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ABSTRACT

We decompose the difference between a firm’s market value and book value into two components: reproducible intangible assets that can be created by competing firms through SG&A/R&D expenditures, and the residual denoted as franchise value which includes the value of transient-rents from capacity-adjustment-costs (Tobin’s Q), longer-lasting franchise rents, and potential market-price intrinsic-value differences. We estimate the parameters of the model for building reproducible intangible capital using 176,005 firm-years of data for nonfinancial firms that are in COMPUSTAT and CRSP databases during the period 1976-2020. The estimated depreciation rates for intangible assets created by capitalizing R&D and SG&A expenditures respectively, and the portion of SG&A that contributes to organizational capital, while consistent with the parameters used in the empirical literature, vary significantly across industries. Ceteris paribus, firms with higher franchise values face fewer product market threats and have higher markups, whereas firms with higher reproducible intangible assets face higher threats. Higher franchise value reduces the sensitivity of a firm’s investments with respect to total Tobin Q. Firms facing fewer product market threats, a measure of competitive advantage, experienced a larger increase in their franchise values due to increased globalization following China’s entry into WTO in 2002 which is consistent with theory.

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Introduction

Valuation of a firm's securities has been a central topic in finance and economics. As Hall (2001) observes, "...the market value of a firm's securities measures the value of the firm's productive assets. If the assets includes only capital goods and not a permanent monopoly franchise, the value of the securities measures the value of the capital." In the absence of a franchise generating economic rents and/or quasi-rents, the firm's capital goods will consist of both tangible assets and intangible assets which can be easily reproduced by other competing firms. While tangible assets and acquired intangible assets appear in a firm's balance sheet, intangible assets created by a firm through its own efforts do not appear on the firm's balance sheet. Such intangible assets include customer and supplier relations, as well as know-how and knowledge that can be created by any of the firm's competitors through learning by doing and investing in R&D (research and development) and SG&A (selling and general administrative) expenditures over time. In the presence of a franchise, a firm's intangible assets will also include the value of economic rents and quasi-rents obtained from the franchise.[1]

We decompose the value of a firm's intangible assets into acquired intangible assets that appear on the balance sheets of firms, intangible assets that competing firms can also create through R&D and SG&A expenditures (e.g., reproducible intangible assets for convenience), and the residual which we denote as "franchise value". The franchise value we measure includes the option value of assets in place due to adjustment costs and lead times associated with changing productive capacity (commonly referred to as the value of Q) in addition to franchise economic rents,[2] and potential mispricing. It can be viewed as a bound on the value of economic rents

[1] See Crouzet, Eberly, Eisfeldt, and Papanikolaou (2022) for an excellent discussion of the properties of intangible capital and related macroeconomics literature.

[2] In classical models such as Hayashi (1982) the entire difference between the market value of assets and reproduction value of assets is due to capital adjustment costs. Hall, Cummins, and Lamont (2000) assume that there are no longer-lasting economic rents and decompose the difference between the market value and the replacement value of tangible capital into e-capital, an intangible asset created by being in business, the value of Q associated with physical capital, and the value of Q associated with e-capital. Crouzet and Eberly (2021) modify the Tobin's Q framework to incorporate both intangible capital and economic rents.

enjoyed by the firm.[3] We examine how franchise value varies across firms within and across industries over time, and the effect of globalization on franchise value.

Franchises may arise ex post even in a competitive environment with no ex-ante entry barriers. For example, consider the case in which all firms in an industry spend on R&D to develop a new drug, and the firm that succeeds first is granted a patent.[4] There are no restrictions on which firms can try to develop the new drug. From an ex-ante perspective, the net present value of the project for developing the new drug can be close to zero. However, ex post, the firm that succeeded can have a large positive franchise value. R&D spending will generally increase a firm's intangible capital (i.e., reproducible knowledge) that the firm may use to pursue future business endeavors. The ex-post value of the firm that succeeded will therefore consist of the value of productive assets that includes the intangible knowledge capital plus a franchise value that equals the present value of the economic rents generated by the patent, which can be much larger than what was expected. The value of the other firms will be the value of the productive assets that includes the knowledge capital plus a franchise value that can be negative.[5]

Franchise value can also be created through SG&A expenditures that increase customer loyalty. For example, The H. J. Heinz Company (Heinz) ranks first in the market for ketchup in the U.S. with a market share of more than 50%.[6] The competitive advantage of Heinz allows the company to price its products higher and earn economic rents.[7] Heinz was acquired by Berkshire Hathaway and 3G Capital for $23 billion in 2013, a value that cannot be replicated by spending what Heinz did over time. The value, netting out the value of tangible productive assets and reproducible intangible assets, is the value of the franchise that Heinz created. Another example

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[3] Our approach is consistent with Lindenberg and Ross (1981) who use the difference between the market value of a firm and the replacement value of its assets as a bound on the value of a firm's franchise economic rents.

[4] The example simplifies the drug development process for the ease of exposition. In practice, a firm must be granted the key product patent first, and then get approval from the FDA for the new drug, a process that is lengthy and time-consuming, before experiencing any economic benefits. See Chemmanur, Li, Tseng, and Wang (2022) for more details.

[5] To see why, suppose there are 100 firms and one and only one firm will get the patent with a franchise value 10 and other firms will each lose -0.101, i.e., have a negative franchise value. The average franchise value across the 100 firms will be 0, and so there are no economic rents ex ante, but the winning firm will earn huge economic rents.

[6] Source: https://www.cnbc.com/id/100464841.

[7] Walmart 9/7/2022 prices: $3.13 for Heinz Simply Ketchup 20 oz bottle, and $1.29 for Hunt's Classic Ketchup.

would be WhatsApp, which was valued at \$1.5 billion based on its final funding round before it was acquired by Facebook for over \$19 billion.[8] The difference between \$19 billion and \$1.5 billion cannot be explained by capitalizing WhatsApp's R&D, SG&A, and other expenditures, and thereby reflects Facebook's valuation of the franchise that WhatsApp succeeded in creating.

In this paper, we develop a method for estimating the franchise value of firms based on information available from its financial statements. For that purpose, we assume that the book value of a firm's assets reflects the replacement value of those assets.[9] We then estimate the value of a firm's intangible assets that do not appear on its balance sheet by capitalizing its R&D expenditures (investment in knowledge capital) and a fraction of its SG&A expenditures (investment in organization capital) and depreciating them.[10] We refer to the knowledge and organization capital that we create in this manner as reproducible intangible assets, since they do not appear in a firm's balance sheet. The franchise value of a firm, by definition, is the difference between its market value and the sum of its book value of its assets and its reproducible (hidden) intangible assets. The value of these reproducible intangible assets depends on the depreciation rate for knowledge capital (δ_{KC}), the portion (λ) of SG&A spending that creates organization capital, and its depreciation rate (δ_{OC}). We choose values for these parameters that minimize the sum of squared franchise value of the firms in our sample. This criterion for estimating the values of unknown model parameters is based on the view that franchises are difficult to create and maintain without competition eroding their value over time.

Our estimated depreciation rate of knowledge capital, δ_{KC}, for healthcare, high-tech, and all

8 Source: https://techcrunch.com/2014/02/21/whatsapp/

9 The book value of assets includes the value of intangible assets shown in the balance sheet of a firm (i.e., identifiable intangible assets and goodwill associated with mergers and acquisitions and asset purchases). Since identifiable intangible assets and goodwill include both reproducible intangible assets and franchise assets, it is difficult to separate them based on the information in firms' financial statements. However, for our purpose, such separation is not necessary. Once there is a market for the firm's intangible assets, it becomes a reproducible intangible asset, and there are no economic rents to be earned by a firm that buys those intangible assets, absent synergies that create economic rents. For convenience we refer tangible and book intangible assets as the book value of assets.

10 Griliches (1979), Mansfield (1980), and Nelson (1982) first propose the term "knowledge capital" in modeling the long-run productivity by incorporating knowledge capital. The knowledge capital is augmented by present R&D spending and the stock of knowledge that may depreciate. Lev (2000) and Hall (2001) first propose the term "organization capital."

firms of 17%, 20%, and 19% respectively are consistent with the 15% to 20% rates assumed in the literature for building knowledge capital by capitalizing and depreciating R&D expenses. Further, our estimated depreciation rates for organization capital, δ_{OC}, for healthcare, high-tech, and all firms of 13%, 25%, and 17% respectively are consistent with the 15% to 20% rates assumed in the literature on capitalizing and depreciating SG&A expenditures. Finally, our estimate of λ, the investment portion of SG&A expense that contributes to creating organization capital of 37% is also consistent with the values assumed in the literature. When we rank firms based on their estimated franchise value, we find that Coca-Cola, 3M, and IBM were among the top five firms during the 80s; and Apple, Amazon, and Netflix were among the top five firms during the most recent decade.

We find that rankings based on franchise value are persistent: 78% (75%) of firms that were in the top (bottom) franchise value quartile in a year within an industry remained in the same quartile in the following year. In addition, the persistence of franchise value is asymmetric for top versus bottom quartiles. While 48% of firms maintain their position in the top quartile during the next five years, only 34% of firms stay in the bottom quartile during the following five years,[11] indicating more competition among firms having lower franchise values.

In the aggregate, the contribution of franchise value to market value increases over time from nearly zero percent in 1976 to 45% in 2020, and the contribution of reproducible intangible assets to market value remains 10% during the same period. This increase in the aggregate franchise value ratio is driven mainly by larger firms, consistent with Autor, Dorn, Katz, Patterson, and van Reenen (2020).

As we noted earlier, our measure of franchise value has several components. Interestingly, in the aggregate, the share of franchise value as a percentage of market value and the share of intangible assets as a percentage of market value that we compute for various industries are not

[11] The effect is more pronounced for firms in the healthcare industry, for which arguably franchise value plays a more important role and results in more asymmetry in the persistence of firms in the top and bottom franchise value quartiles. For the top and bottom franchise value quartile of firms, the difference between the percentage of firms that stay in the same quartile after five years is 19%.

much different from combined share of the value of transient rents due to adjustment costs and the value of economic rents to market value, and the share of intangible assets to market value, in Crouzet and Eberly (2021) even though we use different methods.

Since franchise value comes from having a competitive advantage, we should expect firms with higher franchise values to not only have higher markups (De Loecker, Eeckhout, and Unger, 2020), but also face less product market threats (Hoberg, Phillips, and Prabhala, 2014). While their employees may earn higher wages relative to otherwise similar firms with smaller franchise values, the employee share of their revenues is likely to be smaller (Autor et al., 2020; Barkai, 2020). Our findings are consistent with this line of reasoning.

We also examine the relationship between corporate investment and Tobin's Q, which is "arguably the most common regressor in corporate finance" (Erickson and Whited, 2012). We find that including intangible capital provides a stronger investment-Q relationship. Both the magnitude of the sensitivity of investment to Q and the strength of the relationship between investment and Q (as measured by the regression R-square) increase when we replace standard Tobin's Q (market value scaled by tangible assets) by total Tobin's Q (market value scaled by tangible plus intangible assets) and/or when we replace tangible investment with total investment, which is consistent with Peters and Taylor (2017). Furthermore, we find that high franchise value firms' total investment is less sensitive to Total Q. This is what we would expect, since attractive investment opportunities within a franchise are less likely. Our paper thus contributes to the rich literature investigating why Tobin's Q does not explain investment well in the data.[12] Our findings identify franchise value as another variable that attenuates the sensitivity of investment to Tobin's Q, in addition to financial frictions (Fazzari, Hubbard and Petersen, 1988), measurement errors (Erickson and Whited, 2000; Gomes, 2001; Whited, 2001; Çolak and Whited, 2007; Erickson and Whited, 2012), and diversification discounts (Shin and Stulz, 1998;

[12] The literature includes Fazzari, Hubbard and Petersen (1988), Gilchrist and Himmelberg (1995), Kaplan and Zingales (1997), Erickson and Whited (2000), Gomes (2001), Whited (2001), Cooper and Ejarque (2003), Moyen (2004), Hennessy, Levy, Whited (2007), Çolak and Whited (2007), Philippon (2009), Bakke and Whited (2010), Abel and Eberly (2011), Erickson and Whited (2012).

Scharfstein, 1998; Shin and Park, 1999) that have been identified in the literature.

The literature on international trade suggests that when new markets open, more productive firms with competitive advantages would benefit more (Bernard and Jensen, 1999). We use the United States Congress's granting Permanent Normal Trade Relations (PNTR) status to China in October 2000 and the entry of China into the WTO in December 2001, which opened the Chinese market to U.S. firms and the U.S. market to Chinese firms, as an exogenous shock. Granting China PNTR status led to U.S. firms facing increased competition within the U.S. market, and at the same time reduced costs and uncertainties faced by U.S. firms in accessing Chinese markets. These reduced uncertainties faced by U.S. firms operating in China led to changes in their business strategies and operations with respect to China (Pierce and Schott, 2016). Firms with higher brand value (stronger competitive advantages) benefited not only from improved access to the growing Chinese market, but also by outsourcing manufacturing to lower cost China. Consistent with theory, we find that the franchise value of U.S. firms that were affected more experienced a higher increase in their franchise values after 2000. As we would expect, this increase in franchise value is concentrated in firms in the high-competitive advantage group before the shock.

The rest of the paper is organized as follows. In Section 2, we describe our econometric model for estimating firms' franchise value. In Section 3, we describe the data and discuss our estimated franchise values. In Section 4, we show that, consistent with our hypothesis, franchise value and market power are positively related in the cross section of firms, and investments of firms with higher franchise values are less sensitive to Tobin's Q. In Section 5, we use China's entry into WTO as a natural experiment to examine the hypothesis that globalization benefits firms with higher franchise value more. We conclude our paper with Section 6.

2. Econometric Model of the Franchise Value

In this section, we describe the franchise value model, discuss how we estimate the model parameters, and construct estimates of the reproducible intangible assets as well as franchise value of firms.

2.1. Franchise Value Model

We decompose the market value of a firm's assets into Tangible Assets, Book Intangible Assets, Reproducible Intangible Assets, and Franchise Value as follows:

$$\begin{aligned}\text{Market Value of Assets} &= \text{Tangible Assets} + \text{Book Intangible Assets} + \text{Reproducible Intangible Assets} \\ &+ \text{Franchise Value}\end{aligned} \tag{1}$$

Rearranging the left and right side of Equation (1) gives:

$$\begin{aligned}\text{Franchise Value} &= \text{Market Value of Assets} - \text{Tangible Assets} - \text{Book Intangible Assets} \\ &- \text{Reproducible Intangible Assets}\end{aligned} \tag{2}$$

The challenge to measuring the reproducible intangible assets of a firm arises from the fact that they do not appear on the balance sheet. We write the reproducible intangible assets as the sum of Knowledge Capital and Organization Capital,[13] giving the following expression for Franchise Value:

$$\begin{aligned}\text{Franchise Value} &= \text{Market Value of Assets} - \text{Tangible Assets} - \text{Book Intangible Assets} \\ &- (\text{Knowledge Capital} + \text{Organization Capital})\end{aligned}$$

[13] Reproducible intangible assets is the sum of knowledge capital and organization capital, following the literature. See Corrado, Hulten, and Sichel (2009), Corrado and Hulten (2010), Peters and Taylor (2017), and Falato, Kadyrzhanova, Sim, and Steri (2022). The literature has largely acknowledged the importance of knowledge capital building intangible assets (e.g., Lev and Sougiannis (1996)), and another stream of the literature particularly focuses on measuring organization capital (e.g., Lev and Radhakrishnan (2005), Eisfeldt and Papanikolaou (2013, 2014)).

(3)

We assume that Knowledge Capital (KC) is created through research and development expenditures (R&D) and Organization Capital (OC) is created through selling, general, and administrative expenditures (SG&A). Further, we assume that all R&D spending contributes to creating KC, whereas only the portion that reflects SG&A spending contributes to creating OC.

Following the literature, we use the perpetual inventory method to capitalize and depreciate R&D and SG&A expenses to construct KC and OC. We assume that KC evolves over time according to this equation:

$$KC_{i,j,t} = KC_{i,j,t-1}\left(1-\delta_{KC,j}\right) + (1-\tau_{i,j,t})R\&D_{i,j,t} \tag{4}$$

where $KC_{i,j,t}$ is the stock of knowledge capital of firm *i* in industry *j* at the end of year *t*, $\delta_{KC,j}$ refers to an industry *j*'s depreciation rate for knowledge capital that is constant over time, and $R\&D_{i,j,t}$ is firm *i*'s R&D expenditure during year *t*, and $\tau_{i,j,t}$ is the effective tax rate of firm *i* in industry *j* in year *t*. The effective tax rate is computed as the ratio of the total provision for income taxes by firm *i* in year *t* divided by the pre-tax income in year *t*. Therefore, $(1-\tau_{i,j,t})R\&D_{i,j,t}$ is the after-tax cost of R&D.[14] This after-tax cost of R&D expenses to shareholders is on par with expenditures involved in creating physical capital through capital expenditures (CAPEX) that are not generally deductible as an expense for tax purposes.

Similarly, we assume that OC evolves over time according to the following equation:

$$OC_{i,j,t} = OC_{i,j,t-1}\left(1-\delta_{OC,j}\right) + \lambda_j \times (1-\tau_{i,j,t})\, SG\&A_{i,j,t} \tag{5}$$

in which $OC_{i,j,t}$ is firm *i*'s stock of organization capital at the end of year *t*, and $\delta_{OC,j}$ is the depreciation rate for organization capital. $SG\&A_{i,j,t}$ is firm *i*'s SG&A expenditure during the year *t*, and λ_j is the portion of SG&A expenses that contribute to organization capital. Both $\delta_{OC,j}$ and λ_j are time-invariant but industry-specific measures.

[14] The average effective tax rate during our sample period (1976-2020) for the full sample is 26%. Healthcare and high-tech industries have lower effective tax rates of 14% and 22% respectively.

If the initial stock of KC and OC are known, we can construct KC and OC at time t using equations (4) and (5) as follows:

$$KC_{i,j,t} = KC_{i,j,0} + \sum_{s=0}^{t} \left(1 - \delta_{KC,j}\right)^{s} (1 - \tau_{i,j,t-s}) R\&D_{i,j,t-s}, \text{ and}$$
$$OC_{i,j,t} = OC_{i,j,0} + \sum_{s=0}^{t} \left(1 - \delta_{OC,j}\right)^{s} \lambda_j \times (1 - \tau_{i,j,t-s}) SG\&A_{i,j,t-s} \tag{6}$$

Since we do not know the initial stock of KC and OC, we assume that a firm's R&D and SG&A expenditures had a constant perpetual growth rate ever since the firm's initial point in time, and that these growth rates correspond to the average growth rates for R&D and SG&A in the firm's industry in our sample. With these assumptions, a firm i's initial stock of KC and OC are given by:

$$KC_{i,j,0} = (1 - \tau_{i,j,0}) R\&D_{i,j,0} / \left(\delta_{KC,j} + g_{\text{R\&D-growth},j}\right), \text{ and}$$
$$OC_{i,j,0} = \lambda_j \times (1 - \tau_{i,j,0}) SG\&A_{i,j,0} / \left(\delta_{OC,j} + g_{\text{SG\&A-growth},j}\right) \tag{7}$$

in which $g_{\text{R\&D-growth},j}$ and $g_{\text{SG\&A-growth},j}$ are the average annual growth rates of R&D and SG&A expenditures, respectively, in industry j in our sample.[15]

By substituting the expressions for KC and OC into equation (3), we obtain the following expression for franchise value, as a function of the model parameters:

$$\begin{aligned} FV_{i,j,t} &= MV_{i,j,t} - TA_{i,j,t} - BIA_{i,j,t} \\ &\quad - \left((1 - \tau_{i,j,0}) R\&D_{i,j,0} / \left(\delta_{KC,j} + g_{R\&D\text{-}growth,j}\right) + \sum_{s=0}^{t} \left(1 - \delta_{KC,j}\right)^{s} (1 - \tau_{i,j,t-s}) R\&D_{i,j,t-s} \right) \\ &\quad - \left(\lambda_j \times (1 - \tau_{i,j,0}) SG\&A_{i,j,0} / \left(\delta_{OC,j} + g_{SG\&A\text{-}growth,j}\right) + \sum_{s=0}^{t} \left(1 - \delta_{OC,j}\right)^{s} \lambda_j \times (1 - \tau_{i,j,t-s}) SG\&A_{i,j,t-s} \right) \end{aligned} \tag{8}$$

in which $FV_{i,j,t}$ denotes firm i's franchise value in industry j at the end of year t, and $MV_{i,j,t}$, $TA_{i,j,t}$, and $BIA_{i,j,t}$ denote its market value of assets, tangible assets, and book intangible assets

[15] Specifically, we set the initial knowledge capital stock equal to the first-year R&D expenditures divided by the sum of the depreciation rate $\delta_{R\&D}$ and growth rate.

respectively.[16]

2.2. Estimation

We write the *measured franchise value*, $FV_{i,j,t}$, as the sum of the *unknown true franchise value* (denoted as $fv_{i,j,t}$) and an error term (denoted as $\varepsilon_{i,j,t}$). The error term arises from the market price deviating from the hypothetical true value for reasons such as the behavioral biases of investors or short-lived price pressures due to illiquidity, among others. We therefore replace $FV_{i,j,t}$ with $fv_{i,j,t}$ in equation (8) and develop our estimating equation:

$$\begin{aligned} MV_{i,j,t} &= TA_{i,j,t} + BIA_{i,j,t} \\ &+ \left((1-\tau_{i,j,0}) R\&D_{i,j,0} / \left(\delta_{KC,j} + g_{R\&D\text{-}growth,j}\right) + \sum_{s=0}^{t} \left(1-\delta_{KC,j}\right)^{s} (1-\tau_{i,j,t-s}) R\&D_{i,j,t-s} \right) \\ &+ \left(\lambda_j \times (1-\tau_{i,j,0}) SG\&A_{i,j,0} / \left(\delta_{OC,j} + g_{SG\&A\text{-}growth,j}\right) + \sum_{s=0}^{t} \left(1-\delta_{OC,j}\right)^{s} \lambda_j \times (1-\tau_{i,j,t-s}) SG\&A_{i,j,t-s} \right) \\ &+ fv_{i,j,t} + \varepsilon_{i,j,t} \end{aligned} \tag{9}$$

We assume that the average of the squared franchise value, which is averaged across time and across firms, will attain the global minimum at the true parameter values as the number of firms and time periods becomes very large.

