Is There Super-normal Profit in Real Estate Development?*

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Abstract

This paper explores the question of whether real estate development projects systematically present positive net present value (NPV) and therefore, provide super-normal profit. Such projects are the products of a business operation that governs the exercise of the real call option on development that is represented by developable land. We find that super-normal profits do tend to exist in the investment property development projects produced by publicly-traded equity real estate investment trusts (REITs). Specifically, we find that, over the 1998-2018 period, REITs' Tobin's-Q ratios increase significantly as a function of the ratio of development assets to total assets in the firm, controlling for other factors. This added value is net of land cost and is at the firm level, therefore also net of overhead and search costs associated with the real estate development business operation. Our findings suggest either that the commercial real estate development industry tends to be broadly characterized by super-normal profits, or that there is a beneficial capital allocational efficiency effect of the stock market in attracting, supporting or cultivating firms that are particularly successful at real estate development of investment properties.

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1 Introduction & Background

This paper explores the question of whether commercial real estate development (RED) projects systematically provide super-normal profit. We focus on the development of medium to large scale investment property by publicly-traded real estate investment trusts (REITs). Super-normal profit equates to positive NPV in the projects, ex ante, expected returns in excess of the opportunity cost of capital (OCC) of the projects, that is, more return on average than is warranted by the amount of risk in the investment or, correspondingly, less risk than is implied by the average project returns. If it were possible to invest purely in such real estate development projects directly, such a strategy would systematically and persistently "beat the market", relative to investments priced at fair market value in the capital market. Systematic super-normal profit creates additional market value in a publicly-traded firm's equity shares.

The question of super-normal profit in RED is of interest for several reasons. First, if super-normal profits are prevalent in real estate development projects in general, it raises interesting economic questions. Classical micro-economic and industrial organization theory states that in a competitive industry, super-normal profits should not be systematically and persistently present. Casual observation would seem to suggest that real estate development is indeed a highly competitive industry in the United States. There are numerous firms, low barriers to entry, and no major apparent economies of scale in production as firms of all sizes seem to thrive. Similarly, the efficient market paradigm in capital market theory suggests that it should not be possible to systematically and persistently "beat the market", where in this case the market in question is the direct private market for commercial property assets (not the stock market). On the other hand, because of the local nature of real estate markets, in any given metropolitan area firms capable of managing the development of large-scale commercial projects may not be very numerous, and each land site is unique to some degree. The possibility for systematic super-normal profit is therefore an open and interesting question about the industry.

Secondly, real estate development is a large and important sector of the US economy, with construction generally accounting for over six percent of the GDP and non-residential construction alone employing over 800,000 workers. More importantly, real estate development tremendously affects the physical and social environment. It is how cities are built. It is an important industry to

understand from an economic and investment perspective, for reasons that go beyond just economics and investment. Widespread and persistent super-normal profits could suggest that less real estate development is occurring in the economy than would be optimal from a social welfare perspective.

The question of super-normal profits in real estate development also is intriguing from the perspective of several strands of modern business and financial economic theory. The construction of a real estate development project can be viewed as the exercise of a "real option". Empirical evidence about the economics of real estate development projects may hold implications about option value theory. The theory of innovation and business models also comes into play, as many development projects may have characteristics of product or process innovations, and the possibility for super-normal profits may be a function of the type of business model development firms adopt. Large-scale commercial and mixed-use projects tend to be heterogeneous and unique, often employing creative designs, and likely possessing some degree of market power, if for no other reason than that at the micro-level, locations and sites are unique. Search theory intersects with at least one of the major business models applicable to the real estate development industry, as independent firms specializing in real estate development must find suitable land sites and opportunities for construction projects, or suitable development opportunities for owned land sites.

Finally, the present study may hold implications about the nature and role of the stock market. Most firms that develop commercial property are not publicly traded. But we study the subset that are traded as real estate investment trusts (REITs) in the pubic equity market. Our findings therefore say something not only about the real estate development industry, but also about the stock exchange. Perhaps the informational efficiency, liquidity, and transparency of the public equity market supports a Darwinian type process that attracts, supports, or cultivates firms that tend to be systematically and persistently particularly successful in commercial property development. Whether super-normal profit is a characteristic of real estate development, or of the stock market, this paper cannot determine, but either finding is interesting.

