.01	0.12	-0.13	-0.34	0.20	0.38	-0.15	0.02	-0.04
90th percentile									
	Annual Change	Within	Composition	Entering Firms Total	Exiting Firms Total	For Cause	Mergers	Voluntary	Resid.
1971-1979	0.78	0.06	0.73	0.73	-0.00	0.06	-0.07	-0.00	0.01
1980-1989	0.81	-0.52	1.32	0.96	0.37	0.36	-0.03	0.01	0.03
1990-1999	2.68	-0.66	3.34	2.82	0.52	1.14	-0.58	0.01	-0.05
2000-2009	3.14	1.64	1.50	0.36	1.14	1.51	-0.45	0.15	-0.07
2010-2017	-1.66	0.05	-1.70	-0.11	-1.60	0.70	-1.97	0.05	-0.37

Notes: The first column measures the average annual change in the median and 90th percentiles of operational profitability. Operational profitability is operating income before depreciation minus taxes and interest payments, relative to fixed capital and inventories. The reference group for the counterfactual sample is outgoing firms. See Section 2 for details describing the data and sample.

Table A5: Quantiles of operational profitability, by group (period averages).

	Entering	Continuing	Exiting For Cause	Exiting Merger
Median				
1971-1979	14.41	13.33	2.22	14.88
1980-1989	8.66	11.37	-35.86	12.98
1990-1999	7.77	14.12	-35.02	15.60
2000-2009	6.20	16.91	-50.29	16.80
2010-2017	10.52	19.09	-37.99	21.07
90th Percentile				
	Entering	Continuing	Exiting For Cause	Exiting Merger
1971-1979	37.53	27.94	19.89	33.09
1980-1989	49.44	31.31	12.17	32.54
1990-1999	82.52	51.39	12.65	69.23
2000-2009	89.11	75.30	17.29	89.74
2010-2017	83.34	87.96	31.24	105.81

Notes: This table shows the average annual level of the median and the 90th percentile of operational profitability across entering, exiting and continuing firms. Operational profitability is operating income before depreciation minus taxes and interest payments, relative to fixed capital and inventories. Excludes voluntary delists. See Section 2 for details describing the data and sample.