In Equation (9), $MV_{i,j,t}$, $TA_{i,j,t}$, $BIA_{i,j,t}$, $R\&D_{i,j,t}$, and $SG\&A_{i,j,t}$ are directly observed from firms' financial statements filed with the SEC. We estimate the capitalization parameters ($\delta_{KC,j}$, $\delta_{OC,j}$, and λ_j) in (9) using non-linear least squares by minimizing the squared sum of the true franchise values and the error terms (i.e., $fv_{i,j,t} + \varepsilon_{i,j,t}$). We also pool firm-level data and estimate the parameters, which are the same for all firms within each industry j.[17]

We estimate the parameters of the model in (9) using nonlinear least squares as follows. For notational convenience, we omit the time, firm, and industry subscripts and write Equation (9) as follows:

[16] The sum of the value of tangible assets and book intangible assets is the book value of the asset. Book intangible assets are those that appear on the books (financial statements) of the firm (i.e., identifiable intangible assets and goodwill associated with mergers and acquisitions and asset purchases).

[17] By definition, $\delta_{KC,j}$, $\delta_{OC,j}$, and λ_j should be between zero and one. We use the logit transformation to constrain these parameters. We first take logit, logit(x) = ln{x/(1-x)}, and then take the inverse logit, invlogit(x) = exp(x)/{1 + exp(x)}.

$$MV = TA + BIA + KC + OC + (fv + \varepsilon) \tag{9 i}$$

We then divide both sides of equation (9 i) by "total capital" $(TA + BIA + KC + OC)$ to get:

$$\frac{MV}{(TA+BIA+KC+OC)} = 1 + \frac{(fv+\varepsilon)}{(TA+BIA++KC+OC)} \tag{9 ii}$$

We next take the natural logarithm on both sides of the equation:

$$ln\left(\frac{MV}{(TA+BIA+KC+OC)}\right) = ln\left(1 + \frac{(fv+\varepsilon)}{(TA+BIA+KC+OC)}\right) \tag{9 iii}$$

After we rewrite this equation, we have:

$$ln(MV) - ln(TA + BIA + KC + OC) = ln\left(1 + \frac{(fv+\varepsilon)}{(TA+BIA+KC+OC)}\right) \tag{9 iv}$$

Allowing for firm and year fixed effects, we estimate the parameters in the model for franchise value given in equation (9), δ_{KC}, δ_{OC}, and λ, by minimizing the sample analogue of $E\,[ln(MV) - ln(TA + BIA + KC + OC)]^2$:

$$\min_{\delta_{KC},\delta_{OC},\lambda} Average\,[ln(MV) - ln(TA + BIA + KC + OC)]^2 =$$

$$\min_{\delta_{KC},\delta_{OC},\lambda} Average\,\left[ln\left(1 + \frac{(fv+\varepsilon)}{(TA+BIA+KC+OC)}\right)\right]^2 \tag{9v}$$

Our estimation procedure chooses parameter values that make $(fv + \varepsilon)$ as close to zero as possible with respect to least squares.

Given our assumption that $E\,[ln(MV) - ln(TA + BIA + KC + OC)]^2$ is minimized at the true parameter values, this procedure gives consistent estimates of the model parameters so long as the stochastic process generating $ln\left(\frac{MV}{(TA+BIA+KC+OC)}\right)$ satisfies the regularity conditions commonly assumed in the literature, such that the sample average across time and firms of $ln\left(\frac{MV_{i,j,t}}{(TA_{i,j,t}+BIA_{i,j,t}+KC_{i,j,t}+OC_{i,j,t})}\right)$ converges to $E[ln\left(\frac{MV_{i,j,t}}{(TA_{i,j,t}+BIA_{i,j,t}+KC_{i,j,t}+OC_{i,j,t})}\right)]$ almost surely.

3. Data and Estimated Franchise Value

3.1. Data

We use financial information from Compustat-CRSP for U.S. firms and require that firms be incorporated in the U.S. and have ordinary common shares (CRSP share codes 10 and 11) that are traded on major stock exchanges (NYSE, AMEX, and NASDAQ) (CRSP exchange codes 1, 2, and 3). We exclude firms in the finance industry (SIC codes between 6000 and 6999) and firms that are categorized as public service, international affairs, or non-operating establishments (SIC codes between 9000 and 9999). Our data start in 1976 to allow firms one year to comply with the Federal Accounting Standards 2 (FAS2) mandates that required reporting R&D expenditures, and our data end in 2020.

We measure the market value of assets (MV) as the sum of the market value of equity and total liabilities.[18] The sum of tangible assets and book intangible assets is the book value of assets, reported as total assets in a firm's balance sheet. Also, we exclude firms with missing or negative total assets. In terms of knowledge capital, we use reported R&D expenditures (Compustat item: *xrd*) less in-process R&D expenses (Compustat item: *rdip*) to represent the R&D expenditure to measure knowledge capital. We remove *rdip* from *xrd* in Compustat since *rdip* is a write-off and should not be interpreted as an investment.[19] Using Compustat data to measure SG&A is not straightforward. While firms typically report SG&A and R&D separately, Compustat adds these two items together in the variable labeled "Selling, General, and Administrative Expense." Specifically, Compustat item *xsga* includes SG&A and R&D (after excluding *rdip*). We therefore subtract *xrd (*after deducting *rdip*) from *xsga* to isolate the SG&A that companies report.[20] We then replace missing R&D[21] or SG&A values with zeros.[22] In

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[18] We follow the literature and assume that a firm's book value of debts is about the same as the market value of debts.

[19] Specifically, Compustat item *xrd* includes: (1) R&D expenses reported by companies and (2) R&D acquired by companies that is deemed to not have alternative future use (data item *rdip*: In-Process R&D Expense). See Belo, Gala, Salomao, and Vitorino (2022) for details.

[20] In 4.4% firm-year observations, *xsga* is smaller than *xrd-net-rdip*. This is puzzling since Compustat records *xrd-net-rdip* as a component of *xsga*. We manually collected several annual reports and compared the reported R&D and SG&A with those data in Compustat. We found that in some cases R&D expenditure is much larger than SG&A expenditures suggesting that R&D expenditures were included in cost of goods sold. In these cases, Compustat coded R&D expenses in item *xrd*, but did not include *xrd* in *xsga*, and we do not subtract *xrd-net-rdip* from *xsga*. To the best of our knowledge, only one recent accounting study by Banker, Huang, Natarajan, and Zhao (2019) considers this issue.

[21] The U.S. Statement of Financial Accounting Standards No.2 (SFAS2) requires a firm to disclose its material R&D expenditures. Accounting Series Release 125 (1972) uses 1% of sales as the materiality threshold, which suggests that missing R&D expenditures occur in firms with zero or immaterial corporate R&D. Koh and Reeb (2015) document that 30% of articles in the Journal of Finance use R&D and code missing R&D as zero. However, another interpretation of missing R&D values is that a firm might consciously decide not to separate R&D expenses from other reported expenses (see McVay, 2006).

[22] We report the proportion of missing R&D observations in Table OA1 Online Appendix. 43% of observations in our sample are missing R&D, which is consistent with literature. For example, Koh and Reeb (2015) report that half

Appendix A, we provide a detailed description of our variables.

Our final sample consists of 176,005 firm-year observations from 16,532 unique firms. Table 1 (Panel A) reports the summary statistics of the variables for our estimation. The average market value is $2,545 million and has a median of $192 million, suggesting that some very large-sized firms exist. SG&A expenses are larger than R&D expenses across all statistics, consistent with conventional norms.

<Insert Table 1 Here>

3.2. Estimated Capitalization Parameters

We classify firms into five industries based on these Fama-French 5 industry classes: (1) Consumer, (2) Manufacturing, (3) High-tech, (4) Healthcare, and (5) Other. We estimate Equation (9) for each of the five industries separately and obtain industry-specific estimates of δ_{KC}, δ_{OC}, and λ. The model fit (Pseudo-R^2) is assessed by computing the percentage improvement in the mean squared error generated by the full model in Equation (9) relative to the model with only a firm-specific constant. We calculate the standard errors by bootstrap, re-drawing observations with replacement and with 1,000 iterations at the firm-level.[23] Since the bootstrap procedure does not take into account the endogeneity of firm characteristics and their cross-sectional and time series dependence, we also examine the stability of the estimated parameters in subsamples. Table 2 presents the estimated values of the franchise value model parameters for each industry.

<Insert Table 2 Here>

The estimated depreciation rate for knowledge capital (δ_{KC}) is 19% in the full sample and varies from 14% to 20% across industries.[24] Our estimate of the depreciation rate for

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of firms do not report R&D expenditures. The cross-industry analysis indicates that High-tech and Healthcare industries have fewer missing R&D observations.

[23] We compute the bootstrapped standard error in the following way. Let *N* denote the number of firms in our sample. We draw *N* firms at random with replacement from firms in our sample to get a bootstrap sample. We estimate the model parameters for this bootstrap sample. We then repeat the procedure 1,000 times. We use the standard deviations of the parameters in the 1000 bootstrap estimates as the bootstrap standard errors.

[24] Chan, Lakonishok, and Sougiannis (2001), Hall, Jaffe, and Trajtenberg (2005), Bloom, Schankerman, and van Reenen (2013), and Tseng (2022) all assume a depreciation rate of 15%. Alternatively, Hirshleifer, Hsu, and Li (2013, 2018) assume a depreciation rate of 20%.

organization capital (δ_{OC}) is 17% in the full sample and varies from 13% to 25% across industries. Table 3 (Panel A) provides a comparison of capitalization parameters used in the literature with our estimated parameter values. Prior studies do not estimate the depreciation rate for organization capital obtained by capitalizing and depreciating SG&A expenditures; rather, they assume a depreciation rate of 15% or 20% SG&A.[25] Our study provides some support for the parameters assumed in the literature as well as some guidance for using parameter values in future studies. The estimated fraction of SG&A investment contributing to organization capital (λ) is 37% in the full sample, which is a bit higher than the 30% value assumed in Hulten and Hao (2008).[26] More importantly, our estimates vary significantly across industries—Consumer 22%, Manufacturing 31%, High-tech 49%, Healthcare 57%, and Other 31%, and this variance highlights why it is necessary to use industry-specific capitalization parameters when constructing measures of OC.[27]

Next we split the sample into two periods: 1976-2000 and 2001-2020. Our subperiod estimates in Table OA3 in the Online appendix show that δ_{KC} is larger whereas δ_{OC} is smaller in the second subperiod; also, λ is relatively stable across the two subperiods. We use the estimates for each subperiod to re-compute KC and OC, and compare the times series of the ratio of aggregate reproducible intangible assets to the market value of assets with the corresponding time series obtained using the estimated parameters for the full sample. In this comparison, we find that the two series are close to each other (see Figures OA1, OA2, and OA3 in the Online Appendix), even though the estimated capitalization parameters are different. This suggests that while the estimated total reproducible intangible assets as a percentage of market value is stable, the decomposition of the reproducible intangible component into knowledge and organization

[25] Eisfeldt and Papanikolaou (2013) assumes a depreciation rate of 15%. Alternatively, Hulten and Hao (2008), and Eisfeldt and Papanikolaou (2014) assume a depreciation rate of 20%.
[26] See also Eisfeldt and Papanikolaou (2014); Zhang (2014).
[27] We also estimate the depreciation rate of R&D and SG&A by setting $\delta_{KC} = \delta_{OC}$ in Equation (9), and then re-estimate the parameters for each of the five industries. Our results are included in Table OA2 (Online Appendix). The estimated depreciation rates fall within the range of 15%−26%, and the estimated values of λ fall within the range 24%−61% for the different industries. The Healthcare industry has a relatively low depreciation rate (15%) and a higher portion of SG&A (61%), which helps a firm build organization capital.

capital is difficult to estimate precisely.

<Insert Table 3 Here>

Li and Hall (2020) estimate the R&D depreciation rate based on the Bureau of Economic Analysis-National Science Foundation (BEA-NSF) dataset. Li and Hall (2020) estimate the depreciation rate for R&D capital based on a structural model in which firms optimally choose the level of R&D to maximize the net present value of profits and use the BEA-NSF dataset, which gives R&D expenditure at the industry-level, aggregated from firm-level R&D expenditure among firms that have at least 5 employees. In contrast, we do not assume a specific production function. We use Compustat data, and our sample contains publicly traded firms only. We compare our estimates with the estimates in Li and Hall (2020) for four R&D intensive industries (Pharmaceuticals, Semiconductor, Computers and Peripheral Equipment, and Software) in Table 3 (Panel B).

Even though we use a different approach, our estimated depreciation rates for capital built using R&D expenditure are close to those reported in Li and Hall (2020). For example, both estimates are the same (11%) for pharmaceuticals. An advantage of our approach is that we are able to simultaneously estimate the parameters involved in transforming SG&A expenditures into organization capital. We find that capital built using SG&A expenditure generally depreciates at a slower rate. The portion of SG&A that contributes to building organization capital is about 30% for firms in the Semiconductor and Computers & Peripheral Equipment industries and about 57% for firms in the Pharmaceuticals industry.

3.3. Franchise Value

We use industry-specific intangible capitalization parameters to compute firm-specific time-series of knowledge capital and organization capital based on equations (6) and (7). The sum of knowledge capital and organization capital equals reproducible intangible assets. Using the estimated intangible capital and the observed market value of assets and book value of assets, we construct franchise value at the firm-year level, denoted as $\widehat{FV}_{i,j,t}$ as follows:

$$\widehat{FV}_{i,j,t} = MV_{i,j,t} - TA_{i,j,t} - BIA_{i,j,t}$$
$$-\Big((1-\tau_{i,j,0})\ R\&D_{i,j,0}/\big(\hat{\delta}_{KC,j} + g_{\text{R\&D-growth},j}\big) + \textstyle\sum_{s=0}^{t}\big(1-\hat{\delta}_{KC,j}\big)^{s}(1-\tau_{i,j,t-s})\ R\&D_{i,j,t-s}\Big)$$
$$-\Big(\hat{\lambda}_j \times (1-\tau_{i,j,0})\ SG\&A_{i,j,0}/\big(\hat{\delta}_{OC,j} + g_{\text{SG\&A-growth},j}\big) + \textstyle\sum_{s=0}^{t}\big(1-\hat{\delta}_{OC,j}\big)^{s}\hat{\lambda}_j \times (1-\tau_{i,j,t-s})\ SG\&A_{i,j,t-s}\Big) \tag{10}$$

We present the summary statistics of estimated franchise value in Table 1 (Panel B). The franchise value is negative at the 25th percentile and turns positive only at the 44th percentile. It has a mean value of \$671 million and a median value of \$5.27 million, indicating that the distribution of franchise value is highly right skewed with a few firms having large positive values. In addition, we find a substantial variation of franchise value across industries (see Table 1 Panel C). Specifically, firms in the High-tech industry on average have a larger franchise value, followed by firms in the Healthcare, Consumer, Manufacturing, and Other industries.

Figure 1 plots an average franchise value among firms in each year. The nominal franchise value has dramatically increased, from nearly zero in 1976 to \$7,430 million in 2020. After removing the inflation effect, the CPI-adjusted franchise value (by CPI index with 1982-1984=100) is \$2,873 million in 2020. However, we observe a drop in the number of firms in more recent decades, suggesting that the increased franchise value is likely to be driven by a few large-sized firms that have market power and several smaller firms without market power. Appendix B provides a snapshot of five firms with the largest average franchise value in dollars in a five-year horizon. For example, Apple Inc. came up on top with an average 366.9 billion (CPI-adjusted) per year in 2016-2020.

<Insert Figure 1 Here>

We next examine the extent to which franchise value contributes to market value. For each year, we construct the time series of $(\text{Aggreg.}\,\text{FV}_t/\text{MV}_t)$, the time *t* value of the ratio of the sum of the franchise value of all the firms to the sum of the market values of all the firms. We also construct the time series of $(\text{Ave.}\,\text{FV}_t/\text{MV}_t)$, the time *t* value of the average of all of firms' ratio of franchise value to market value. The *aggregate* gives higher weight to larger firms whereas the *average* gives equal weight to all firms. As can be seen in Figure 1 (Panel B), $\text{Aggreg.}\,\text{FV}_t/\text{MV}_t$ has an upward trend—from 0% in 1976 to 40% in 2020, whereas $\text{Ave.}\,\text{FV}_t/\text{MV}_t$ hovers around zero. These findings indicate that a few large-sized firms have large and positive franchise values, while other firms have small positive or negative franchise values.[28]

3.4. Reproducible Intangible Assets

As for our measured reproducible intangibles, Table 1 (Panel B) shows that the ratio of reproducible intangible assets to total capital has a mean of 24% and a median of 20%. These results indicate that for half of all firms, their capital consists of more than 20% of reproducible intangibles. In particular, firms in the Healthcare and High-tech industries rely on reproducible intangible capital by about 45% and 32% of total capital (Panel C Table 1). Within reproducible intangibles, knowledge capital makes up 21%.

We plot the aggregate intangible assets in Figure OA4 in the Online Appendix. The positive aggregate amount of book intangibles first appeared in 1988 and had a large increase in 2001, potentially due to a changed in accounting standard.[29] Both knowledge capital and organization capital increased from 1976 to 2020. We compute the aggregate ratio among the three components of intangibles. The aggregate ratios show that the intangible assets decomposition was stable after 2002 with approximately 20% of the assets consisting of knowledge capital, 30% of the assets consisting of organization capital, and 50% of the assets consisting of book intangible assets.[30]

3.5. Market Value Decomposition

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[28] In our sample, a 23% of 176,005 firm-year observations MV is less than BV. Therefore, we should expect some firms to have negative franchise values.

[29] The adoption of the Statement of Financial Accounting Standards (SFAS) No. 142 changed accounting for goodwill dramatically and was effective after Dec. 15, 2001.