In this paper, we examine stock market valuation-based evidence of super-normal profits (positive NPV) at the firm level using REITs' development assets. The REITs we examine are publicly-traded firms that are effectively pure plays in investment property. REITs are an important sector in the stock market, and are important players in the commercial property market. Some 200 REITs have a total stock market capitalization of approximately $1 trillion, holding income generating

property assets worth approximately $1.5 trillion.[1] Many, but not all, REITs engage in various types of RED to varying degrees. Though REIT RED is far from the totality of RED in the US, it is a substantial and important component of the industry. REIT RED regularly accounts for over $30 billion per year in RED projects (which is some 20% of all development of investment properties), and around 70% of REITs engage in development to some degree, though development is a small portion of REITs' total assets, which are primarily productive income-generating property assets. (See Figure 1 below.) The information richness and informational efficiency of the stock market, together with consideration of the business models that can theoretically characterize the RED industry, enable us to shed a new and different light on the question of the profitability of RED projects and the RED industry.

[Insert Figure 1 around here]

At this point we should note a distinction. We are not studying the efficiency of the stock market. We are not claiming that the ability of a firm to systematically produce postive NPV from RED activity should or would necessarily lead to the firm persistently generating super-normal returns in its share price. If the market is efficient, the firm's value creation capability will be impounded in the level of the firm's stock price, hence, reflected in the firm's Tobin's-Q. Any "pop" in share price or super-normal stock returns would presumably have happened historically, perhaps very gradually (or even possibly in the firm's IPO price), as the market recognized the firm's capability. We are not doing an event study or a study of the effect of individual or specific RED projects or announcements, but rather our focus is the firm's general capabilities, as reflected in the *average* RED project as recognized by the stock market, not claiming that all projects are successful. Concomitantly, we are not studying how RED activity affects the investment risk of the firm's stock. Though RED projects may be more risky than stabilized income-generating property holdings and *ceteris paribus* that should increase the firm's stock's volatility, that does not negate the possibility for such RED projects to add value, that is, to present positive NPV.

In brief, our findings suggest that super-normal profits do tend to exist systematically in the real estate development projects produced by REITs. Consistent with development projects profiting

[1] This compares to a total of $4.4 trillion multi-family and non-farm non-residential mortgages outstanding as of 1Q2019 according to the Federal Reserve Bank (FRB).

from some market power, we find that REIT Tobin's-Q ratios are positively related to the proportion of the REITs total assets in development projects after controlling for other factors that could influence the Tobin's-Q of the firm. The findings suggest positive NPV in RED projects sufficient to more than cover RED business search and overhead costs, since those would also be reflected in the firm's stock price and hence in the Tobin's Q. It is likely that some, perhaps much, of the Tobin's-Q effect may reflect anticipated profits from future projects, the stock market's perception that the REIT can persistently generate super-normal profits in development, with construction in progress or the development pipeline being a signal to the stock market for that business strategy.

We run a number of tests to assess the robustness of our results. First, we address the concern that REITs that do development may differ in some characteristics from other REITs and these characteristics may influence the Tobin's-Q. To deal with this issue, we match each firm with high development exposure (development real estate assets $> 90^{th}$ percentile) to its closest control firm with very low development exposure (development real estate assets $< 10^{th}$ percentile), identified based on firm size, leverage, cash holdings and exact matching on year. Our results remain robust while using the matched sample. Second, we show that results remain robust when instead of Tobin's-Q, which is an objective accounting-based metric with a pedigree in the financial economics literature, we use the price to net asset value (P/NAV) ratio as an alternative indicator of value creation. The P/NAV ratio is a subjective estimate, but it is widely considered in practice in the real estate investment industry, since in the case of real estate NAV can be estimated based on valuation metrics in the private property market. Finally, we we examine the effect of "boom" and "bust" periods, just before, and during, the Global Financial Crisis. Not surprisingly, the ability of REITs to create value through RED projects was bolstered during the boom, and hampered during the bust.

The remainder of this paper is divided into four sections. Section 2 presents the overall theoretical model and framework, together with a review of some relevant literature. Section 3 discusses the data and econometric methodology. Section 4 presents the results. Section 5 concludes.

2 Theoretical Framework and Literature Review

In this section we present our basic theoretical framework and strategy for empirical analysis, followed by a review of some relevant literature.

2.1 Overview of Theoretical Framework

We begin with a basic theoretical framework. What we refer to as the real estate development (RED) industry consists of development projects that construct buildings designed to produce rental income, as well as the firms that originate, lead, manage, and (at least partly) own such projects.[2] For our purpose, a RED "firm" may be a part or an operation within a REIT that is a vertically integrated company which also holds and manages existing income-producing property. Importantly, we distinguish the RED business from the business of investing in (holding and managing) stabilized income-producing properties. Sometimes REITs undertake development projects via joint ventures (JVs) with other firms. In such JVs, the REIT may be the lead or managing partner in the project, or it may be a more passive "money partner". It is not generally possible in the REIT data to distinguish between these two roles, although it is the belief of the authors that in most development projects done by equity REITs, the REIT is the sole owner or at least the lead or an active partner in any joint project.[3]