[30] Given that firms may not report R&D expenditure when firms have less 1% of sales on R&D (SFAS2), we also estimate our capitalization parameter separately for firms reporting R&D and firms without. We find that the intangible capital composition under this specification is similar to our baseline specification. Organization capital accounts for 30% of the aggregate intangible asset decomposition in both firms reporting R&D and not reporting R&D sample. Figure OA5 provides the detailed intangible asset decomposition in sample of firms reporting R&D and not reporting R&D.

The franchise value model enables us to decompose the market value into four components: tangible assets, book intangible assets,[31] reproducible intangible assets, and the residual that we denote as franchise value. Specifically, we obtain tangible assets directly from our observed data, which is the book value of assets minus the book intangible assets. We measure intangible assets as the sum of the book intangible assets (observed in our data) and the reproducible intangible assets (measured in our model). Franchise value is the portion of market value after we exclude tangible and intangible assets. We present a stacked graph of aggregate amount across the four components that add up to the total market value of assets.

Figure 2 (top graph) shows that total market value significantly increased since 1976 and reached $45 trillion in 2020, when total franchise value amounted to $21 trillion, followed by tangible assets of $14 trillion, book intangible assets of $5.5 trillion, and reproducible intangible assets of $4 trillion. In the *aggregate*, the market value of across all years and all firms consists of 47% tangible assets, 10% book intangible assets, 11% reproducible intangible assets, and 32% franchise value. These numbers highlight that franchise value largely contributes to about one-third of aggregate market value.

We also examine the time-series aggregate market value decomposition, in which we compute aggregate ratios, as the ratio of the aggregate tangible assets, book intangible assets, reproducible intangible assets, and franchise value to the aggregate market value across all firms in each year, denoted as Aggreg. Tangible/MV, Aggreg. Book intangible/MV, Aggreg. Reproducible intangible/MV, and Aggreg. FV/MV respectively. Figure 2 (Panel B) shows that Aggreg. Tangible/MV consistently decreased from 80% to 40% over 1976-2020, whereas both the Aggreg. Book intangible/MV and the Aggreg. Reproducible intangible/MV was about 10% over years. This finding indicates a compositional shift in both internal inputs associated with R&D and SG&A investment flows and externally purchased intangibles associated with identifiable intangibles and goodwill. Importantly, the Aggreg. FV/MV significantly increased in

[31] Book intangible assets is the sum of the identifiable intangible assets (Compustat *intano*) and goodwill (Compustat *gdwl*), both of which are reported in the balance sheet.

the most recent two decades and hit 45% in 2020. Notice that in the aggregate, FV/MV was negative until 1984. This is consistent with the observations in Modigliani and Cohn (1979) and Cohen, Polk, and Vuolteenaho (2005) that U.S. stocks were undervalued in the late seventies and early eighties due to money illusion.

<Insert Figure 2 Here>

Next we examine the decomposition of the aggregate market value of firms across all years and all firms in different size deciles. Firms are split into deciles based on firm size (measured by firm market value) within each industry and in a year. Figure 3 shows that Aggreg. FV/MV consistently increases from size bin 1 (smallest firms) to size bin 10 (largest firms), whereas tangible assets and reproducible intangible assets, decrease as size bins increase. When we focus on large size bins, the aggregate market decomposition comprises about 30% of franchise value, 50% of tangible assets, and 20% of intangible assets. This evidence echoes our argument that large firms drive aggregate franchise value.

<Insert Figure 3 Here>

We then compare the decomposition between the largest size group that has the top 10% size firms and other firms that comprise the bottom 90% size firms. Figure 4 shows that the largest firms significantly contribute to aggregate franchise value with almost $20 trillion in year 2020, whereas the other firms only contribute less than $5 trillion. The aggregate ratios show that in the largest size group, franchise value dramatically increased by 50% in two peaks—right before the 2000 dot-com bubble and in year 2020. In contrast, firms in the other size group had an aggregate franchise value ratio largely below 20%. We note that size does not drive tangible assets or intangible assets, given that we observe a similar pattern between the two groups.

Figure OA6 in the Online Appendix compares the aggregate and average decomposition in subsamples split by size for the largest firms (top 10%) and other firms (bottom 90%). The time series of the aggregate ratio and the average ratio of tangible assets (or book intangible assets) stay close over time between the largest size group and the other size group, implying that tangible assets and book intangible assets are not related to size. In contrast, for the reproducible intangible assets and franchise value, we observe that the reproducible intangible assets are largely driven by smaller firms and that franchise value is significantly driven by large firms.

<Insert Figure 4 Here>

Figure 5 plots the aggregate market value decomposition within each industry. Franchise value is a significant fraction (40%) of market value in the Healthcare and High-tech industries. Intangible Assets contribute to 36% of market value in the Healthcare industry and contribute to 26% of market value in the High-tech industry. These findings suggest that intangible assets as well as franchise economic rents are important components to fast growing sectors.

Figures OA7, OA8, and OA9 in the Online Appendix plot the time-series profile of the aggregate amount as well as the ratio of market value decomposition across industries. We observe a striking industrial heterogeneity of aggregate franchise value ratio that shows a significant variation across times in the High-tech and Healthcare industries, but only a slightly upward trend in other industries.

<Insert Figure 5 Here>

3.6. Persistence of Franchise Value Ranks

A firm's franchise economic rents are likely to be persistent. For example, patent protections last for several years. Network externalities are not easy to replace and habits that give rise to preference for products die slowly. Therefore, we empirically examine the persistence of franchise value in this section.

3.6.1 Transition Probability

First, we compute a one-year transition frequency (probability, for convenience) matrix. For each year, we rank firms based on the quartile of franchise value within an industry, for which Q1 (Q4) stands for the rank of a firm with the lowest (highest) franchise value. We then compute the *conditional probability* from one rank to another in year t +1 across ranks, conditional on an assigned quartile in year t. Table 4 (Panel A) shows that the probability for the year-to-year transition from Q1 to Q1 is 75%, and the transition from Q4 to Q4 compared to other forms of transition is 78%. In other words, a firm with a low franchise value is likely to retain a low franchise value and vice versa for a firm with a high franchise value, which implies that franchise value is persistent. We find qualitatively similar outcomes across industries (Panel B Table 4).

<Insert Table 4 Here>

We examine a multi-year persistence of franchise value by computing the empirical likelihood that a firm with Q1 (Q4) rank maintains its Q1 (Q4) rank over the next *n* years. Figure 6 shows that a firm with a Q4 rank that consecutively remains in Q4 for the next 2 years has a probability of 65%, and that figure is 59% for a firm with a Q1 rank. This multi-year persistence analysis documents an asymmetric phenomenon between firms with high and low franchise value. We find that 48% of firms with Q4 rank remain in Q4 for 5 consecutive years, whereas that figure is only 34% for firms with Q1 rank. Table OA4 in the Online Appendix reports the results across industries. We observe that the asymmetric pattern between firms with high and low franchise value quartile is more pronounced in the Healthcare and High-tech industries.[32]

<Insert Figure 6 Here>

3.6.2 Autocorrelation

We examine the autocorrelation of franchise value based on an AR(1) model. We estimate the coefficient on lagged franchise value (relative to total capital) (φ) in the autoregressive model with the order 1: $(FV/Total\ capital)_{i,t} = \alpha + \varphi(FV/Total\ capital)_{i,t-1} + \xi_{i,t}$. The AR(1) model is repeatedly estimated every year, resulting in the dynamic autocorrelation of franchise value. Figure 7 shows that the autocorrelation of franchise value was positive and close to one for most of the time, except for years 2001, 2002, and 2008. The result further supports the persistence of franchise value; that said, unexpected crises may incur short-term deviation from persistence due to temporary redistributions of firms' economic rents. Figure OA10 in the Online

[32] For example, in the Healthcare industry, 46% of firms with a Q4 rank remain in Q4 for 5 consecutive years, whereas only 27% of firms with a Q1 rank remain in Q1.

Appendix displays the cross-industry results that generally comply with the pattern shown in the above, and the cross-firm size autocorrelation that shows a higher autocorrelation in the largest size group than in the other size group, suggesting that franchise value persistence is driven by large firms.

<Insert Figure 7 Here>

4. Franchise Value, Market Power, and Investment Sensitivity to Tobin's Q

4.1. Franchise Value and Market Power

The franchise value of a firm that we compute is a noisy measure of a firm's market power. It includes the value of transient rents due to capacity adjustment costs in classical Q theory models, the value of longer-lasting rents, and also any potential deviation of market price from fundamental value.[33] However, the component due to adjustment costs as a fraction of a firm's market value likely varies little over time for any given firm. In addition, if we assume the market is sufficiently efficient, or that any potential mispricing is adequately captured by firm and year fixed effects in our regression specification, then a firm's share of franchise value with respect to its market value is likely to be a reasonably precise measure of the firm's relative market power. To the extent that the franchise value we estimate has information about market power, we expect firms with higher franchise value to have higher markups, face lower product market threats, and have lower labor shares, ceteris paribus.

For markups, we use the measure proposed by De Loecker et al. (2020). Our testing model controls for size effect by sorting firms into decile groups based on firm size (measured by market value of assets) in a year, and for industry effects by grouping firms based into five industries based on the Fama and French classification system. We then rank firms in increasing order according to their franchise value and normalize the rank by dividing by N, which is the number of firms in the size-industry group. This gives a value between $1/N$ and 1 for the

[33] We do not separate the component of franchise value due to transient rents (Q) and more permanent rents due to monopoly franchises, as well as potential mispricing. To separate the value of rents from adjustment costs from the value of more permanent rents, we need a model for rents.

normalized rank variable (denoted as Rank FV). We examine the association between markups and the normalized franchise value rank based on the following OLS regression:

$$Markup_{i,t} = \alpha + \delta_1 Rank\ FV_{i,t} + \alpha \mathbf{X}_{i,t} + c_i + c_t + \xi_{i,t}, \tag{11}$$

in which $Markup_{i,t}$ is a markup measured following De Loecker et al. (2020)[34] for firm i in year t. $Rank\ FV_{i,t}$ is firm i's ranked franchise value in year t. $\mathbf{X}_{i,t}$ includes control variables, which are the logarithm of market capitalization and logarithm of reproducible intangible value. c_i, and c_t are firm and year fixed effects. Standard errors are clustered at the firm level, given that the time dimension of our panel is substantially smaller than the firm dimension (Petersen, 2009).

Column 1 and Column 2 of Table 5 present our results. We find a positive association between franchise value and markups, and this association is economically and statistically significant. When a firm's normalized franchise value rank moves from the 25th percentile to the 75th percentile, the markup increases by 0.06 (a 4.7% increase in comparison with the sample median).[35] The coefficient for the reproducible intangible value is not statistically significant. These conclusions are not sensitive to alternative measures of markups (see Table OA6 in the Online Appendix).[36]

<Insert Table 5 Here>

For product market threats, we use the Hoberg et al. (2014) product market fluidity measure. This measure captures the annual changes in rivals' product overlaps with a firm's own product line based on unique words in product descriptions in firms' 10-K filings. Firms with a higher product market fluidity measure face higher product market threats. Using this measure, we examine the relation between franchise value and product market liquidity using the following

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[34] We use the Stata code provided in De Loecker et al. (2020).

[35] Given that the estimated coefficient is 0.121 (Column 1 of Table 5), and the median of markup is 1.29 (Online Appendix Table OA5 reports the summary statistics for the variables in our regressions), therefore the increase in economic magnitude in comparison with the sample median is 0.12×50%/1.29 = 4.7%.

[36] The first alternative markup measure is the difference between revenue and cost of goods sold, scaled by cost of goods sold. The second alternative markup measure is the difference between revenue and the sum of cost of goods sold and SG&A, scaled by the sum of cost of goods sold and SG&A.

regression:

$$Product\ market\ fludity_{i,t} = \quad \alpha + \delta_1 Rank\ FV_{i,t} + \alpha\mathbf{X}_{i,t} + c_i + c_t + \xi_{i,t}, \tag{12}$$

in which the regression specification is the same as that of equation (11) with markups replaced by product market fluidity.

Column 3 and Column 4 of Table 5 show that product market fluidity is strongly negatively associated with franchise value. A firm in the 75th percentile of franchise value rank faces a 2.7%[37] lower product market threats as measured by the Hoberg et al. (2014) measure; this finding is statistically significant, especially when compared to firms in the 25th percentile of franchise value rank. In contrast, firms with larger reproducible intangible assets face higher product market threats. This finding is intuitive, since reproducible intangible assets that other competing firms can also replicate using SG&A and R&D expenditures are unlikely by themselves to significantly reduce product market competition. While reproducible intangible assets and franchise value are both "intangible", in the sense that one cannot see them, only the latter helps protect a firm from competition.

The literature documents the decline in labor share and attributes it to the rise of superstar firms (Autor et al., 2020). Barkai (2020) documents a negative relationship between labor share and industry concentration. To the extent that our measure of franchise value is a measure of market power, we should expect firms with higher franchise value to be associated with lower labor shares. Therefore, we consider the following regression:

$$Labor\ share_{i,t} = \alpha + \delta_1 Rank\ FV_{i,t} + \alpha\mathbf{X}_{i,t} + c_i + c_t + \xi_{i,t}, \tag{13}$$

in which we replace markups by labor shares in equation (11) and $Labor\ share_{i,t}$ measured as the total staff expense (Compustat item *xlr*) divided by the sum of staff expenses and earnings (Compustat item *ebitda*), following Autor et al. (2020).

[37] Similarly, the estimated coefficient in Column 3 of Table 5 is −0.341, and the median of product market fluidity is 6.25. Therefore, the *decrease* in economic magnitude relative to the sample median is 0.34×50%/6.25 = 2.7%.

Column 5 and Column 6 of Table 5 shows that labor share is negatively and significantly associated with franchise value, albeit for smaller sample sizes. Firms in the 75^{th} percentile of franchise value rank have a 14% lower labor share when compared to firms in the 25^{th} percentile of franchise value rank. This result, along with the increase in franchise value in recent years presented in Figure 1, provides supporting evidence that the rise in superstar firms or firms with high franchise value may explain why labor share has declined in recent years.

We examine the robustness of these findings by repeating the analysis within each industry, and we provide our results in Table OA7 of the Online Appendix. We find qualitatively similar results[38] and, more importantly, the positive (negative) correlation between the ranked franchise value measure and markups (product fluidity) become much stronger in the High-tech and Healthcare industries.

4.2. Investment Sensitivity to Tobin's Q

Peters and Taylor (2017) point out that in the presence of intangible capital, the more suitable measure of Tobin's Q would be Total Q*,* which represents market value divided by tangible assets plus intangible assets. They find that Total Q better explains both tangible investment as well as total investment. We therefore regress investment rates on lagged Standard Q, and regress these rates separately on Total Q. All regressions include firm and year fixed effects and adjust standard errors to be clustered at the firm level. The tangible investment rate is measured as tangible investment divided by lagged tangible assets. The total investment rate is measured as total investment (tangible investment plus intangible investment) divided by lagged sum of tangible assets and intangible assets.[39] We provide the summary statistics of our variables for the investment-Q relation analysis in Table OA5 in the Online Appendix.

<Insert Table 6 Here>

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[38] We find insignificant results in the labor share analysis for the Healthcare and Other industry. We should interpret the across-industry labor share analysis with caution due to our small sample size.

[39] For the ease of comparison with Peters and Taylor (2017), in this analysis we follow their variable definitions to measure tangible investment, intangible investment, Standard Q, and Total Q (See the details in Appendix A) and exclude firms with less than $5 million in tangible assets.

As can be seen in Table 6 (Panel A), when we measure investment using tangible investment only, the benchmark model that includes only firm and year fixed effects explains approximately 8% of the variance in tangible investment rate (Column 1). Including Standard Q or Total Q to the baseline model increases the variance explained by 12% and 16% respectively (Column 2 and 3). When we replace tangible investment with total investment, the baseline model explains 16%. Including Standard Q increases the variance explained by 9% (Column 5), and when including Total Q, it enhances the model explanation by 18% (Column 6). These results are consistent with findings in the literature, validating our measurement of the value of reproducible intangible assets.[40]

Next, we examine how franchise value affects the investment-Q relation. In classical Q-theory models, product markets are competitive with free entry, and the market values of assets deviate from their corresponding replacement values only due to capital-adjustment costs. Positive demand shocks will increase prices benefiting firms with assets already in place, resulting in the market value of such firms rising above their replacement values. An increase in the value of Q indicates shortage pricing, and a firm will thus invest to increase capacity to meet increased demand. However, when the firm enjoys economic rents, an increase in Q need not necessarily indicate an increase in investment opportunities.

To see why, we consider an economy in which all electricity is supplied by hydel power. An increase in demand for electricity will cause the price of electricity to rise. A firm's market value will also rise, resulting in a higher Q. However, there is no available method for the firm supplying hydel electricity to increase its capacity to meet increased demand. In fact, the increase in market value is entirely due to increased franchise economic rents,[41] and the presence of franchise economic rents weakens the positive relation between investment and Q.

We assume that the share of the franchise value due to this franchise economic rent

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[40] We also examine the investment-Q relation in each industry. Table OA8 (Online Appendix) shows that the regression results are quantitatively similar to the ones based on our full sample.

[41] Another example would be a firm like WD-40 in 1998, a cash cow with few tangible assets and few growth opportunities, discussed in detail in Chapter 7 of Greenwald, Kahn, Sonkin, and Biema (2004).

component is increasing in the measured franchise value. This assumption implies that Tobin's Q (MV/total capital) is explained not so much by adjustment costs as by franchise economic rents for high franchise value firms, and we should expect their investment-Q relation to be weaker as well.

To examine this hypothesis, we create High FV as an indicator variable equal to one when a firm's franchise value (relative to market value) belongs to the top quartile of firms in a year and within an industry. We interact High FV with Total Q and add the interaction variable to the Total Investment-Total Q regression. We present our results in Table 6 (Panel B Column 2) and find that the interaction variable is negative and statistically significant. This evidence supports our assumption that shares of adjustment costs decline as franchise value increases. Our empirical findings are consistent with Gutiérrez and Philippon (2018), and Barkai (2020).

We further examine the robustness of a franchise value's attenuation effect on the investment-Q relation over time by splitting our sample period into three subperiods (1976-1990, 1991-2005, and 2006-2020). The estimated coefficient of the interaction variable is significantly negative across all subperiods (Columns 4-8).[42]

5. China's Entry into WTO and Franchise Value of U.S. Firms

In this section, we examine how China's entering the WTO affects a firm's franchise value. In 2000, the United States Congress granted Permanent Normal Trade Relations (PNTR) status to China, which reduced tariffs and the uncertainty of duties on Chinese imports. Granting this PNTR status to China reduced the investment uncertainty of U.S. firms in China and provided incentives for U.S. firms to shift business development and operations to China (Pierce and Schott (2016); Antràs, Fort, and Tintelnot (2017)). As a result, the direct investment of U.S. firms in China increased from \$9.6 billion in 2000 to \$53.9 billion in 2018.[43]

The literature suggests that when new markets open up, firms with a competitive advantage

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[42] We reexamine our analyses within each industry and present the results in Table OA9 (Online Appendix). The cross-industry results are qualitatively similar to the main findings.

[43] Data source: UN Comtrade database and the U.S. Bureau of Economic Analysis.

benefit most (Bernard and Jensen, 1999). U.S firms face more competition domestically from foreign firms, and foreign firms face more competition from U.S. firms in their respective home markets. That would suggest that U.S. firms with a competitive advantage would benefit more from the opening of markets, assuming that their competitive advantage in the U.S. market carries over to foreign markets. We should expect such firms to experience a larger increase in their franchise value following China's entry into the WTO. To examine this hypothesis, we separate firms in our sample into two groups: firms with high and low competitive advantages, respectively. As we discussed earlier, the franchise value that we compute is due to transient rents from adjustment costs (Q), longer-lasting franchise economic rents, and potential mispricing. Hence, it will be a noisier measure of competitive advantage when compared to the Hoberg et al. (2014) (HPP) measure of product market fluidity. We therefore use the HPP measure to identify firms with high and low competitive advantages.

Following Pierce and Schott (2016), we define exposure to China shock using the industry level NTR (Normal trade relationship) gap, which is defined as the difference between non-NTR tariff rates and NTR tariff rates. NTR Gap represents the increase in tariff rates if the renewal of normal trade relation fails; therefore, NTR gaps measure the industry exposure of China shock. Presumably, industries with larger NTR gaps are those affected more by changes in the U.S. import policy to China. We follow the literature and use the NTR gap in 1999.

We examine the effect between China shock and U.S. manufacturing franchise value using a generalized OLS difference-in-differences (DD) specification that examines whether the increase in franchise value in industries with higher NTR gaps are larger after China was granted PNTR status. Following the literature, we restrict our sample to U.S. manufacturing firms (SIC 2000-3999) from 1990 to 2007.We estimate the following equation:

$$Rank\ FV_{i,t} = \alpha + \delta_1 NTR\ Gap_i \times\ Post_t + Post_t + \alpha \mathbf{X}_{i,t} + c_i + c_t + \xi_{i,t}, \tag{14}$$

in which $NTR\ Gap_i$ is the industry-level (4-digit SIC) NTR gap in 1999; $Post_t$ is an indicator for the post-PNTR period (i.e., from year 2001 forward); $\mathbf{X}_{i,t}$ includes the control variables, which are the logarithm of the market capitalization and the logarithm of reproducible intangible value; and c_i, and c_t are industry and year fixed effects. Standard errors are clustered at the industry level.

Table 7 presents the results of our DD estimates. We find that regression coefficients on the interaction term are significantly positive, which means that firms that were affected more increase more in franchise value after the shock. In addition, when we separate the sample into high and low pre-shock competitive advantage (proxied by product market fluidity), we find that the effect exists only for firms in the high competitive advantage group. This finding suggests that China's entering the WTO provided an opportunity for U.S. firms with a competitive advantage locally to further expand the value of their respective franchises.[44]

<Insert Table 7 Here>

6. Conclusion

There is a wide gap between the market values of firms and corresponding values appearing on their financial statements (i.e., their book values). The difference between the market value and the book value is often referred to in the literature as the value of a firm's intangible assets. In this paper, we decompose the gap into two components: reproducible intangible assets and franchise value. Reproducible intangibles represent knowledge, know how, and organization capital that firms create by being in business and incurring expenditures that other firms can also create over time through similar expenditures that do not appear in firms' balance sheets. Franchise value is the residual that includes the following: the option value of assets in place that enables firms to benefit from temporarily high prices due to shortage and costs that firms face when adjusting productive capacity to market conditions (related to classical Tobin's Q); the value of quasi longer-lasting franchise economic rents from positive shocks and permanent

[44] We also examine the outcome of Total Q after China's entry into the WTO by replacing the Rank FV with Total Q in our DID analysis. We present the results in Table OA10 in the Online Appendix and find that Total Q did not significantly increase after the event. This finding further confirms that our FV is a measure of franchise rents, which is different from Total Q.

erosion of the value of a firm's assets due to negative shocks; and potential deviation of market prices from fundamental values due to various reasons discussed extensively in the behavioral finance literature.

Using financial statement data and market prices of publicly traded firms in the U.S. during the period 1976 to 2020, we estimate the capitalization and depreciation parameters for R&D and SG&A expenditures by minimizing the sum of squared franchise values of firms, assuming that franchises are difficult to create and maintain in a free-market economy and that financial markets are on average informationally efficient. Our estimated capitalization and depreciation parameters are not only consistent with estimates in other studies in the literature even though they use different methods, but also support the values assumed in a number of studies, in addition to providing guidance for values to be used in future research.

We find that the franchise value we measure has a significant franchise economic rent component: firms with higher estimated franchise values face lower product market threats and lower investment sensitivity to Tobin's Q, even after adjusting for the presence of reproducible intangible assets obtained by capitalizing SG&A and R&D expenditures. According to the literature, firms with a competitive advantage would benefit more when new markets open (i.e., in our setting, the franchise value of such firms will increase more). We examine this hypothesis using China's entry into the WTO in 2002 as a natural experiment, and by using fewer product market threats as a measure of competitive advantage. We find that firms with fewer product market threats experienced a larger increase in their franchise values after 2002. These findings are consistent with the literature in that our measure of franchise value has a significant component due to franchise economic rents.

While there is a vast literature examining the role of firms' intangible assets on the real economy, most studies in this literature assume that firms earn little franchise economic rents, as in Hall (2001). This assumption has been challenged in recent studies.[45] We contribute to this evolving literature.

[45] The literature includes Gutierrez and Philippon (2018), Autor et al. (2020), De Loecker et al. (2020), Crouzet and Eberly (2021).

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Appendix A.

Definition of Variables.

Measures of franchise value

Franchise value (FV) is the franchise value, which is measured based on our franchise value model and formulated in Equation (8): $FV_{i,j,t} = MV_{i,j,t} - TA_{i,j,t} - BIA_{i,j,t}$

$$-\left((1-\tau_{i,j,0})R\&D_{i,j,0}/\left(\delta_{KC,j}+g_{\text{R\&D-growth},j}\right)+\sum_{s=0}^{t}\left(1-\delta_{KC,j}\right)^{s}(1-\tau_{i,j,t-s})R\&D_{i,j,t-s}\right)$$

$$-\left(\lambda_j \times (1-\tau_{i,j,0})SG\&A_{i,j,0}/\left(\delta_{OC,j}+g_{\text{SG\&A-growth},j}\right)+\sum_{s=0}^{t}\left(1-\delta_{OC,j}\right)^{s}\lambda_j \times (1-\tau_{i,j,t-s})SG\&A_{i,j,t-s}\right)$$

Rank FV is the ranked franchise value variable with a range from 0 to 1. The variable is measured as follows. We sort firms into groups based on deciles of firm size within an industry and in a year. We then rank firms based on their franchise value in each group with a range between 0 and 1. The firm size is measured by market value of assets, and the industry is based on the Fama-French five industry classification system.

Measures of intangible capital

Knowledge capital (KC) is the knowledge capital based on our franchise value model.

Organization capital (OC) is the organization capital based on our franchise value model.

Reproducible intangible assets (RIA) is the sum of knowledge capital (*KC*) and organization capital (*OC*).

Other firm-level variables

Market value of assets (MV) is the market value of assets, measured as the sum of the market value of equity (Compustat *prcc_f* (fiscal year-end price) times *csho* (number of shares outstanding)) and total liabilities (Compustat *lt*).

Tangible assets (TA) is the tangible assets, measured as the book value of assets (Compustat *at*) minus book intangible assets—identifiable intangible assets (Compustat *intano*) plus goodwill (Compustat *gdwl*)).

Book intangible assets (BIA) is the balance-sheet book intangible assets, measured as the sum of identifiable intangible assets (Compustat *intano*) and goodwill (Compustat *gdwl*).

Total capital (TC) is the total capital, measured as the sum of tangible assets, book intangible assets, and reproducible intangible assets.

R&D is the R&D expenditure, measured as reported R&D (Compustat *xrd*) minus in-process R&D expenses (Compustat *rdip*)

SG&A is the selling, general, and administrative expense expenditure. Measuring SG&A from our Compustat data is not trivial. Companies typically report SG&A and R&D separately. Compustat, however, adds them together in a variable misleadingly labeled "Selling, General, and Administrative Expense" (Compustat *xsga*). We therefore subtract *xrd (*after deducting *rdip*) from *xsga* to obtain the SG&A reported by companies.

Effective tax rate is measured as the total income taxes (Compustat *txt*) divided by pre-tax income (Compustat *pi* minus *spi*).

Markup is the production-based approach of markups, following De Loecker et al. (2020).

Product market fluidity is the product market fluidity measure based on changes in key product words in firms' 10-Ks following Hoberg et al. (2014).

Labor share is the payrolls-to-value-added, measured as the ratio of wage bills (Compustat *xlr*) to the sum of wage bills (Compustat *xlr*) and EBITDA (earnings before interest, tax, depreciation, and amortization) (Compustat *ebitda*). See Autor et al. (2020) for further details.

NTR Gap is defined as the difference between the non-NTR (normal trade relationship) tariff rate and the NTR tariff rate. We follow Pierce and Schott (2016) to measure the NTR gap in 1999 and at the 4-digit SIC industry level.

Standard Q is the standard Tobin's Q, measured as a firm's market value divided by tangible assets. We follow Peters and Taylor (2017) to measure the firm's tangible assets as the book value of property, plant, and equipment (Compustat *ppegt*), and the firm's market value as the market value of outstanding equity (Compustat *prcc_f* times *csho*), plus the book value of debt (Compustat *dltt* plus *dlc*), minus the firm's current assets (Compustat *act*).

Total Q is the adjusted Tobin's Q, measured as a firm's market value divided by the sum of tangible assets and intangible assets. We follow Peters and Taylor (2017) to measure the firm's market value (see Standard Q variable definition), and the firm's intangible assets as the sum of the firm's externally purchased (Compustat *intano* plus *gdwl*) and internally created intangible capital (*KC* plus *OC*).

Tangible investment rate is the ratio of tangible investment, divided by lagged tangible assets. We follow Peters and Taylor (2017) to measure the firms' tangible investment as capital expenditures (Compustat *capx*), and the firm's tangible assets as the book value of property, plant, and equipment (Compustat *ppegt*).

Total investment rate is the ratio of total investment divided by lagged sum of tangible assets and intangible assets. The total investment is the sum of tangible investment and intangible investment, measured as $R\&D + \lambda \times SG\&A$. For Compustat items to measure this variable refers to *Total Q* and *Tangible investment rate*. The λ is the portion of SG&A that builds organization capital. Different from Peters and Taylor (2017), which they set a constant λ of 0.3, we set an industry-specific λ, estimated based on our franchise value model (see Table 3).

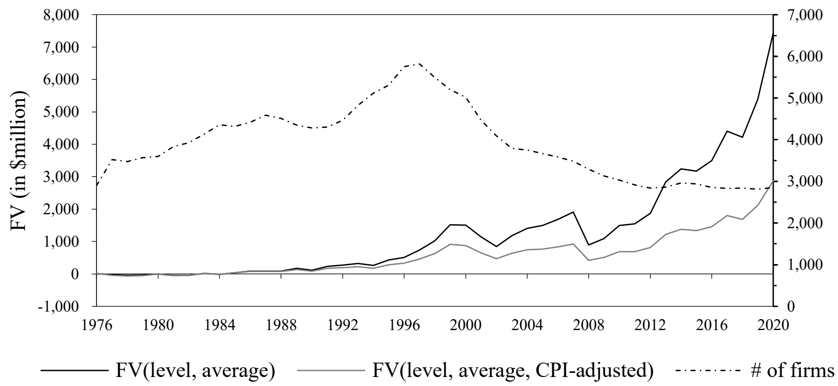
Appendix B.

List of Top Firms by Franchise Value in 1985, 2000, 2015, and 2020.

This table lists the top five firms with the largest average franchise value in a five-year horizon. We rank firms within an industry across four different five-year periods: 1981-1985, 1996-2000, 2011-2015, and 2016-2020. The numbers shown in italics are CPI-adjusted franchise values (CPI index with 1982-1984 =100) and expressed in $ billion.

Rank	Consumer		Manufacturing		High-tech		Healthcare		Other	
					Period: 1981-1985					
1st	Coca-Cola	*3.7*	3M	*3.1*	IBM	*28.5*	Abbott Laboratories	*2.5*	Dun & Bradstreet	*3.0*
2nd	Altria Group	*3.6*	Texas Oil & Gas	*2.7*	HP	*3.1*	Merck & Co	*2.2*	Waste Management	*1.5*
3rd	Walmart	*2.6*	Standard Oil	*2.0*	BellSouth	*2.6*	Wyeth	*2.2*	S&P Global	*1.0*
4th	McDonald's	*2.4*	Amoco	*1.0*	Eastman Kodak	*2.3*	HCA Hospital Corp of America	*1.6*	Time Warner	*1.0*
5th	RS Legacy	*2.2*	Procter & Gamble	*0.9*	TEGNA	*2.1*	Smithkline Beckman	*1.2*	FedEx	*1.0*
					Period: 1996-2000					
1st	Coca-Cola	*84.2*	Exxon Mobil	*83.1*	Microsoft	*148.3*	Merck & Co	*74.6*	United Parcel Service	*37.9*
2nd	Walmart	*58.4*	Procter & Gamble	*41.5*	Cisco Systems	*93.3*	Pfizer	*71.1*	Avis Budget Group	*7.2*
3rd	Altria Group	*42.8*	Gillette	*23.8*	Intel	*87.5*	Bristol-Myers Squibb	*50.4*	Waste Management	*5.9*
4th	Home Depot	*32.0*	E. I. du Pont de Nemours and Co	*21.5*	AT&T	*51.2*	Johnson & Johnson	*41.5*	Omnicom Group	*5.7*
5th	PepsiCo	*25.4*	Chevron	*18.9*	IBM	*45.1*	Eli Lilly and Co	*37.9*	AES	*5.6*
					Period: 2011-2015					
1st	Amazon.com	*59.5*	Exxon Mobil	*83.8*	Apple	*169.1*	Johnson & Johnson	*34.3*	United Parcel Service	*34.4*
2nd	Philip Morris International	*58.0*	Procter & Gamble	*39.2*	Alphabet	*96.3*	Gilead Sciences	*32.2*	Union Pacific	*22.0*
3rd	Coca-Cola	*56.3*	Chevron	*24.3*	Microsoft	*67.9*	AbbVie	*30.8*	Las Vegas Sands	*13.8*
4th	Walmart	*40.9*	3M	*22.7*	Facebook	*63.5*	Celgene	*20.2*	Southern Copper	*8.5*
5th	PepsiCo	*36.8*	Boeing	*21.8*	IBM	*47.9*	Biogen	*16.5*	Hilton Worldwide Holdings	*7.5*
					Period: 2016-2020					
1st	Amazon.com	*278.9*	Procter & Gamble	*60.5*	Apple	*366.9*	Johnson & Johnson	*78.8*	Netflix	*45.8*
2nd	Home Depot	*75.4*	Boeing	*53.3*	Microsoft	*269.5*	AbbVie	*39.9*	United Parcel Service	*41.7*
3rd	Coca-Cola	*70.1*	Nike	*36.6*	Alphabet	*225.4*	Merck & Co	*36.2*	Union Pacific	*36.1*
4th	Tesla	*63.9*	Exxon Mobil	*36.3*	Facebook	*157.7*	Amgen	*30.6*	Airbnb	*29.7*
5th	McDonald's	*55.6*	3M	*34.0*	Verizon Communications	*52.0*	Abbott Laboratories	*23.3*	S&P Global	*18.3*

Panel A. Time-series franchise value



Panel B. Aggregate vs. average franchise value ratio

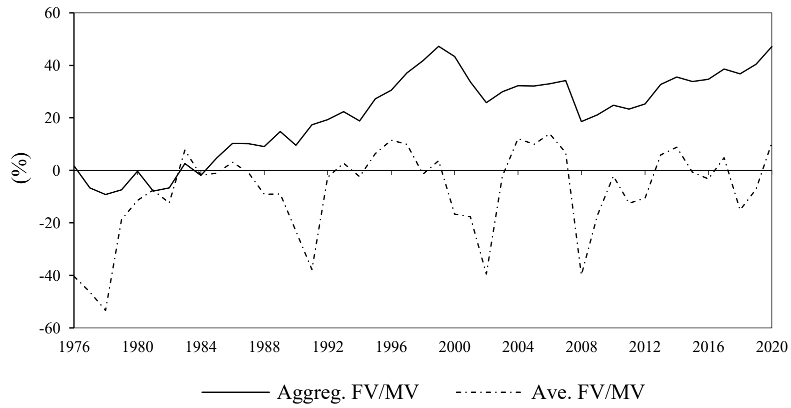


Figure 1. Time Series of Franchise Value.

This figure presents the time-series of franchise value. The sample contains U.S. publicly traded firms from 1976 to 2020 with 176,005 firm-year observations and 16,532 unique firms. Panel A plots the FV(level, average)—the average nominal franchise value among firms in a year (black line) and the FV(level, average, CPI-adjusted)—the average franchise value deflated by the CPI index with 1982-1984=100 among firms in a year (gray line). The dashed line plots the number of firms in a year (right scale). Panel B plots the aggregate franchise value ratio (Aggreg. FV/MV)—the ratio of aggregate franchise values to the aggregate market value across all firms in each year (solid line) and the average franchise value ratio (Ave. FV/MV)—the average ratio of firm-level franchise value to market value among firms in each year.

Panel A. Aggregate amount

Panel B. Aggregate ratio

Panel C. Aggregate ratio (stacked chart)

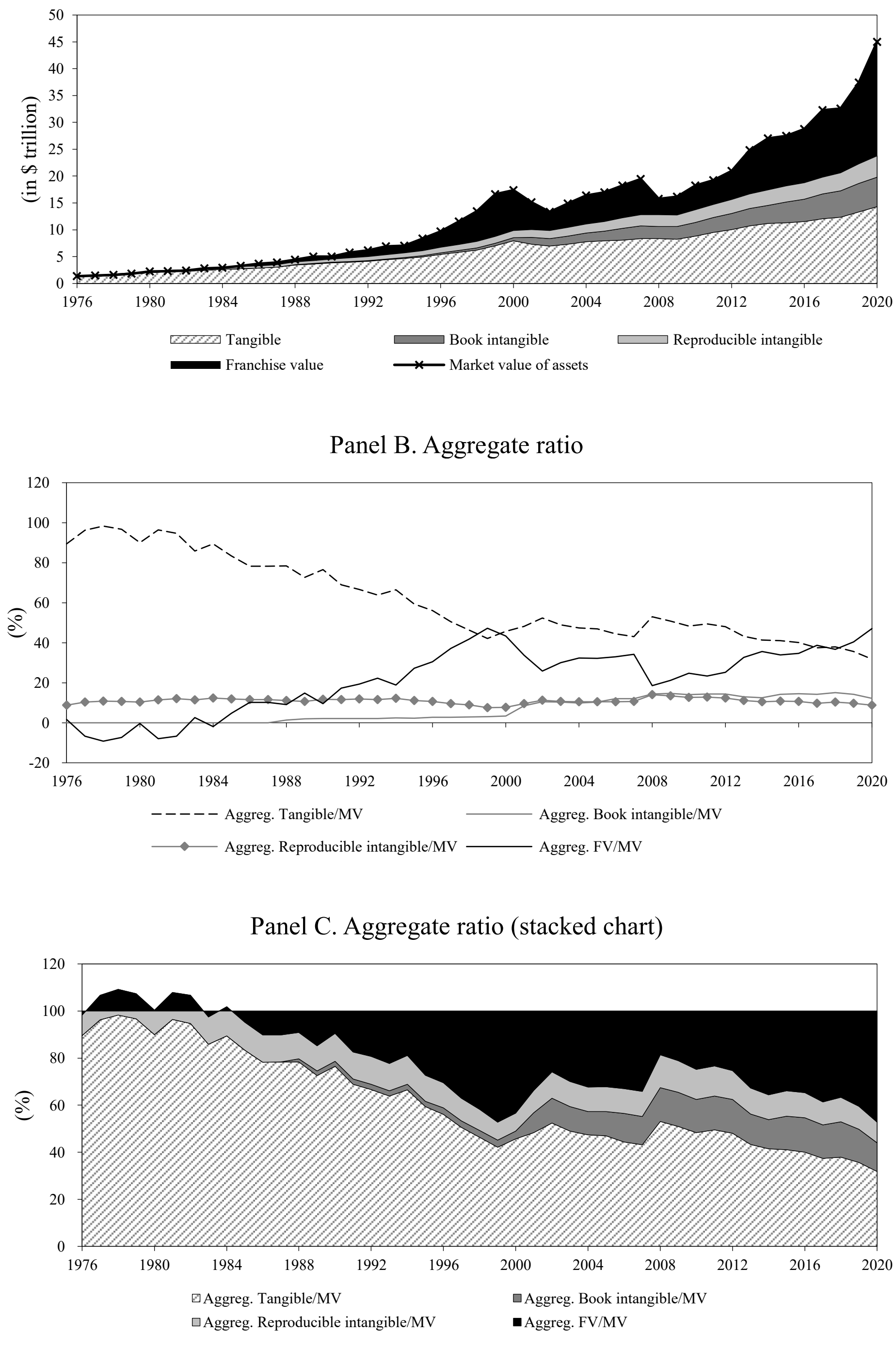


Figure 2. Market Value Decomposition.