The overall RED process may be viewed as having two distinct phases. The first phase is the Preliminary Phase, occurring prior to the commitment to any project. This phase may or may not involve land purchase for "land banking" or land speculation. Developable land is essentially a real option, providing a call option to obtain a built property upon the payment of the "exercise price" which is the construction cost. The Preliminary Phase involves a search process, referred to in the real estate literature as either a project looking for a site or a site looking for a project.[4]

[2]The present study does not include the "merchant building" industry which focuses largely on single-family housing development projects. Housing development is a rather separate and different industry, producing a smaller scale and more homogeneous product in a separate market from that of the investment property industry. Though some large housing developers are publicly-traded firms, they are not REITs. We also do not consider the social housing development industry that is largely based on governmental subsidies and not-for-profit developers.

[3]So-called "mortgage REITs", which originate and invest in commercial mortgages, are distinct from "equity REITs" and are not included in our study.

[4]See Miles et al. (2007). The "site looking for a use" would presumably involve the REIT owning and holding the development land possibly for some time prior to construction. The "use looking for a site" would presumably generally not involve REIT ownership of land prior to the construction project. In our data on REIT holdings, the historical cost of land held for development is less than 15% of the total direct costs of projects currently underway. (See in Table 1, Development Land is 1.1% of total REIT assets on average, while the combination of already-expended

The second phase in the overall development process is the Construction Phase. This begins when funds start to be expended on specific development projects, including construction costs as well as the purchase of any land not already owned. In the data we use in this study, the Construction Phase is represented by the variable "Property Development Pipeline"[5] available in the S&P Global SNL REIT Financial Database. Note that expenditures on Development Land and on Construction in Progress cannot be depreciated under GAAP financial accounting rules. Hence, the value of these assets in the REITs' books equals the historical cost invested by the REIT.

The Construction Phase of the overall development process may be viewed as the "exercise" of the "real" call option that the ownership or control of developable land provides. It is the process of obtaining insofar as possible the highest and best use (HBU) value of the site in return for the payment of the construction cost. This is the realization of the classical residual model of land value:[6]

$$L = V - K, \tag{1}$$

where L is the value of the land, V is the value of the completed HBU project, and K is the construction cost including necessary (normal, not super-normal) profit for the developer/landowner (including covering average and necessary basic firm overhead).[7] In our conception of the meaning of a RED "project", as distinct from the broader RED "process" or RED "business" at the entity level, we include only the Construction Phase in the "project". The Preliminary Phase is part of the RED "business" but not part of any RED "project". Our focus in the present paper is on the question of super-normal profit in RED "projects", the Construction Phase.

In the Preliminary Phase there is optionality and flexibility, which has value, but it is not certain that any given option will ever be favorably exercised by the firm. In the Construction Phase there is no longer as much optionality or flexibility (though there typically remains some), but there is realization of whatever NPV exists in the project.

and to-be-expended funds on current projects ("Property Development Pipeline") is 7.7% of total assets.)

[5]This variable represents the publicly stated projection of the total costs to be incurred in the construction of on-going RED projects, as reported by the REITs for all projects underway. We scale this value by the REIT's total assets. Thus, "Property Development Pipeline" includes both the cost already incurred in the construction as well as the unfunded but committed remaining planned cost of the on-going projects.

[6]Attributed to Ricardo (1817).

[7]We assume the land value, L, reflects "normal" profit, by definition.

Theoretically, if the land is owned during the Preliminary Phase, then the "smooth pasting condition" (aka the "high contact" condition) of the optimal exercise of the call option (Merton (1973)) implies that the value of the asset (and hence of the firm owning the asset) does not change between the Preliminary and Construction Phases. In essence, the smooth pasting condition says that optimal exercise of the option occurs when and only when V-K exactly equals the value of the call option, which at that point is the economic value of the land: L = V-K. Since the market value of the land is an opportunity cost of the development project (the option is extinguished by its exercise), the NPV of the project based on current market values is: V-K-L = 0. Thus, in itself the purchase of land at fair market value and subsequent rational exercise of the development option contained in the land does not imply non-zero NPV and therefore does not in itself affect the value of the firm per share of equity stock (no impact on stock price).

If the Preliminary Phase involves a search operation apart from or in addition to land ownership, then for the overall development business including both phases to break even (earn normal profit, effectively NPV=0 overall), the NPV of the projects that get built must on average be sufficiently positive to offset the search costs at the entity level of the development firm.

More broadly, we can imagine three possible business models in the development industry, in terms of the economic profitability of RED projects. One model involves no super-normal profits (zero NPV). Another model suggests super-normal profits (NPV $>$ 0) on average in the projects that get built, but normal profit (NPV=0) at the entity level in the development firm on average overall across both the Preliminary and Construction Phases, with the positive NPV in the built projects just offsetting the search costs including losses on the projects that never get built. Finally, a third model can be envisioned in which super-normal profits generated at the project level are able to be captured on a sustained basis at the firm level, and with sufficient magnitude to exceed any entity level costs associated with the RED process (including search costs).

According to classical industrial organization theory, this third possibility requires that the RED projects create or take advantage of some sort of market power effectively for the development firm. Otherwise, competition would drive super-normal profits to zero. Such value creation could reflect Schumpeterian entrepreneurial profit related to innovation in the RED projects. Or it could derive from uniqueness in the development projects related to original project design or the uniqueness of project site and location. Possibly local political connections enable some development projects to

be undertaken in a context that dampens competition that might otherwise be able to hold profits down. Perhaps the scale of a RED project in relation to its local market area squeezes out potential competition. Any such sources of super-normal profit could also be based on or complemented by spillover effects and synergies with the development firm's other pre-existing or future planned real estate holdings. The fundamental cash flow source of any super-normal profits might be temporary in any given project; the key point is that they produce a present value of the project assets at the time of construction in excess of the present value of the economic opportunity cost of the resources expended on the projects (including land, construction, and cost of capital reflecting the amount of risk in the project). Furthermore, anticipation of future such positive NPV investment could be impounded in the firm's stock price, associated with current development assets as an indicator of such a general and expected capability of the firm.

2.2 Formal Model and Empirical Analytical Strategy

To elaborate and formalize the preceding description, consider three stylized business models of RED firms. All three of these models are consistent with economic theory and seem plausible based on casual empiricism. It is not clear a priori which one should or does prevail, even just within the REIT-based sample that we can study rigorously.

(1) Production Model: This model views the RED business much like a manufacturing business producing long-lived capital goods in a competitive industry. In the case of RED, the value of real property derives from two sources, the land and the building structures on the land. The land is neither produced nor consumed, so the value added by the production firm is that of the structure, though of course in interaction with its site and location. In a competitive industry the long-run equilibrium price equals the long run marginal cost of production including normal profit and overhead. Consistent with the previous description, the RED firm buys land at fair market value (either before or at the time of construction of the RED projects), adds value equal to the construction cost (including normal, not super-normal, profit including covering basic overhead cost of the development firm), and the smooth pasting condition implies zero NPV at both the project and firm level. The firm receives V-K from the project, but pays V-K for the land (on average), hence, at both the project and firm level:

$$NPV = V - K - L = V - K - (V - K) = 0. \tag{2}$$

The value added by the production process just equals its total cost.

(2) Search Model: This model refers to the situation where the RED firm must expend resources finding good projects or good land sites, but makes profits only from the projects that actually get built. Competitive equilibrium keeps firm level economic profits at zero (that is, the firm earns normal accounting profits on average, reflecting the amount of risk the firm's investors face), but project-level profits are super-normal (NPV > 0) in order to cover the firm-level search costs. (Search costs in this model are viewed as reflecting an additional function of the development firm, beyond basic overhead costs which as noted in the Production Model are presumed to be included in K.) At the project level the Search Model implies V-K $>$ L, and therefore:

$$NPV = V - K - L > 0. \tag{3a}$$

But at the firm level:

$$NPV = V - K - L - S = 0. \tag{3b}$$

where "S" is the search costs, across the firm and (we can think of them as being) apportioned in some manner pro rata among the projects that get built. Thus, we have: S = V-K-L, or equivalently: L = V-K-S. At the project level, for projects that get built, either V is greater or K is less than is the case in the Production Model. But the result is the same at the firm level: no value added to the firm (per share of common stock).

(3) Market Power Model: In this business model the RED firm is able to sustain super-normal profits not only at the project level as in the Search Model but at the firm level as well. As described in the previous sub-section, through some manner of consistent innovation, the uniqueness of locations, sites and designs, perhaps local political connections, and/or some sort of synergy of scope across the firm's individual projects and properties, it might be possible for at least some RED firms to consistently produce super-normal profits. Such a RED firm consistently creates

value beyond production costs including the economic opportunity cost of the land and any search costs the firm faces. Labeling such added value as A^*, the Market Power Model implies:

$$NPV = V + A^* - K - L - S = V + A^* - K - S - (V - K - S) = A^* > 0. \tag{4}$$

Here we have assumed that L = V-K-S, the firm-level zero-profit land price from the Search Model. If the land price is L = V-K, not reflecting search costs, then here we have NPV = A* - S. But the definition of the Market Power Model, and the key point, is that in that case we would have NPV = A*-S > 0, strictly positive project level profits (on average) sufficient to make entity level profits super-normal even net of search costs.[8]