This figure presents the market value decomposition. The decomposition contains four components: tangible assets, book intangible assets, reproducible intangible assets, and franchise value. The sample contains U.S. publicly traded firms from 1976 to 2020. The aggregate ratios refer to the ratio of the aggregate tangible assets, book intangible assets, reproducible intangible assets, and franchise value to the aggregate market value across all firms in each year, denoted as Aggreg. Tangible/MV, Aggreg. Book intangible/MV, Aggreg. Reproducible intangible/MV, and Aggreg. FV/MV, respectively. Panel A plots the time-series of the aggregate amount of market value decomposition. Panel B plots the aggregate ratios. Panel C represents the aggregate ratios of Panel B in a stacked chart.

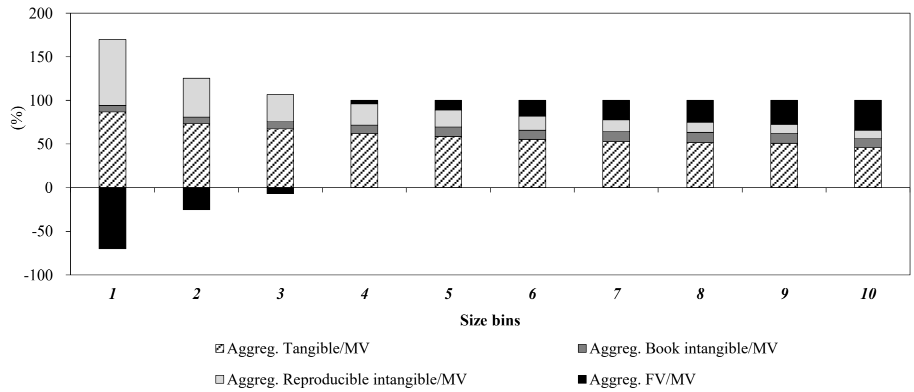


Figure 3. Market Value Decomposition by Firm Size.

The figure presents the market value decomposition across firm size bins. Firms are assigned into deciles based on firm size (measured by firm market value) within an industry and in a year. The market value decomposition contains four components: tangible assets, book intangible assets, reproducible intangible assets, and franchise value. The sample contains U.S. publicly traded firms from 1976 to 2020. The aggregate ratios are measured by aggregate tangible assets, book intangible assets, reproducible intangible assets, and franchise value to the aggregate market value across all firms in each size bin and denoted as: Aggreg. Tangible/MV, Aggreg. Book intangible/MV, Aggreg. Reproducible intangible/MV, and Aggreg. FV/MV.

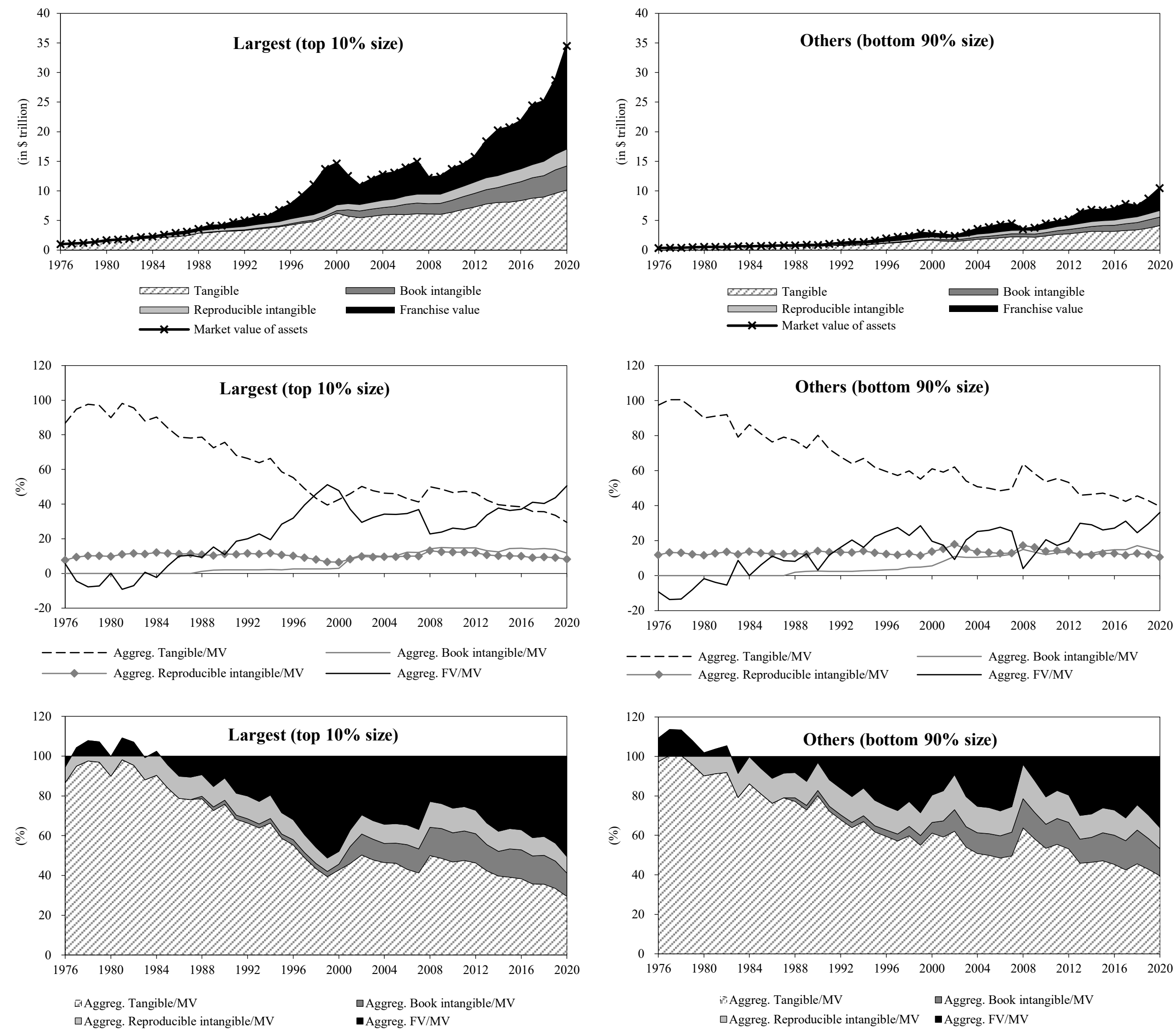


Figure 4. Market Value Decomposition: Largest Firms vs. Others.

The figure presents the market value decomposition of the largest firms versus other firms. Firms are assigned into deciles based on firm size (measured by firm market value) within an industry and in a year. Largest refers to the group of firms with top decile size. Others refers to the group of other firms. The market value decomposition contains four components: tangible assets, book intangible assets, reproducible intangible assets, and franchise value. The sample contains U.S. publicly traded firms from 1976 to 2020. The aggregate ratios are measured by aggregate tangible assets, book intangible assets, reproducible intangible assets, and franchise value to the aggregate market value across all firms in each year and denoted as: Aggreg. Tangible/MV, Aggreg. Book intangible/MV, Aggreg. Reproducible intangible/MV, and Aggreg. FV/MV. The top graphs plot the time-series of the aggregate amounts of market value decomposition. The middle graphs plot the aggregate ratios. The bottom graphs plot the aggregate ratios of the middle graphs in a stacked chart.

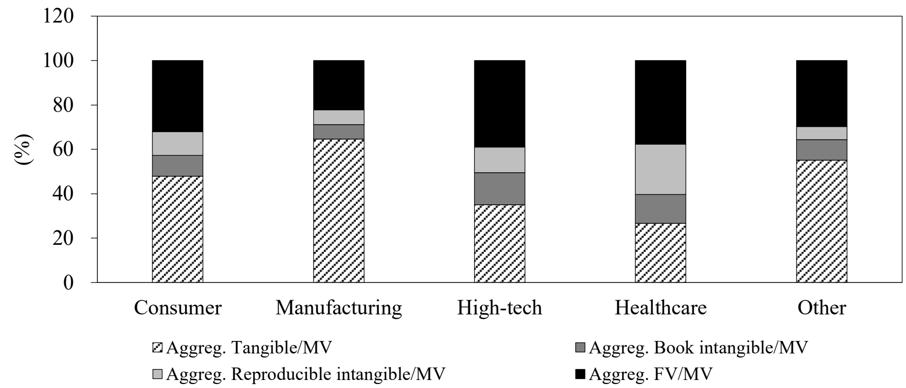


Figure 5. Market Value Decomposition by Industry.

This figure presents the market value decomposition across industries based on the Fama-French 5 industry classifications: Consumer, Manufacturing, High-tech, Healthcare, and Other. The sample contains U.S. publicly traded firms from 1976 to 2020. The aggregate ratios are measured by aggregate tangible assets, book intangible assets, reproducible intangible assets, and franchise value to the aggregate market value across all firms in an industry and denoted as: Aggreg. Tangible/MV, Aggreg. Book intangible/MV, Aggreg. Reproducible intangible/MV, and Aggreg. FV/MV.

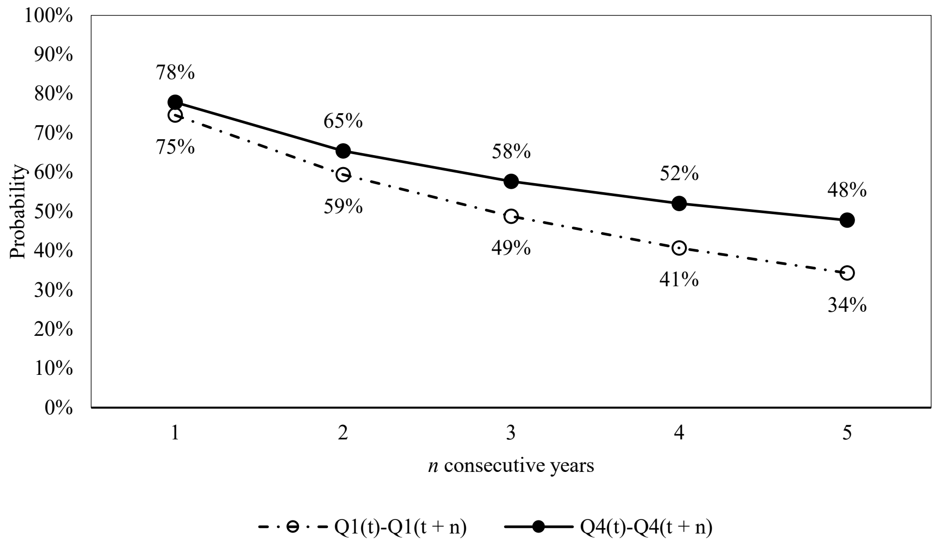


Figure 6. Persistence of Franchise Value.
This figure presents the probability of remaining in Q1 (or Q4) for *n* consecutive years. The sample contains U.S. publicly traded firms from 1976 to 2020. A firm is sorted into four groups in a given year and within an industry based on the quartile of franchise value. Q1 (Q4) denotes a group of firms with the lowest (highest) franchise value. Q1(*t*)-Q1(*t* + *n*) indicates the probability that a firm with Q1 rank consecutively maintains Q1 rank for *n* years (dash line). Similarly, Q4(*t*)-Q4(*t* + *n*) indicates the probability that a firm with Q4 rank consecutively maintains Q4 rank for *n* years (solid line).

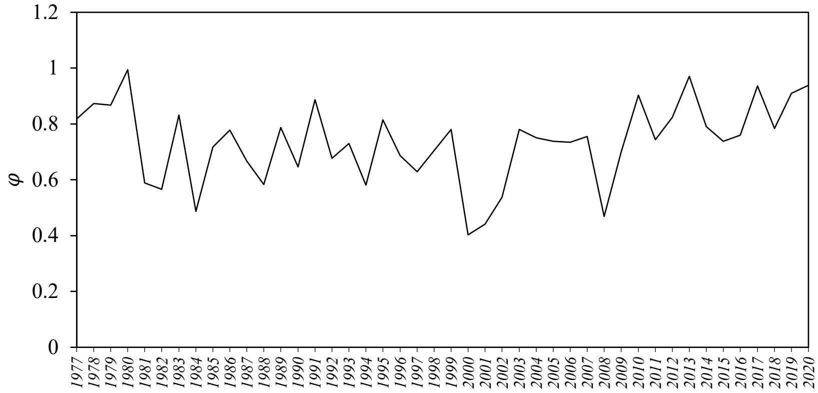


Figure 7. Autocorrelation of Franchise Value.

This figure plots the coefficient on franchise value in the autoregressive model. The sample contains U.S. publicly traded firms from 1976 to 2020. We estimate the coefficient on lagged franchise value (relative to total capital) in the autoregressive model with the order of one: $(FV/Total\ capital)_{i,t} = \alpha + \varphi(FV/Total\ capital)_{i,t-1} + \xi_{i,t}$. The total capital is the sum of tangible assets and intangible assets. The AR(1) model is estimated repeatedly every year from 1977 to 2020.

Table 1. Summary Statistics.

The table presents the summary statistics. The sample contains U.S. publicly traded firms from 1976 to 2020 with 176,005 firm-year observations and 16,532 unique firms. Panel A reports the statistics for the variables in the estimation. A firm's market value of assets is measured as the sum of the market value of equity and the book value of total liabilities including current liabilities. Tangible assets refers to a firm's book value of tangible assets. Book intangible assets refers to the sum of identified intangible assets and goodwill reported in the balance sheet. R&D is the research and development expense, and SG&A is the selling, general, and administrative expense. Panel B reports the summary statistics of measures of franchise value and reproducible intangible assets (the sum of knowledge capital and organization capital) estimated from the franchise value model. Panel C reports the summary statistics in Fama-French 5 Industries. The units of each observation are in million dollars (except for ratios). Appendix A provides detailed variable descriptions.

Panel A. Summary statistics of variables in the estimation

	Mean	SD	P25	P50	P75
Market value of assets	2,545.34	8,477.98	41.90	192.30	1,091.96
Tangible assets	1,266.26	4,087.14	26.32	113.42	567.33
Book intangible assets	358.96	3,562.54	0	0	14.13
R&D	23.80	116.37	0	0	5.10
SG&A	174.15	564.64	3.37	17.48	86.57
Effective tax rate	26%	23%	0%	30%	40%

Panel B. Franchise value and reproducible intangible assets

	Mean	SD	P25	P50	P75
Franchise value (FV)	671.44	2935.22	-18.14	5.27	156.76
Knowledge capital (KC)	72.85	354.23	0	0.12	14.97
Organization capital (OC)	172.28	594.82	3.56	17.24	79.48
Reproducible intangible assets (RIA)	255.14	935.97	5.36	26.01	117.65
RIA/Total capital	0.24	0.19	0.09	0.20	0.35
KC/RIA	0.21	0.28	0.00	0.05	0.38
OC/RIA	0.79	0.28	0.62	0.95	1.00

Panel C. By industry

	Consumer	Manufacturing	High-tech	Healthcare	Other
Franchise value (FV)	610.56	580.63	934.58	717.28	446.15
Knowledge capital (KC)	21.47	56.89	133.03	164.71	1.16
Organization capital (OC)	201.98	131.98	195.92	230.19	106.28
Reproducible intangible assets (RIA)	241.02	193.97	342.91	403.67	108.45
RIA/Total capital	0.18	0.16	0.32	0.45	0.16
KC/RIA	0.08	0.17	0.36	0.46	0.03
OC/RIA	0.92	0.83	0.64	0.54	0.97

Table 2. Capitalization Parameter Estimates.

This table presents the estimated values of the parameters in the model for franchise value below:

$$MV_{i,j,t} = TA_{i,j,t} + BIA_{i,j,t} + \left((1-\tau_{i,j,0})\, R\&D_{i,j,0}/\left(\delta_{KC,j} + g_{\text{R\&D-growth},j}\right) + \sum_{s=0}^{t}\left(1-\delta_{KC,j}\right)^{s}(1-\tau_{i,j,t-s})\, R\&D_{i,j,t-s}\right) + \begin{pmatrix} \lambda_j \times (1-\tau_{i,j,0}) SG\&A_{i,j,0}/\left(\delta_{OC,j} + g_{\text{SG\&A-growth},j}\right) \\ + \sum_{s=0}^{t}\left(1-\delta_{OC,j}\right)^{s}\lambda_j \times (1-\tau_{i,j,t-s})\, SG\&A_{i,j,t-s} \end{pmatrix} + fv_{i,j,t} + \varepsilon_{i,j,t}$$

in which $MV_{i,j,t}$ is firm *i*'s market value of assets in industry *j* at the end of year *t*, measured as the sum of the market value of equity and the book value of total liabilities including current liabilities. $TA_{i,j,t}$ is the firm's tangible assets, $BIA_{i,j,t}$ is the firm's book intangible assets, $fv_{i,j,t}$ is the firm's unobserved true franchise value, and τ is the effective tax rate. Our estimation parameters are: $\delta_{KC,j}$, the depreciation rate for knowledge capital for industry *j*; $\delta_{OC,j}$, the depreciation rate for organization capital for industry *j*; λ_j, the portion of SG&A expenses that contributes to organization capital. We classify firms based on the Fama-French 5 industry classification system. The sample contains U.S. public firms from 1976 to 2020. The model fit (Pseudo-R^2) is computed as the percentage improvement in the mean squared error generated by the full model relative to the model with only a firm specific constant. Standard errors are bootstrapped with 1,000 replications at the firm-level and reported in parentheses. For column "All," we aggregate the estimated parameters across five industries by a weighted-average weighted by the number of observations in each industry.

	Consumer	Manufacturing	High-tech	Healthcare	Other	All
δ_{KC}	0.14	0.15	0.20	0.17	0.33	0.19
(s.e.)	*(0.07)*	*(0.04)*	*(0.03)*	*(0.01)*	*(0.09)*	
δ_{OC}	0.18	0.16	0.25	0.13	0.11	0.17
(s.e.)	*(0.17)*	*(0.11)*	*(0.11)*	*(0.11)*	*(0.04)*	
λ	0.22	0.31	0.49	0.57	0.31	0.37
(s.e.)	*(0.16)*	*(0.16)*	*(0.21)*	*(0.26)*	*(0.05)*	
Pesudo-R^2	81%	85%	79%	72%	80%	
No. of observations	40,551	46,209	42,573	22,048	24,624	176,005

Table 3. Comparison of Capitalization and Depreciation Parameters in the Literature.

This table summarizes and compares our estimates of R&D and SG&A capitalization parameters with the parameters in the literature. The intangible capitalization parameters are: (1) δ_{KC}, which is the depreciation rate for knowledge capital; (2) δ_{OC}, which is the depreciation rate for organization capital; and (3) λ, which is the portion of SG&A that builds organization capital. In Panel A, the table presents the estimates based on our franchise value model and the sample of U.S. public firms from 1976 to 2020, and summarizes the parameters in the literature. The industry classification is based on the Fama-French 5 Industry Classification system. In Panel B, the table displays the estimated parameters values in Li and Hall (2020), in which they use BEA-NSF data from 1987 to 2007, and presents the estimates based on our franchise value model with the sample of U.S. public firms from 1987 to 2007.

Panel A. Literature comparison

		Consumer	Manufacturing	High-tech	Healthcare	Other
Our paper (Compustat, 1976-2020)	δ_{KC}	0.14	0.15	0.20	0.17	0.33
	δ_{OC}	0.18	0.16	0.25	0.13	0.11
	λ	0.22	0.31	0.49	0.57	0.31
Lev and Sougiannis (1996) (Compustat, 1975-1991)	δ_{KC}	0.13-0.14	0.13-0.14	0.20	0.11	0.13-0.14
Hall (2007) (Compustat, 1974-2003)	δ_{KC}	0.19-0.36	0.19-0.36	0.31	0.15	0.19-0.36
Chan, et al. (2001) and others[a]	δ_{KC}			0.15 or 0.20		
Eisfeldt and Papanikolaou (2013) and others[b]	δ_{OC}			0.15 or 0.20		
Hulten and Hao (2008) and others[c]	λ			0.30		

[a] Chan et al. (2001), Hall et al. (2005), Bloom et al. (2013), and Tseng (2022) use 15%. Alternatively, Hirshleifer et al. (2013, 2018) use 20%.
[b] Eisfeldt and Papanikolaou (2013) use 15%. Alternatively, Hulten and Hao (2008), and Eisfeldt and Papanikolaou (2014) use 20%.
[c] Eisfeldt and Papanikolaou (2014), Zhang (2014)

Panel B. R&D depreciation rate in R&D intensive industries

		Pharmaceuticals	Computers and peripheral equipment	Semiconductor	Software
	SIC Code (4-digit)	(2830, 2831, 2833-2836)	(3570-3579, 3680-3689, 3695)	(3661-3666, 3669-3679)	(7372)
Li and Hall (2020) (BEA-NSF, 1987-2007)	δ_{KC}	0.11	0.36	0.23	0.31
Our paper (Compustat, 1987-2007)	δ_{KC}	0.11	0.35	0.20	0.27
	δ_{OC}	0.10	0.12	0.15	0.15
	λ	0.57	0.29	0.31	0.37

Table 4. Probability Transition Matrix.