Thus, in the Market Power Model, RED projects add value to the firm (not just scale, but value per share of common stock). Indeed, the entire RED business adds value. In the terminology of corporate finance as coined by Myers (1977), under the Market Power Model the RED firm is a "growth stock". It is possible that only some RED firms, not all, have such an ability to sustain the Market Power Model. If that is the case, it would perhaps not be surprising that such firms might grow and thrive in the environment of virtually unlimited liquidity and information efficiency provided by the public stock exchange. In other words, studying REITs might entail a sample selection in relation to the broader RED industry as a whole. We would be studying a sample of the industry's "champion" firms. Even if so, it is still interesting to study RED in REITs, as an interesting subject in its own right, and as an important component of the overall RED industry, and for the implications that findings about REIT RED entail about both the RED industry and the stock market.

The above three business models are not mutually exclusive, either across firms or across time. However, by studying development activity within publicly-traded equity REITs, we seek to shed light on which of the above three RED business models is most prevalent, at least among such firms and over the time span for which we have data, 1998-2018. We have noted that REITs are an important and interesting component of the RED industry and of the stock market, and the depth,

[8] We characterize the super-normal profits as stemming from value creation, and we think it likely this is a broadly correct characterization. However, one can imagine sources of super-normal profit that are more akin to expropriation or transfer receipts than to value creation, for example, if political connections enable the firm to access land at less than its economic value without offsetting contributions by the firm. But strictly speaking the focus of our analysis is on super-normal profit, which gets reflected in the firm's share price, not on how or where that super-normal profit is derived.

detail and quality of information available on publicly-traded REITs enable us to draw conclusions not possible by studying the private property market where admittedly the bulk of development projects do occur.

In essence, we seek to use the information provided by the Tobin's-Q of the REITs, in combination with detailed accounting information about REITs' asset holdings and other firm characteristics, to ascertain whether REITs' RED activity tends systematically to create value (provide positive NPV, super-normal profit) for the REIT. The numerator of the Tobin's-Q ratio is the market value of the firm, reflecting the value that the stock market assigns to the firm. The denominator is meant to represent the replacement cost of the firm's assets. Thus, the ratio is correlated with value creation by the REIT over and above the cost of its assets. Consistent with prior literature, we use the net book value of the firm's assets as a proxy for replacement cost in the denominator of the Tobin's-Q.[9] Based on official financial accounting reports, the Tobin's-Q as thusly defined has the advantage of objective and precise measurement, as well as consistency with the prior financial economic literature. However, in the case of REITs, since real estate assets trade directly in a well functioning market, it is possible to estimate a current market-value-based replacement cost for the REITs' assets. This is in fact done in the real estate investment industry, defined as the so-called "Net Asset Value" (NAV) of the firm. Although such NAV figures are only estimates, they have been found to be very highly correlated with accounting-based book values (+92%) (See Hartzell, Sun, and Titman (2006).) In our empirical analysis we supplement the traditional accounting-based Tobin's-Q with the P/NAV ratio as a substitute dependent variable, to provide a robustness check on our Tobin's-Q based results.

This approach is based on the concept of "growth stocks". As suggested by Myers (1977), in the general corporate finance context, a firm becomes a growth stock by virtue of having "real options" that provide it with positive NPV opportunities. In essence, the stock market perceives such firms as being able to *create value* beyond what is represented just by the replacement cost of the firm's currently in-place assets. Of course, a firm can grow in scale simply by raising external debt or equity capital, without producing positive-NPV projects or super-normal profits. And it is possible to use capital structure and dividend policy to skew a firm's equity returns toward growth and

[9]For example, see Villalonga and Amit (2006), Boudry (2011), Coles, Lemmon, and Meschke (2012), Humphery-Jenner (2014), and Pavlov, Steiner, and Wachter (2018), which all use book value to define the Tobin's-Q as an indicator of value creation by the firm (generation of positive NPV).

away from income, again without recourse to positive NPV investments. But in principle neither of these approaches to "growth" *per se* will increase the price per share or the Tobin's-Q of the firm in a cross-sectional comparison. Only the ability to do positive NPV investments increases the firm's price per share cross-sectionally, at least in the classical view based on fundamentals.

Thus, the basic idea in our empirical analysis is to use evidence of the effect of RED assets on REITs' Tobin's-Q values to identify whether the RED business systematically brings positive NPV to the firm. As is clear from the above description of the RED business models, such firm-level positive NPV can only arise if there is even more project-level positive NPV, because other than real estate development projects that actually get built, the RED business has no source of profit, but it does face costs. Finding of a positive RED impact on REIT Tobin's-Q can thus, in principle, differentiate between the Market Power Model and the other two RED business models described above. If RED projects in progress bolster REITs' Tobin's-Q, then this implies that there are firm-level positive NPV effects (i.e., super-normal profits) from RED projects, considering not only the direct project costs but also entity-level costs associated with the RED business such as search and overhead costs.

Of course, we need to control for other considerations and characteristics of the firm that could affect the Tobin's-Q without implying positive NPV from development projects. One special such possibility is land holdings, as the market value of land can grow rapidly over time, while it remains on the REITs books at historical cost. And while land held for development is part of the Preliminary Phase of the overall RED business, we are most interested in distinguishing between that phase, prior to the exercise of the development call option, and the Construction Phase which represents the actual creation of physical capital by the exercise of the call option. Ultimately, any realization of RED profit (super-normal or otherwise), must derive from projects that actually get built (by someone). Conceivably, a REIT could make a profit purely from buying and selling land, without developing the land itself. However, this is not generally what REITs do, and is made difficult by regulatory constraints REITs face in order to preserve their exemption from corporate income tax. Thus, to the extent that REITs profit from land holding, it is generally only as a result of the culmination of the RED process. And as noted, merely buying and selling land at fair market value, though it would generate accounting profits reflecting the opportunity cost of capital of land speculation, would not create positive NPV or an associated windfall "pop" in the

firm's share price. In fact, REITs do very little land holding, and REIT stockholders view REITs as "income stocks", valued for their dividends.

Another possible confounding factor could be the pure scale-increasing effect of RED projects. As they increase the total value of the firm's assets, this in itself could have an efficiency-based value enhancing effect on the firm, even though the RED project itself might be zero NPV. Indeed, the real estate literature, such as Ambrose et al. (2000) and Ambrose, Highfield, and Linneman (2005), has noted economies of scale in capital costs in REITs. Indeed, this point applies to any strategy that increases the scale of the firm. Thus, we need to control for the size of the firm.

Along the same lines, corporate finance capital structure theory suggests that leverage could affect the value of the firm, which could thereby have implications for the Tobin's-Q. However, the value of debt tax shields is less relevant for REITs because they are effectively exempt from corporate income tax. And the literature on the effect of capital structure on REIT stock price is mixed and inconclusive (see section 2.3 below). Nevertheless, we control for leverage in our analysis.

Since we are using book value rather than actual market value based replacement cost as the denominator of our Tobin's-Q metric, we need to also control for characteristics of the REITs' holdings that could cause the difference between the book value and the current market value of the REITs' assets to differ across REITs. Such a difference would be caused primarily by differences in real (economic) depreciation rates and in the average time since when the depreciating property assets were acquired. These depreciation related considerations could also interact with the types of properties and the geographic locations of the properties held by the REITs. Thus, we need to control for the average age of the properties and the average holding period of the properties, as well as the types and locations of the REITs' property holdings. (Land is a particular example of this, as noted above.) Furthermore, as we are looking for a general systematic and secular value creation capability, we need to control for how the numerator of the Tobin's-Q would reflect transient or cyclical real estate market conditions. Thus, we also control for the time fixed effects.

Finally, we want to control for the management and governance quality of the REITs. Of course, the firm's quality of management and governance could be related to their ability to earn super-normal profit in the RED business, and to that extent we need not control for such a consideration. But management and governance quality could also reflect the firm's overall general ability to create value apart from RED activities. The most effective way to control for the quality of REIT

management and governance is to allow for firm fixed effects in our analysis, allowing each REIT to have its own idiosyncratic effect on Tobin's-Q apart from its RED assets.

To the extent that we can effectively control for confounding factors such as those noted here, the empirical analysis strategy outlined below in Section 3 should enable a reasonably rigorous characterization of which of the above three RED business models is most prevalent among REITs, with the implications described previously for whether RED projects systematically generate super-normal profits within REITs, as reflected in the firms' Tobin's-Q. As noted, any resulting conclusions would not necessarily apply to all RED projects among all types of developers in the RED industry. But the REITs that do RED are an important and interesting type of developer. If super-normal profits are prevalent at the project level or firm level among REIT developers, this carries interesting implications about the development industry and about REITs, as we have noted.