The table presents the transition probability matrix on annual change of franchise value quartiles. The sample contains U.S. public firms from 1976 to 2020. A firm is sorted into four groups within an industry and in a year based on the quartile of franchise value. Q1 (Q4) denotes a group of firms with the lowest (highest) franchise value. The numbers in the table report the conditional probability that firms in a quartile in year *t* transit across quartiles in year *t* + 1.

Panel A. Full sample

		Quartile (year *t* + 1)			
	Quartile (in year *t*)	Q1	Q2	Q3	Q4
	Q1	75%	14%	7%	4%
	Q2	18%	62%	18%	2%
	Q3	9%	23%	55%	13%
	Q4	6%	3%	14%	78%

Panel B. By industry

Consumer	Q1	78%	12%	6%	4%
	Q2	15%	66%	17%	2%
	Q3	8%	23%	58%	11%
	Q4	5%	2%	13%	80%
Manufacturing	Q1	76%	14%	6%	5%
	Q2	17%	65%	16%	3%
	Q3	7%	20%	60%	13%
	Q4	5%	3%	14%	79%
High-tech	Q1	71%	17%	7%	5%
	Q2	19%	60%	19%	2%
	Q3	11%	24%	52%	13%
	Q4	8%	3%	14%	75%
Healthcare	Q1	71%	17%	7%	5%
	Q2	22%	54%	22%	3%
	Q3	11%	24%	48%	17%
	Q4	6%	3%	15%	76%
Other	Q1	75%	14%	7%	4%
	Q2	17%	62%	18%	2%
	Q3	9%	24%	54%	13%
	Q4	6%	2%	15%	77%

Table 5. Markups, Product Market Threat, and Labor Share.

The table reports OLS regression coefficients of the effects of markups, product market fluidity, and labor share, as well as the rank of franchise value. For the corresponding OLS regression models, see equation (11)-(13) in Section 4.1. In Columns 1-2, we use the production-based approach of markups from De Loecker et al. (2020). In Columns 3-4, we use the product market fluidity measure based on changes in key product words in firms' 10-Ks from Hoberg et al. (2014). In Columns 5-6, we compute the labor share as the payrolls-to-value-added, measured as the ratio of wage bills (*xlr*) to the sum of wage bills and EBITDA (*ebitda*), following Autor et al. (2020). Reproducible intangible is estimated from our franchise value model. The Rank FV variable is measured as follows. We sort firms into groups based on deciles of firm size (measured by market value of assets) within an industry and in a year. We then rank firms based on their franchise value in each group using a scale of 0-1. All specifications are estimated using OLS and include controls (log market capitalization and fixed effects for year and firm). For variable definitions and details of their construction, see Appendix A. Heteroskedasticity-consistent standard errors clustered at the firm level are shown in italics underneath the coefficient estimates. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

	Markup	Markup	Product market fluidity	Product market fluidity	Labor share	Labor share
	(1)	(2)	(3)	(4)	(5)	(6)
Rank FV	0.121***	0.120***	-0.341***	-0.210***	-0.127***	-0.149***
	0.011	*0.012*	*0.054*	*0.061*	*0.019*	*0.023*
Log(Market Cap)	0.054***	0.054***	0.335***	0.289***	-0.010	-0.013
	0.005	*0.006*	*0.021*	*0.023*	*0.011*	*0.015*
Log(Reproducible intangible)		-0.001		0.073**		-0.004
		0.009		*0.036*		*0.008*
Year FE?	yes	yes	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes	yes	yes
R-squared	79.90%	80.00%	72.90%	70.50%	54.60%	54.80%
No. of observations	129,923	129,755	115,936	109,103	15,762	10,787

Table 6. Investment-Q Relation and Franchise Value.

This table reports OLS regression coefficients of investment rates on lagged Tobin's Q. The sample contains U.S. public firms from 1976 to 2020. We employ two investment rate measures in Panel A. Tangible investment rate is measured as tangible investment divided by lagged tangible assets. Total investment rate is measured as total investment (tangible investment plus intangible investment) divided by lagged sum of tangible assets and intangible assets. We employ two Tobin's Q measures. Standard Q is measured as a firm's market value divided by tangible assets and Total Q is measured as a firm's market value divided by the sum of tangible assets and intangible assets. Appendix A provides the detailed variable definitions. Columns 1 regresses tangible investment rate on the baseline model that includes firm fixed effects and year fixed effects. Columns 2-3 regress the baseline model with an additional variable of lagged Standard Q or lagged Total Q. Column 4-6 regress the models that replace the tangible investment rate in Columns 1-3 with total investment rate. Panel B of reports OLS regression coefficients of total investment rates on lagged Total's Q and their interaction with a high franchise value dummy (High FV). High FV is an indicator equal to one when a firm's franchise value scaled by market value, belongs to the top quartile of firms in a year and within an industry. Within-firm R^2 are reported. Heteroskedasticity-consistent standard errors clustered at the firm level are shown in italics underneath the coefficient estimates. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

Panel A. Investment-Q regressions

	Tangible investment rate			Total investment rate		
	(1)	(2)	(3)	(4)	(5)	(6)
Lagged Standard Q		0.010***			0.008***	
		0.000			*0.000*	
Lagged Total Q			0.044***			0.045***
			0.001			*0.001*
Year FE?	yes	yes	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes	yes	yes
Within-firm R^2	8.11%	20.50%	23.70%	16.00%	24.90%	34.10%
No. of observations	127,668	124,884	124,884	127,668	124,884	124,884

Panel B. Investment-Q relation and franchise value

	Dependent variable: Total investment rate							
Subsample period	Full sample 1976-2020		1976-1990		1991-2005		2006-2020	
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Lagged Total Q	0.045***	0.052***	0.058***	0.064***	0.044***	0.049***	0.033***	0.043***
	0.001	*0.001*	*0.002*	*0.003*	*0.001*	*0.001*	*0.001*	*0.002*
High FV		0.048***		0.058***		0.050***		0.032***
		0.002		*0.004*		*0.003*		*0.004*
Lagged Total Q × High FV		-0.016***		-0.016***		-0.012***		-0.015***
		0.001		*0.003*		*0.001*		*0.002*
Year FE?	yes	Yes	yes	yes	yes	Yes	yes	yes
Firm FE?	yes	yes	yes	yes	yes	Yes	yes	yes
Within-firm R^2	34.10%	35.10%	23.10%	24.10%	33.00%	33.90%	25.50%	26.30%
No. of observations	124,884	124,884	36,869	36,869	50,854	50,854	37,161	37,161

Table 7. China and Franchise Value: A Quasi-natural Experiment.

This table reports difference-in-differences estimates of the effects of China being granted PNTR status on the rank of franchise value. The sample contains U.S. public firms from 1990 to 2007. NTR Gap is defined as the difference between non-NTR (normal trade relationship) tariff rates and NTR tariff rates. We follow Pierce and Schott (2016) to measure the NTR gap in 1999 and at the 4-digit SIC industry level. We proxy the competitive advantage based on a firm's product market fluidity (Hoberg et al., 2014) in 1999. Post is an indicator variable that equals one for observations on or after 2001. Controls are the log of market cap and the log of reproducible intangibles. For variable definitions and details of their construction, see Appendix A. Heteroskedasticity-consistent standard errors clustered at the industry level are shown in italics underneath the coefficient estimates. We use ***, **, and * to denote significance at the 1%, 5%, and 10% level, respectively.

	Dependent variable: Ranked franchise value					
	Full sample		High competitive advantage		Low competitive advantage	
	(1)	(2)	(3)	(4)	(5)	(6)
NTR Gap × Post	0.129**	0.178***	0.161*	0.168***	0.025	0.056
	0.056	*0.054*	*0.087*	*0.061*	*0.094*	*0.080*
Controls?		yes		yes		yes
Year FE?	yes	yes	yes	yes	yes	yes
Industry FE?	yes	yes	yes	yes	yes	yes
R-squared	5.1%	42.3%	12.2%	42.6%	7.8%	44.2%
No. of observations	24,721	24,708	7,499	7,498	10,282	10,280

Online Appendix

for

Franchise Value, Tobin's Q, and Markups

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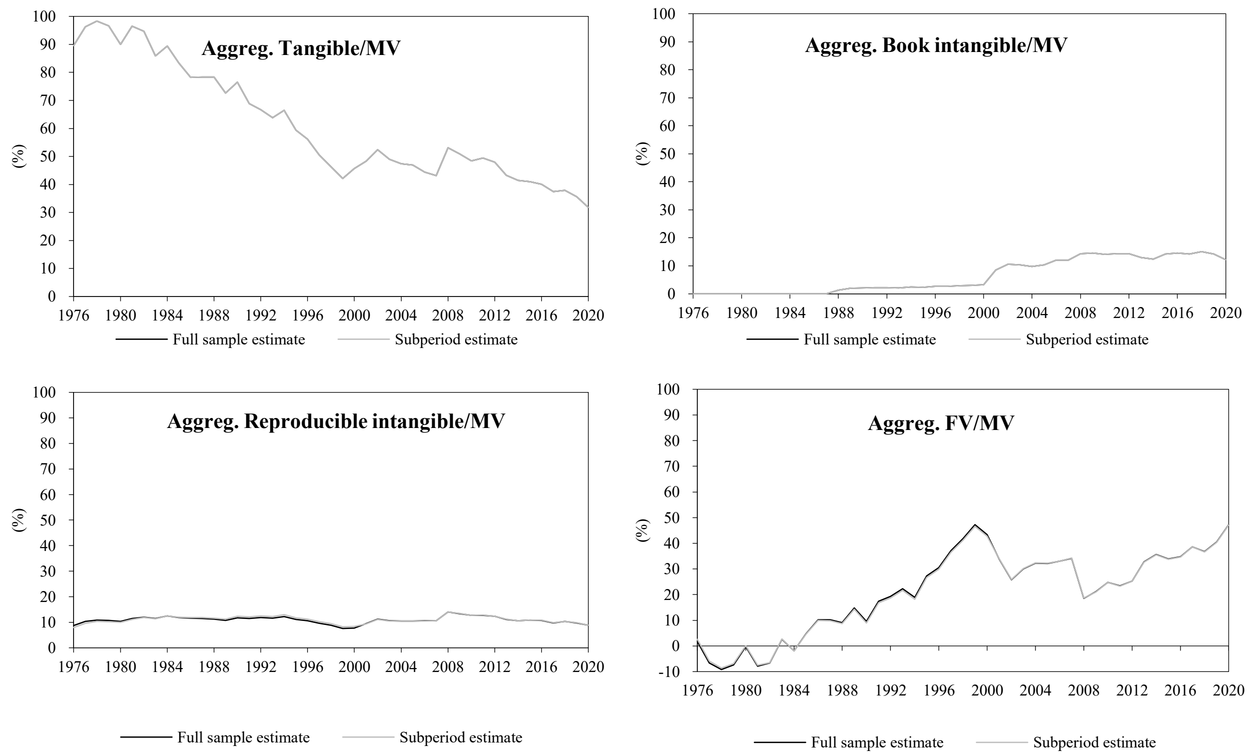


Figure OA1. Market Value Decomposition: Subperiod Estimated Parameters.
This figure plots the market value decomposition based on the subperiod estimated parameters. We re-estimate the franchise value model with two subperiods: 1976-2000 and 2001-2020. We use the subperiod estimates to measure the reproducible intangible assets. The black line plots the marker value decomposition, measured with the full sample estimates. The gray line plots the market value decomposition, measured separately on the two subperiod samples estimates. The market value decomposition contains four components: tangible assets, book intangible assets, reproducible intangible assets, and franchise value. The aggregate ratios are measured by aggregate tangible assets, book intangible assets, reproducible intangible assets, and franchise value to the aggregate market value across all firms in each year and denoted as: Aggreg. Tangible/MV, Aggreg. Book intangible/MV, Aggreg. Reproducible intangible/MV, and Aggreg. FV/MV.

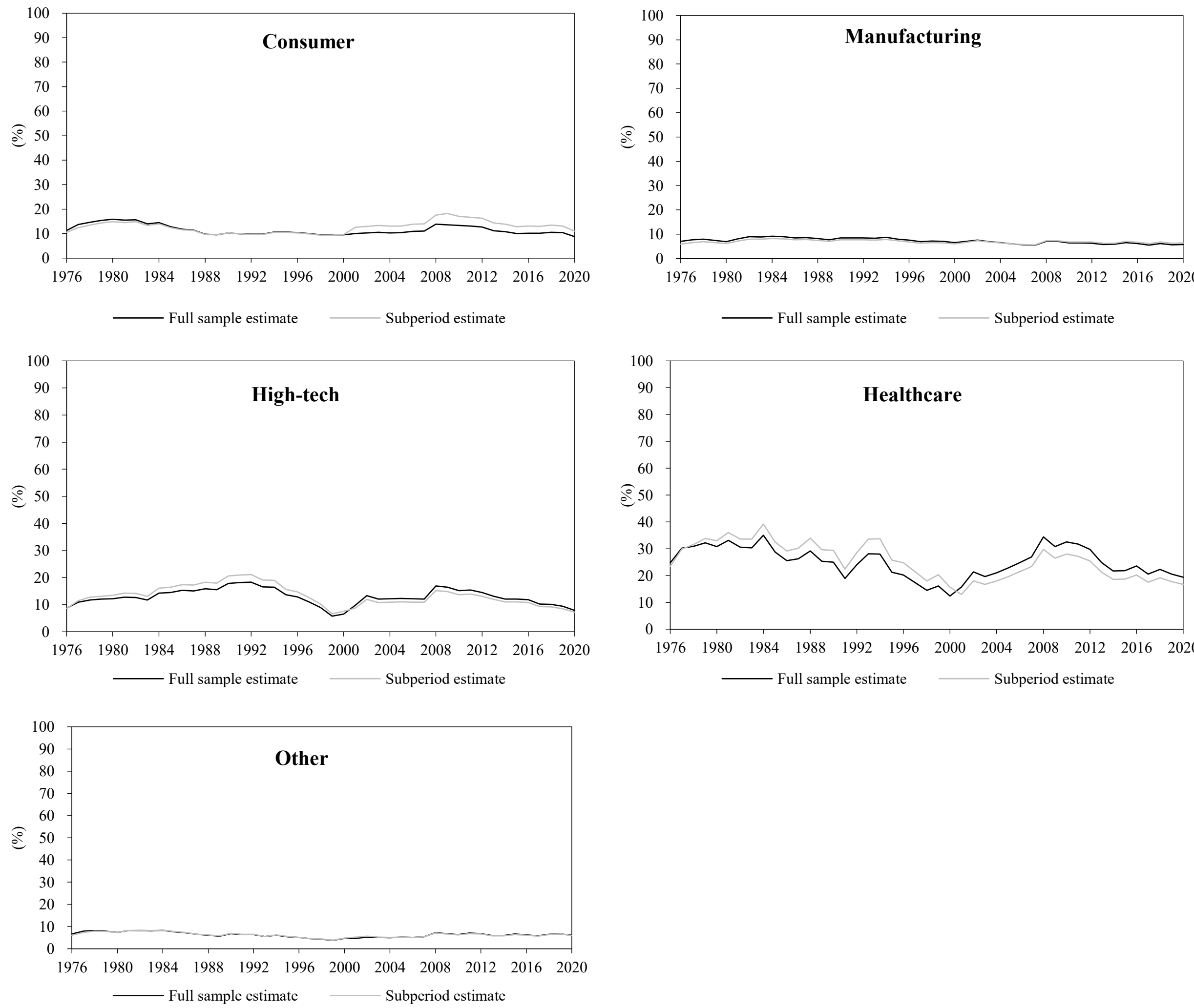
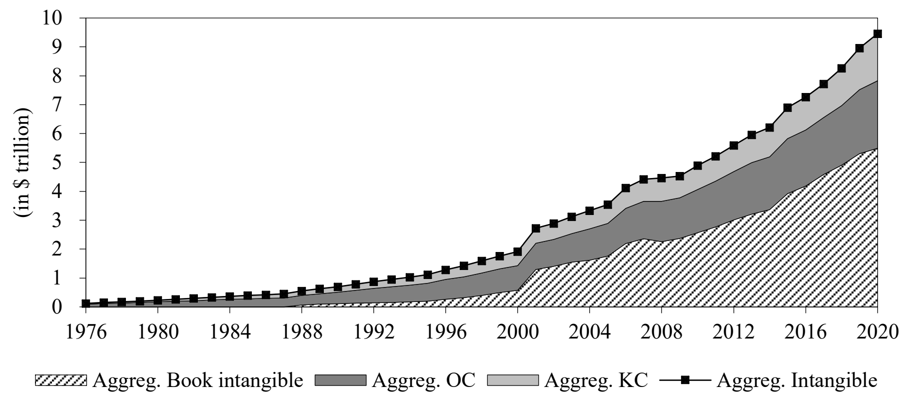


Figure OA2. Reproducible Intangible Assets by Industry: Subperiod Estimated Parameters. This figure presents the reproducible intangible assets based on the subperiod estimated parameters. Reproducible intangible assets is the sum of knowledge capital and organization capital. We re-estimate the franchise value model with two subperiods: 1976-2000 and 2001-2020. We use the subperiod estimates to measure the reproducible intangible assets. The black line plots the aggregate reproducible intangible assets, measured with the full sample estimates to the aggregate market value across firms in each year. The gray line plots the aggregate reproducible intangible assets, measured separately on the two subperiod samples estimates to the aggregate market value across firms in each year.

Figure OA3. Franchise Value by Industry: Subperiod Estimated Parameters.

This figure presents the franchise value based on the subperiod estimated parameters. We re-estimate the franchise value model with two subperiods: 1976-2000 and 2001-2020. We use the subperiod estimates to measure the franchise value. The black line plots the aggregate franchise value, measured with the full sample estimates to the aggregate market value across firms in each year. The gray line plots the aggregate franchise value, measured separately on the two subperiod samples estimates to the aggregate market value across firms in each year.

Panel A. Intangible assets decomposition (Aggregate amount)



Panel B. Intangible assets decomposition (Aggregate ratio)

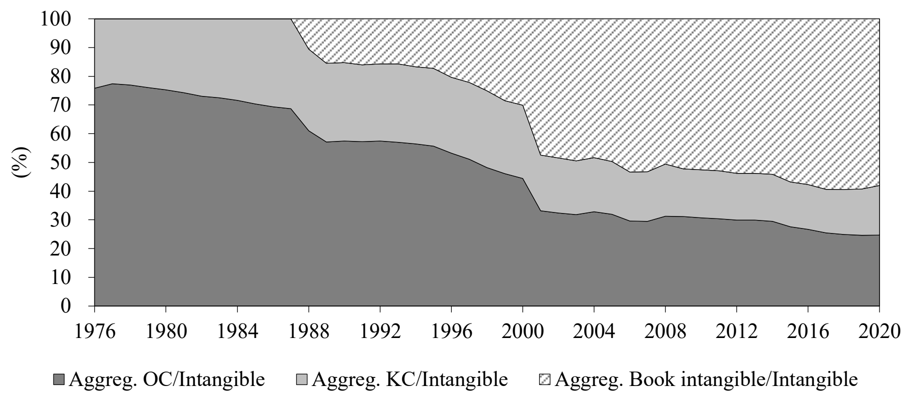
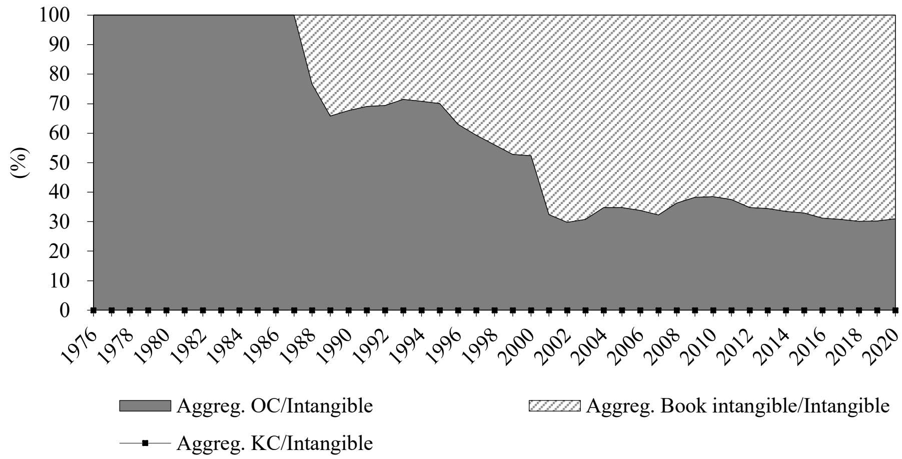


Figure OA4. Intangible Assets.
This figure presents the time-series profile of the intangible assets. Intangible assets is the sum of knowledge capital, and organization capital—both created based on our franchise value model, and book intangible assets. Panel A presents the aggregate amounts in each year, and Panel B presents the aggregate ratios measured by aggregate knowledge capital, organization capital, and book intangible assets to the aggregate intangible assets across all firms in each year and denoted as: Aggreg. KC/Intangible, Aggreg. OC/Intangible, and Aggreg. Book intangible/Intangible.

Panel A. Non-R&D firms



Panel B. R&D firms

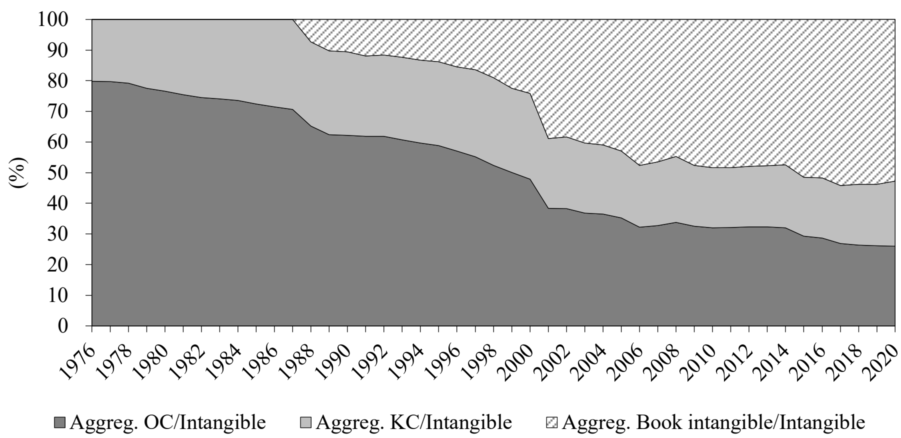


Figure OA5. Intangible Assets Decomposition: Non-R&D Firms vs. R&D Firms.
This figure presents the aggregate ratios as in Figure OA4, separately for Non-R&D firms (firms that do not report R&D or firms with zero R&D) (Panel A) and for R&D firms (firms that report R&D) (Panel B).

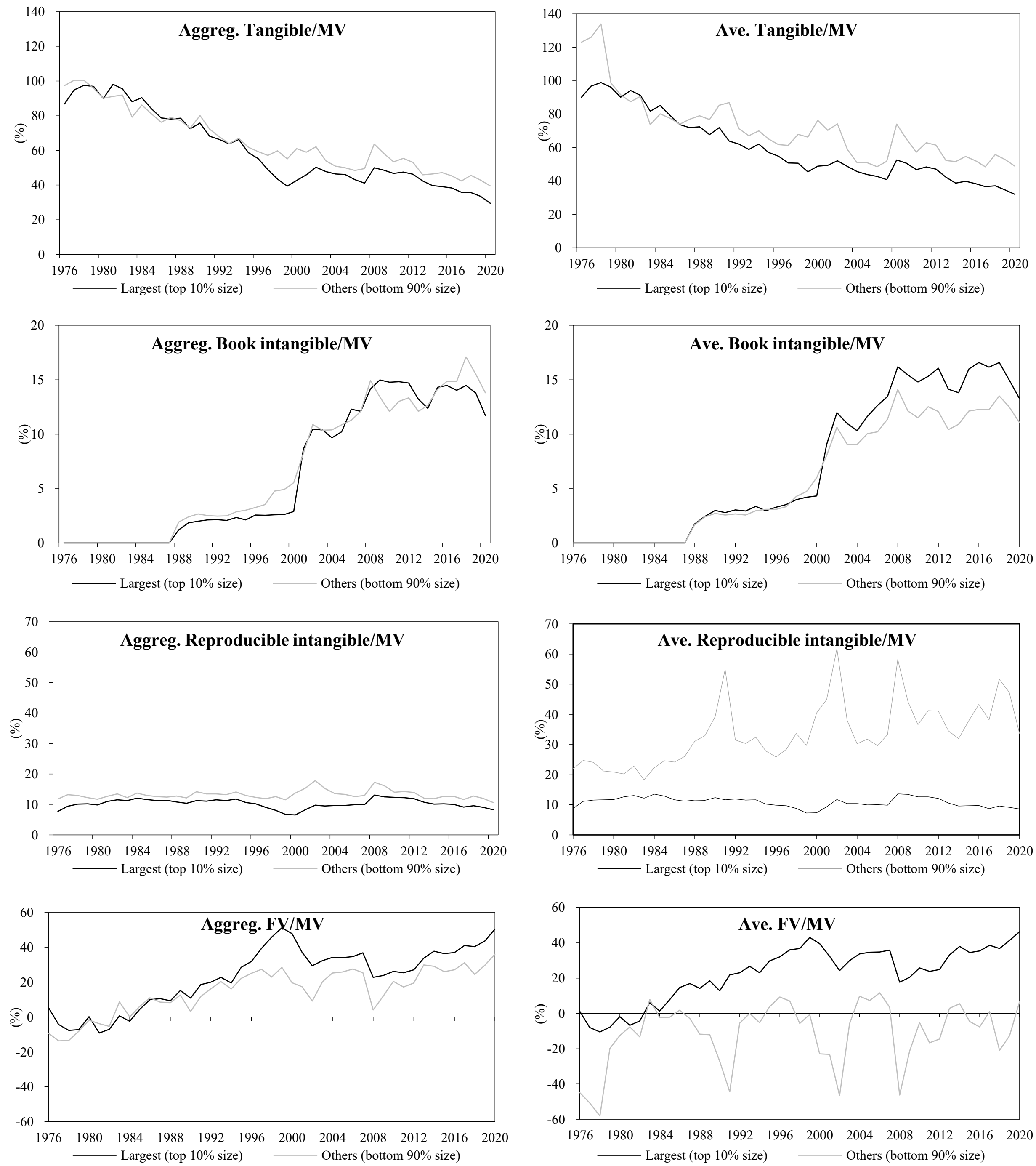


Figure OA6. Time-series of Market Value Decomposition: Largest Firms vs. Other Firms.
This figure plots trends in the aggregate and average decomposition ratios in the subsamples split by size (measured by market value): Largest firms (top 10%) vs. Others (bottom 90%).

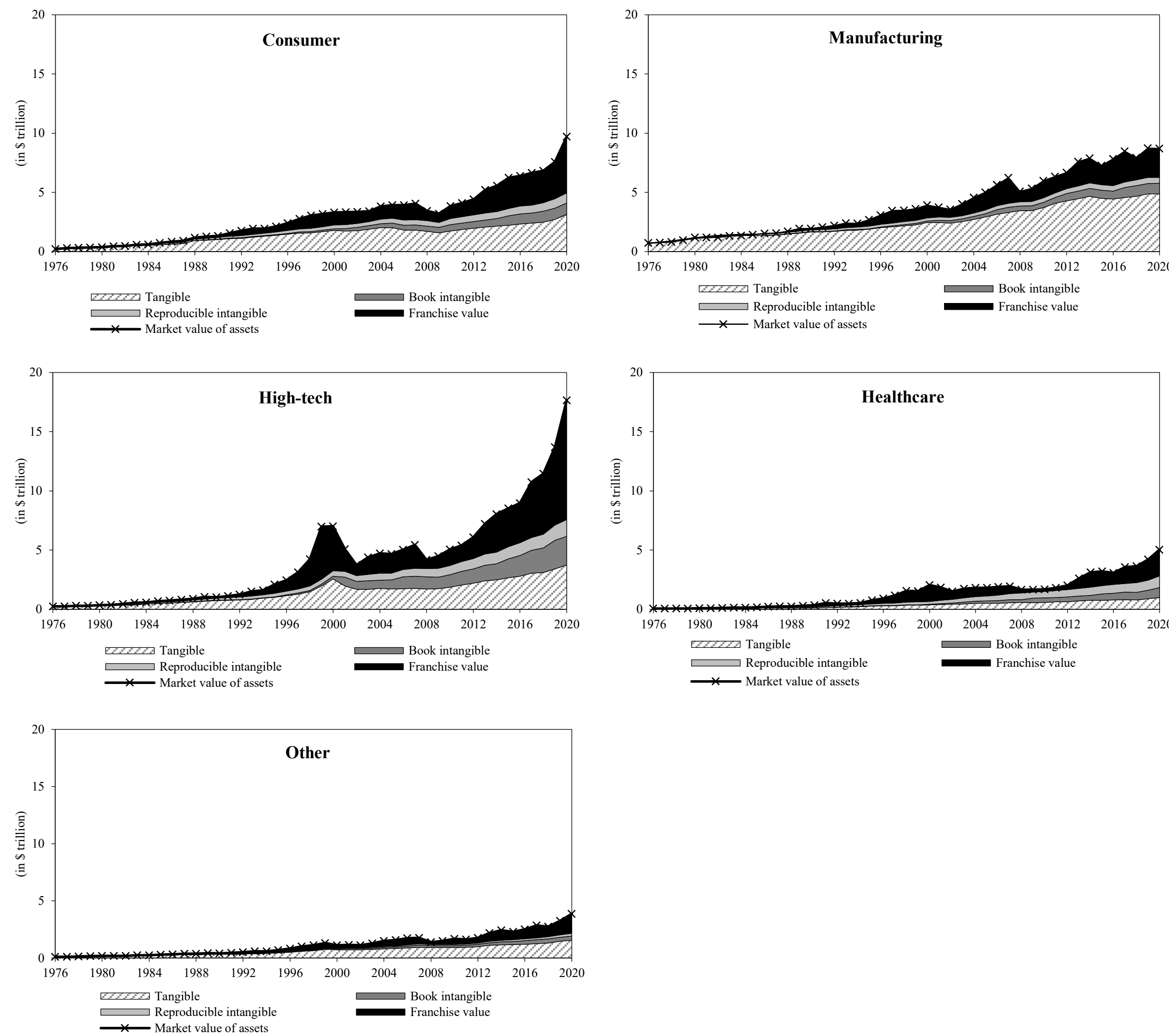


Figure OA7. Market Value Decomposition by Industry.

This figure presents the evaluation of the aggregate market value decomposition. The decomposition contains four components: tangible assets, book intangible assets, reproducible intangible assets, and franchise value. This figure plots a stacked graph of the aggregate amount of market value decomposition in each year.

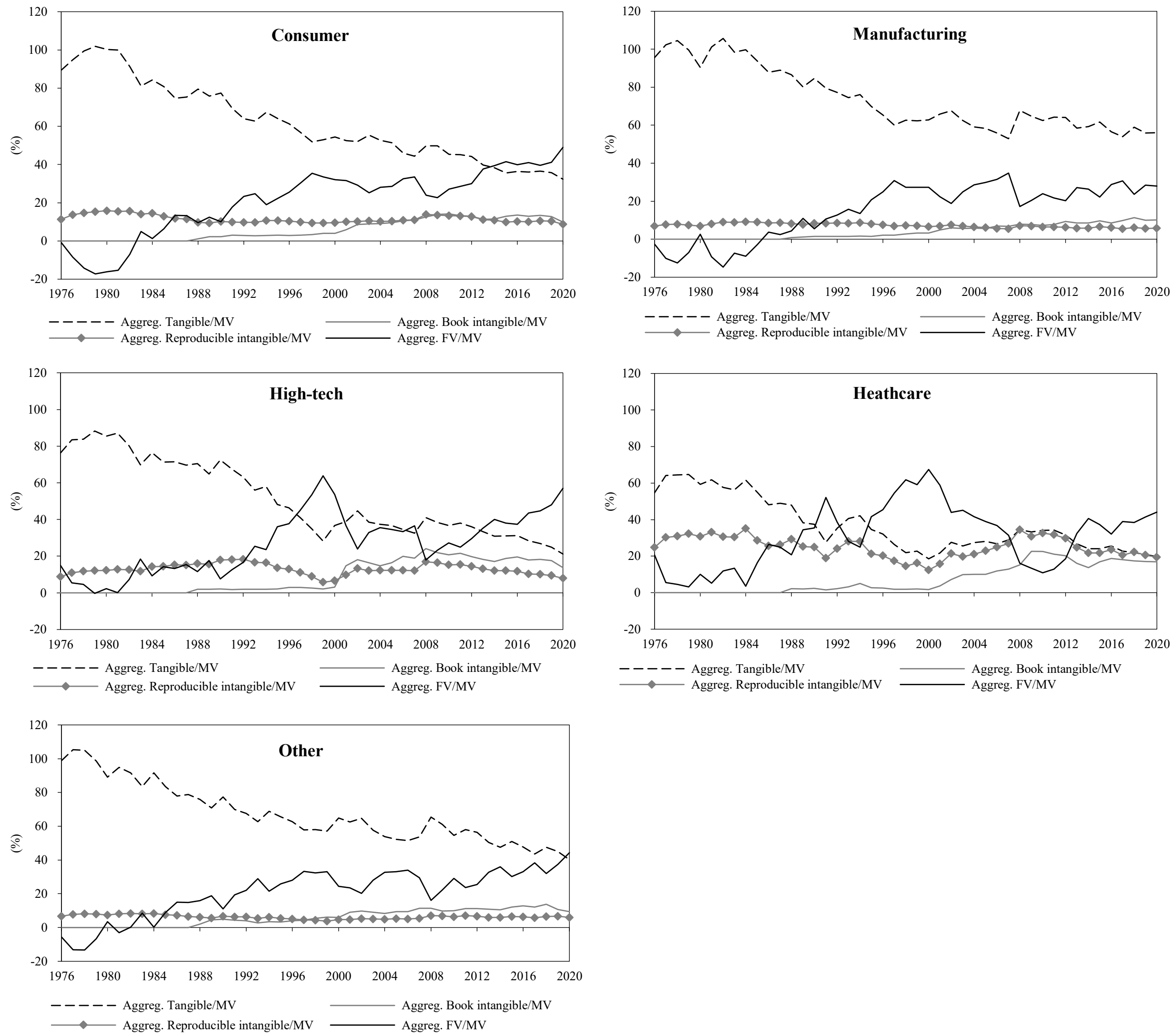


Figure OA8. Ratio of Market Value Decomposition by Industry.

This figure presents the time-series profile of the aggregate ratios of market value decomposition. The aggregate ratios of tangible assets, book intangible assets, reproducible intangible assets, and franchise value (Aggreg. Tangible/MV, Aggreg. Book intangible/MV, Aggreg. Reproducible intangible/MV, and Aggreg. FV/MV) is the ratio of the aggregate tangible assets, book intangible assets, reproducible intangible, and franchise value to aggregate market values across all firms in each year.

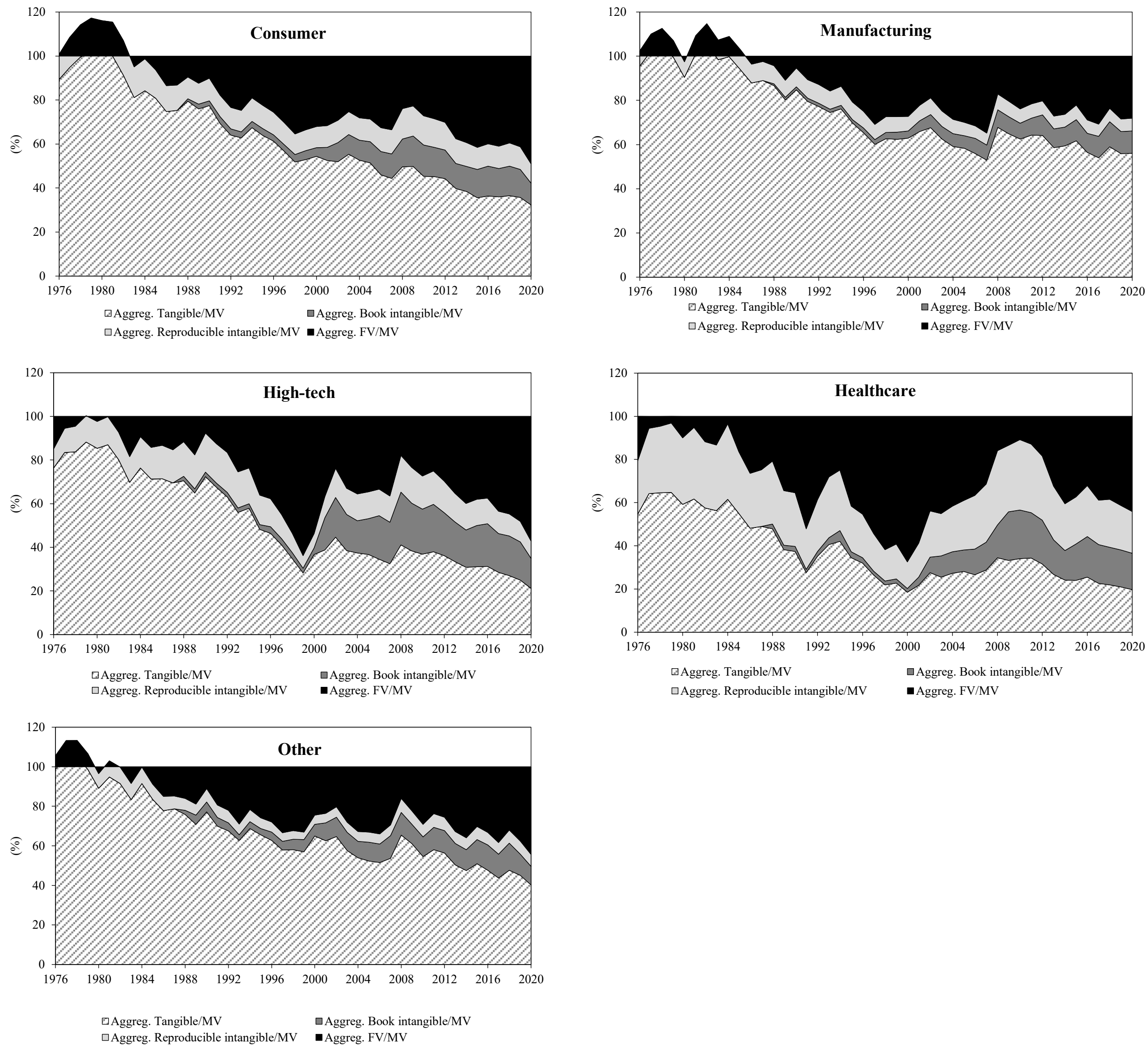


Figure OA9. Ratio of Market Value Decomposition by Industry (Stacked Graph).
This figure presents the graphs of Figure OA8 in a stacked chart.