2.3 Review of Some Relevant Literature

This paper relates to several strands in the business and economic literature. First, it contributes to the literature that relates land to the call option model of development. For example, Xu and Lai (2018) show that developer behavior combines with flexibility in in the development option to cause project timing to avoid down markets that already existing assets cannot avoid, a proposition also suggested by Geltner, Kumar, and Van de Minne (2020). Clapp, Jou, and Lee (2012) show that the hedonic model can be extended to include an option value term. They derive the implications of option value for a cross sectional hedonic equilibrium, where value equals use value (the present value of the existing vector of hedonic characteristics) plus option value (the right to exchange the existing vector for a new one at some cost). A related strand of literature studies real options attached with the development process. For example, Lindenthal, Eichholtz, and Geltner (2017) show that physical characteristics of lots and buildings, and social variables, i.e. characteristics of lot owners and/or occupiers explain a significant proportion of redevelopment of urban lots. Buttimer, Clark, and Ott (2008) find that using a presale option can reduce market risk and allows developers to carry out projects with a lower expected return on equity. Buttimer and Ott (2007) show that employing a preleasing option can enable developers to hedge the risks of leasing rental rates and vacancies in the space market. Clapp, Eichholtz, and Lindenthal (2013) show that dynamics of the house prices are significantly affected by the re-development option value. Geltner,

Kumar, and Van de Minne (2020) argue that flexibility in the (re)development option may cause new developments to present less investment risk and greater capital value growth than pre-existing stabilized property assets, controlling for financial and operational leverage, and for depreciation in built structures. In general, the theoretical framework and empirical evidence for the real option model of land development suggests how developers might use optionality and flexibility to create value and achieve positive NPV. However, the option model in itself does not necessarily imply systematic positive NPV from development, due to the smooth pasting condition noted previously in 2.1.

Second, our paper is related to the strand of literature studying value creation by examining the firms' Tobin's-Q ratio, as we do. For example, Villalonga and Amit (2006) use Tobin's-Q as a measure of corporate value and show that family ownership creates value only when the founder serves as CEO of the family firm or as Chairman with a hired CEO. Hartzell, Sun, and Titman (2006) use Tobin's-Q to find that REITs with stronger corporate governance have higher firm value as they respond more positively to their investment opportunities. One advantage of the Tobin's Q is that it is a forward-looking measure of firm performance (as opposed to, for example, accounting profit rate used in Demsetz and Lehn (1985)). As noted, the Tobin's Q reflects the capitalization into stock market value of the firm's overall capability to create value from the assets it employs, not just from current projects underway, but the market's forward-looking appraisal of the firm's future prospects as well. This is important for our focus in this paper.

Third, we contribute to the rather scarce but growing thread of papers that examine the specific nature and role of property development activities, especially regarding commercial or income-producing (investment) property (as distinct from papers focusing on housing per se). Brounen, Eichholtz, and Kanters (2000) provide evidence that larger REITs and REITs specializing in outlet centers and regional malls tend to undertake development more frequently. They also provide evidence that the risk and return for REITs engaging in property development are higher than for REITs that do not engage in development. This makes sense a priori on theoretical grounds, and is not inconsistent with any of the three business models proposed above, as development projects face inherent "operational leverage" (even if they are pre-leased), due to the lack of perfect correlation between the value of the built property and the cost of construction. Such leverage understandably increases risk, and that increases the economic opportunity cost of capital. Brounen and Eichholtz

(2004), utilizing an international sample of listed property companies, provide evidence that there is substantial variation between countries in the level of development activity among listed property companies. However, as noted in Section 1, there is an important distinction between studies of stock returns such as the above, and our focus on secular value creation as reflected in stock value levels as measured in the Tobin's-Q.

Another area of literature relevant to the current paper is the study of search friction.[10] Mortensen (2011) argues that even after technological advance has reduced information asymmetry, unique characteristics of real estate still result in significant matching and search cost in the private property asset market where properties are directly valued. Within such a market, search costs are arguably higher for development projects than for existing properties, because development projects are more scarce, and developers need to screen and choose a project based on, not the actual, but the potential value of the property that is yet to be developed.

Other relevant studies on REITs consider the effect of capital structure, and/or of firm size, on the value of the firm. Howe and Shilling (1988) use the fact that REITs do not pay any corporate taxes to examine several hypotheses concerning the market reaction to announcements of new security issues. Ambrose et al. (2000) and Ambrose, Highfield, and Linneman (2005) provide evidence of economies of scale in capital costs in REITs. A strand of literature dating at least back to Ambrose and Linneman (2001) highlights the importance of corporate governance in REIT performance. For example, Capozza and Seguin (2003) find that REITs with greater insider holdings use less debt in their capital structure and have higher relative valuation as measured by both higher premiums to net asset value and higher multiples of cash flows. As noted, these are all factors that we control for in our analysis of the relationship between development investments and REIT Tobin's-Q ratio.

Finally, in a recent paper, Van Nieuwerburgh (2019) finds that REIT share prices are too high to be justified by reasonable expected returns and expected dividend growth rates based on capital market equilibrium theory. He argues that the high prices reflect unrealistically optimistic expectations about future income growth from commercial properties. In the present paper, however, we raise the possibility that super-normal profit from RED activity could provide at least one source of more rational growth expectations for REIT value, beyond just income growth from current in-place productive assets.