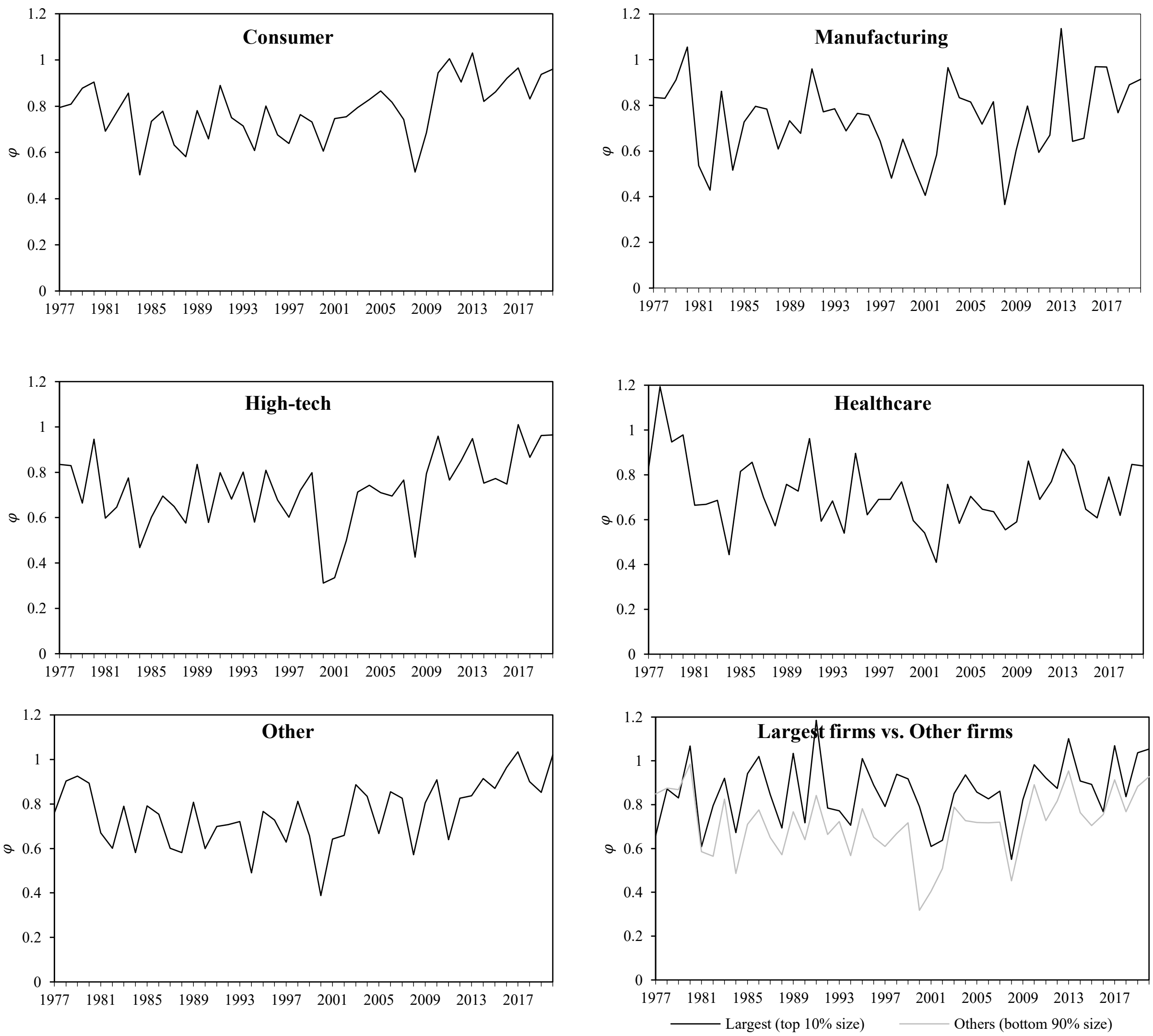


Figure OA10. Autocorrelation of Franchise Value by Industry and Firm Size.

This figure plots the coefficient on franchise value in the autoregressive model. We estimate the coefficient on lagged franchise value (relative to total capital) in the autoregressive model with the order of one: $(FV/Total\ capital)_{i,t} = \alpha + \varphi(FV/Total\ capital)_{i,t-1} + \xi_{i,t}$,. Total capital refers to the sum of tangible assets and intangible assets. The AR(1) model is estimated repeatedly every year from 1977 to 2020. The right-bottom graph is based on the subsamples split by size (measured by market value): Largest firms (top 10%) vs. Others (bottom 90%).

Table OA1. Missing R&D Observations.

This table presents the proportions of missing R&D, zero R&D, and positive R&D observations. The numbers indicate the proportion of firms do not report R&D expenditures (i.e., Missing R&D), zero R&D expenditures (i.e., Zero R&D), and positive R&D expenditures (i.e., Positive R&D) for the full sample and by industry.

	Full Sample	Consumer	Manufacturing	High-tech	Healthcare	Other
Missing-R&D	43%	47%	53%	22%	13%	79%
Zero-R&D	10%	31%	3%	2%	6%	9%
Positive-R&D	47%	22%	45%	76%	81%	12%

Table OA2. Capitalization Parameter Estimation: Two Parameter Model.

This table presents the parameters estimated in the non-linear function of our franchise value model, in which we require that the depreciation rates of knowledge capital and organization capital are identical (i.e., $\delta_{KC}=\delta_{OC}$).

	Consumer	Manufacturing	High-tech	Healthcare	Other	All
$\delta_{KC}=\delta_{OC}$	0.21	0.16	0.26	0.15	0.18	0.20
(s.e.)	*(0.09)*	*(0.05)*	*(0.07)*	*(0.03)*	*(0.04)*	
λ	0.24	0.31	0.59	0.61	0.38	0.41
(s.e.)	*(0.10)*	*(0.09)*	*(0.20)*	*(0.11)*	*(0.06)*	
Pesudo-R^2	81%	85%	79%	72%	80%	
No. of observations	40,551	46,209	42,573	22,048	24,624	176,005

Table OA3. Capitalization Parameter Estimates by Subperiod.

Panel A. Subsample period: 1976-2000

	Consumer	Manufacturing	High-tech	Healthcare	Other	All
δ_{KC}	0.06	0.13	0.13	0.03	0.27	0.12
(s.e.)	*(0.04)*	*(0.04)*	*(0.02)*	*(0.02)*	*(0.10)*	
δ_{OC}	0.25	0.17	0.32	0.17	0.12	0.22
(s.e.)	*(0.04)*	*(0.02)*	*(0.15)*	*(0.07)*	*(0.02)*	
λ	0.22	0.27	0.66	0.68	0.32	0.39
(s.e.)	*(0.02)*	*(0.01)*	*(0.26)*	*(0.13)*	*(0.02)*	
Pesudo-R^2	75%	82%	73%	68%	74%	
No. of observations	27,825	31,864	24,862	10,475	16,034	111,060

Panel B. Subsample period: 2001-2020

	Consumer	Manufacturing	High-tech	Healthcare	Other	All
δ_{KC}	0.25	0.48	0.27	0.22	0.41	0.32
(s.e.)	*(0.05)*	*(0.04)*	*(0.04)*	*(0.02)*	*(0.11)*	
δ_{OC}	0.13	0.10	0.21	0.13	0.11	0.14
(s.e.)	*(0.01)*	*(0.00)*	*(0.02)*	*(0.01)*	*(0.01)*	
λ	0.26	0.32	0.43	0.51	0.30	0.37
(s.e.)	*(0.01)*	*(0.01)*	*(0.02)*	*(0.03)*	*(0.01)*	
Pesudo-R^2	77%	80%	78%	69%	75%	
No. of observations	12,726	14,345	17,711	11,573	8,590	64,945

Table OA4. Persistence of Franchise Value by Industry.

This table presents the probability of maintaining Q1 or Q4 for *n* consecutive years across industries. A firm is classified into four groups in a year and within an industry based on the quartile of franchise value. Q1 (Q4) denotes a group of firms with the lowest (highest) franchise value. Q1(*t*)-Q1(*t* + *n*) indicates the probability that a firm with Q1 rank consecutively maintains Q1 rank for *n* years. Q4(*t*)-Q4(*t* + *n*) indicates the probability that a firm with Q4 rank consecutively maintains Q4 rank for *n* years.

Panel A. Full sample

		n-years				
		1	*2*	*3*	*4*	*5*
	Q1(*t*)-Q1(*t* + *n*)	75%	59%	49%	41%	34%
	Q4(*t*)-Q4(*t* + *n*)	78%	65%	58%	52%	48%

Panel B. By industry

Consumer	Q1(*t*)-Q1(*t* + *n*)	78%	65%	55%	47%	40%
	Q4(*t*)-Q4(*t* + *n*)	80%	69%	61%	56%	52%
Manufacturing	Q1(*t*)-Q1(*t* + *n*)	76%	61%	50%	42%	35%
	Q4(*t*)-Q4(*t* + *n*)	79%	67%	58%	52%	48%
High-tech	Q1(*t*)-Q1(*t* + *n*)	71%	55%	44%	37%	30%
	Q4(*t*)-Q4(*t* + *n*)	75%	62%	54%	49%	44%
Healthcare	Q1(*t*)-Q1(*t* + *n*)	71%	54%	42%	33%	27%
	Q4(*t*)-Q4(*t* + *n*)	76%	63%	56%	50%	46%
Other	Q1(*t*)-Q1(*t* + *n*)	75%	60%	50%	42%	35%
	Q4(*t*)-Q4(*t* + *n*)	77%	65%	57%	52%	48%

Table OA5. Summary Statistics of Regressions Variables (Table 5-7).

Panel A. Full sample

	Mean	Std	P25	P50	P75	No. of observations
Markup	1.53	0.76	1.10	1.29	1.64	130,951
Product market fluidity	6.93	3.55	4.32	6.25	8.80	117,029
Labor share	0.55	0.52	0.40	0.64	0.78	16,072
Log(Market Cap)	5.42	2.26	3.74	5.26	7.00	175,985
Log(Reproducible intangible)	3.52	2.05	2.04	3.45	4.89	163,848
Rank FV	0.51	0.29	0.26	0.51	0.76	176,005
Standard Q	3.84	8.56	0.41	1.05	3.22	138,532
Total Q	1.18	1.85	0.26	0.65	1.34	138,532
Tangible investment rate	0.16	0.18	0.06	0.11	0.19	127,668
Total investment rate	0.23	0.18	0.11	0.18	0.29	127,668

Panel B. By industry

	Consumer	Manufacturing	High-tech	Healthcare	Other
Markup	1.32	1.33	1.82	2.04	1.39
Product market fluidity	5.02	6.40	7.29	9.95	6.71
Labor share	0.65	0.46	0.53	0.42	0.66
Log(Market Cap)	5.38	5.73	5.29	5.13	5.39
Log(Reproducible intangible)	3.39	3.34	3.78	4.00	3.12
Rank FV	0.51	0.51	0.51	0.52	0.51
Standard Q	2.09	1.35	6.88	9.56	2.99
Total Q	0.98	0.75	1.69	1.74	1.20
Tangible investment rate	0.16	0.13	0.20	0.18	0.18
Total investment rate	0.23	0.17	0.32	0.28	0.20

Table OA6. Alternative Markup Measures.

The table reports the results with two alternative markup measures. We replace the markup measure of De Loecker et al. (2020) with the following two alternative measures in Table 5:

$\text{Markup_1} = $ (Sales revenue-Cost of goods sold)/Cost of goods sold

$\text{Markup_2} = $ [Sales revenue-(Cost of goods sold + SG&A)]/(Cost of goods sold + SG&A)

We rerun Columns 1 and 2 of Table 5 for each alternative markup measure.

	Markup_1 (1)	Markup_1 (2)	Markup_2 (3)	Markup_2 (4)
Rank FV	0.079***	0.190***	0.074***	0.105***
	0.020	*0.023*	*0.012*	*0.014*
Log(Market Cap)	0.106***	0.068***	0.063***	0.054***
	0.010	*0.009*	*0.005*	*0.006*
Log(Reproducible intangible)		0.075		0.013
		0.015		*0.009*
Year FE?	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes
R-squared	68.70%	68.90%	71.30%	72.00%
No. of observations	171,752	159,735	173,688	161,670

Table OA7. Markups, Product Market Threat, and Labor Share by Industry.

Panel A. Consumer

	Markup	Product market fluidity	Labor share
	(1)	(2)	(3)
Rank FV	0.105***	-0.318**	-0.152***
	0.014	*0.121*	*0.039*
Log(Market Cap)	-0.000	0.199***	-0.039
	0.007	*0.053*	*0.027*
Log(Reproducible intangible)	0.040***	-0.112	0.055**
	0.011	*0.083*	*0.024*
Year FE?	yes	yes	yes
Firm FE?	yes	yes	yes
R-squared	81.30%	58.30%	51.10%
No. of observations	34,032	24,240	2,995

Panel B. Manufacturing

Rank FV	0.033**	-0.141	-0.116***
	0.015	*0.132*	*0.031*
Log(Market Cap)	0.077***	0.389***	-0.046
	0.009	*0.066*	*0.037*
Log(Reproducible intangible)	-0.069***	0.134	-0.042
	0.011	*0.102*	*0.044*
Year FE?	yes	yes	yes
Firm FE?	yes	yes	yes
R-squared	69.20%	70.20%	56.10%
No. of observations	32,664	23,238	2,842

Panel C. High-tech

Rank FV	0.245***	-0.319***	-0.373***
	0.033	*0.100*	*0.129*
Log(Market Cap)	0.050***	0.271***	0.089*
	0.011	*0.035*	*0.053*
Log(Reproducible intangible)	0.008	0.007	-0.045
	0.018	*0.051*	*0.037*
Year FE?	yes	yes	yes
Firm FE?	yes	yes	yes
R-squared	80.90%	68.40%	56.30%
No. of observations	34,407	31,150	1,144

Panel D. Healthcare

Rank FV	0.203***	-0.300*	-0.049
	0.077	*0.165*	*0.114*
Log(Market Cap)	0.144***	0.316***	-0.028
	0.026	*0.051*	*0.044*
Log(Reproducible intangible)	0.068	0.047	-0.023
	0.048	*0.099*	*0.025*
Year FE?	yes	yes	yes
Firm FE?	yes	yes	yes
R-squared	77.30%	78.00%	56.00%
No. of observations	11,788	17,113	1,280

Panel E. Other

Rank FV	0.137***	-0.422***	-0.074*
	0.029	*0.162*	*0.043*
Log(Market Cap)	0.020	0.308***	-0.047**
	0.013	*0.061*	*0.021*
Log(Reproducible intangible)	0.009	-0.106	0.009
	0.024	*0.083*	*0.013*
Year FE?	yes	yes	yes
Firm FE?	yes	yes	yes
R-squared	74.20%	65.10%	54.20%
No. of observations	16,864	14,362	2,526

Table OA8. Investment-Q Relation by Industry.

Panel A. Consumer

	Tangible investment rate		Total investment rate	
	(1)	(2)	(3)	(4)
Lagged Standard Q	0.006***		0.003***	
	0.001		*0.001*	
Lagged Total Q		0.042***		0.048***
		0.002		*0.002*
Year FE?	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes
Within-firm R^2	18.90%	21.30%	22.00%	36.50%
No. of observations	36,254	36,254	36,254	36,254

Panel B. Manufacturing

Lagged Standard Q	0.006***		0.003***	
	0.001		*0.000*	
Lagged Total Q		0.048***		0.039***
		0.002		*0.002*
Year FE?	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes
Within-firm R^2	14.10%	18.40%	14.30%	27.10%
No. of observations	41,999	41,999	41,999	41,999

Panel C. High-tech

Lagged Standard Q	0.006***		0.004***	
	0.000		*0.000*	
Lagged Total Q		0.040***		0.038***
		0.001		*0.001*
Year FE?	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes
Within-firm R^2	30.80%	29.00%	34.60%	46.90%
No. of observations	37,539	37,539	37,539	37,539

Panel D. Healthcare

Lagged Standard Q	0.004***		0.002***	
	0.000		*0.000*	
Lagged Total Q		0.038***		0.033***
		0.002		*0.001*
Year FE?	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes
Within-firm R^2	21.50%	16.60%	20.10%	32.90%
No. of observations	19,185	19,185	19,185	19,185

Panel E. Other

Lagged Standard Q	0.005***		0.002***	
	0.000		*0.000*	
Lagged Total Q		0.032***		0.028***
		0.002		*0.001*
Year FE?	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes
Within-firm R^2	14.60%	14.40%	14.60%	24.20%
No. of observations	21,305	21,305	21,305	21,305

Table OA9. Investment-Q Relation: High vs. Low Franchise Value.

Panel A. Total investment rate (Full period: 1976-2020)

	Consumer	Manufacturing	High-tech	Healthcare	Other
	(1)	(2)	(3)	(4)	(5)
Lagged Total Q	0.046***	0.061***	0.050***	0.049***	0.052***
	0.003	*0.003*	*0.001*	*0.002*	*0.003*
High FV	0.041***	0.041***	0.067***	0.057***	0.057***
	0.005	*0.004*	*0.005*	*0.008*	*0.006*
Lagged Total Q × High FV	-0.011***	-0.023***	-0.014***	-0.018***	-0.023***
	0.003	*0.004*	*0.002*	*0.003*	*0.003*
Year FE?	yes	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes	yes
Within-firm R^2	36.70%	24.90%	49.80%	32.30%	27.90%
No. of observations	30,609	37,377	28,577	12,190	16,131

Panel B. Total investment rate (Subperiod: 1976-1990)

	Consumer	Manufacturing	High-tech	Healthcare	Other
Lagged Total Q	0.052***	0.060***	0.063***	0.065***	0.070***
	0.005	*0.008*	*0.004*	*0.008*	*0.008*
High FV	0.057***	0.041***	0.087***	0.056***	0.049***
	0.007	*0.006*	*0.010*	*0.024*	*0.013*
Lagged Total Q × High FV	-0.001*	0.002	-0.025***	-0.019*	-0.019**
	0.006	*0.009*	*0.005*	*0.010*	*0.009*
Year FE?	yes	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes	yes
Within-firm R^2	19.00%	23.80%	38.70%	34.60%	17.40%
No. of observations	10,497	14,228	5,720	1,701	4,723

Panel C. Total investment rate (Subperiod: 1991-2005)

	Consumer	Manufacturing	High-tech	Healthcare	Other
Lagged Total Q	0.048***	0.058***	0.046***	0.045***	0.052***
	0.003	*0.004*	*0.001*	*0.003*	*0.003*
High FV	0.041***	0.039***	0.070***	0.074***	0.069***
	0.006	*0.006*	*0.007*	*0.011*	*0.010*
Lagged Total Q × High FV	-0.009***	-0.021***	-0.011***	-0.019***	-0.019***
	0.003	*0.005*	*0.002*	*0.004*	*0.004*
Year FE?	yes	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes	yes
Within-firm R^2	33.40%	21.40%	48.10%	26.00%	27.30%
No. of observations	12,273	13,710	12,922	5,324	6,625

Panel D. Total investment rate (Subperiod: 2006-2020)

	Consumer	Manufacturing	High-tech	Healthcare	Other
Lagged Total Q	0.026***	0.058***	0.046***	0.046***	0.040***
	0.007	*0.006*	*0.002*	*0.003*	*0.006*
High FV	0.017*	0.028***	0.040***	0.045***	0.027***
	0.010	*0.009*	*0.006*	*0.011*	*0.009*
Lagged Total Q × High FV	-0.003	-0.021***	-0.018***	-0.015***	-0.014**
	0.007	*0.007*	*0.003*	*0.004*	*0.007*
Year FE?	yes	yes	yes	yes	yes
Firm FE?	yes	yes	yes	yes	yes
Within-firm R^2	26.70%	23.90%	33.40%	27.60%	25.80%
No. of observations	7,839	9,439	9,935	5,165	4,783

Table OA10. China and Total Q: A Quasi-natural Experiment.

	Dependent variable: Total Q					
	Full sample		High competitive advantage		Low competitive advantage	
	(1)	(2)	(3)	(4)	(5)	(6)
NTR Gap × Post	0.279	0.286	0.486	0.344	0.215	0.368
	0.304	*0.247*	*0.296*	*0.233*	*0.65*	*0.395*
Controls?		yes		yes		yes
Year FE?	yes	yes	yes	yes	yes	yes
Industry FE?	yes	yes	yes	yes	yes	yes
Firm FE?						
R-squared	9.90%	48.40%	12.50%	45.60%	11.50%	54.00%
No. of observations	20,179	20,169	6,279	6,279	8,643	8,641