[10]This has been a subject studied in the real estate literature (and more extensively in the labor literature).

In summary, while the extant literature is consistent with our study and supports our identification of control variables that affect the value of the firms, to the best of our knowledge, ours is the first paper that examines Tobin's-Q ratio of REITs and provides evidence of super-normal profit, positive NPV, in REIT RED activity.

3 Data and Methodology

We examine all publicly traded U.S. REITs available in the S&P Global SNL REIT Financial Database from 1998 through 2018. We start with 1998 because that is when SNL started to report the development exposure of REITs.

As noted, we regress REIT Tobin's-Q ratios onto development assets as a fraction of total assets, and other control variables.[11] Specifically, we run the following firm-fixed effect specification for the Tobin's-Q ratio of firm i in year t:

$$\begin{aligned} Q_{i,t} = \alpha_i + \beta \cdot NewDevelopment_{i,t} + \gamma \cdot DevelopmentLand_{i,t} + \eta \cdot Controls_{i,t} \\ + PropertyExposure_{i,t}^{PropType} + PropertyExposure_{i,t}^{Loc} + z_t + \epsilon_{i,t}. \end{aligned} \tag{5}$$

where our dependent variable, Tobin's Q, is defined as the ratio of firm's market value to book value of its total assets. As is typically done in the literature, "market value" of the firm is defined as the enterprise value, equal to the market value of common equity plus the book value of debt and preferred stock. As described in Section 2, Tobin's-Q as thusly defined is widely used in the literature .

$NewDevelopment_{i,t}$ is the ratio of RED assets to total assets for REIT i in year t, where "total assets" refers to the net book value of the firm. RED assets (or property development pipeline) is defined as the sum of "Construction in Progress" (book value of funds expended on construction projects currently underway based on historical cost without depreciation) and "Unfunded Pipeline" (value of funds earmarked for but not yet been expended in projects underway).[12] The results are

[11] Note that although our estimation dataset is pooled across both firms and time, the nature of the model is essentially cross-sectional, not time series, as it compares the level of the dependent variable (ratio) across firms.

[12] We use "RED assets" or "property development pipeline" interchangeably as indicators of the REITs' development exposure.

robust to using only "Construction in Progress" as the definition of RED assets.[13]

$DevelopmentLand_{i,t}$ is the book value on nondepreciable land held for the purpose of future development. $Controls_{i,t}$ denotes a set of firm-level controls - firm size, leverage, cash holdings, weighted average age of properties owned, square of weighted average age of properties owned, and weighted average holding period of properties owned - as discussed in Section 2.2 and in more detail later in this section. We also control for firm fixed effects α_i as well as year fixed effects z_t. Standard errors are clustered at the firm level.

We control for REITs' property type fixed effects and location fixed effects by relative square foot exposure in their property holdings.[14] We obtain REITs' property level information from S&P Global SNL Asset Database. The variables $PropertyExposure_{i,t}^{PropType}$ and $PropertyExposure_{i,t}^{Loc}$, respectively, are based on the square feet of properties owned by REITs in each property type category (apartment, office, retail, industrial, other) and in each of the top 25 geographical markets (separately), as defined by Real Capital Analytics (RCA).[15]

Our control variables are widely used in the finance and real estate literature. Together, they control for the characteristics that could influence the cross section of Tobin's-Q apart from expectation of positive NPV in development projects. The control variables are as follows.

LogAssets is the natural logarithm of firms' total assets. It measures the size or scale of the firm, a variable that might reflect scale economies or Fama-French capital market equilibrium stock pricing factors.

Leverage is the ratio of total debt to total assets by book value. This variable will control for possible capital structure effects such as signaling or costs of financial distress, although with REITs being tax-exempt, some of the traditional motivations for such effects are less meaningful for REITs.

Cash is defined as the ratio of cash and cash equivalents to total assets. This is a signaling variable that prior research has suggested may impact Tobin's Q.

[13]These results are available from the authors upon request.

[14]This is superior to defining such fixed effects based only on the headquarters locations of the firms, as is typically done in the corporate finance literature where such direct measures of physical assets is not possible or meaningful. In real estate, it is well established at least since Capozza and Korean (1995) that property type and size can affect both property-level and REIT-level performance.

[15]In unreported results, we find that our results are robust to use of REITs property type fixed effects and location fixed effects by relative net book value exposure in their property holdings. In other words, our results are qualitatively the same if we define REITs' Property Exposure by using net book value of properties instead of their size in square feet, and are available from the authors upon request.

We control for linear and non-linear effects of the age of the properties owned by REITs. This relates to how depreciation of building structures could differentially affect the difference between net book value and current actual market value replacement cost of assets across REITs. For this we compute weighted average age of the properties owned by REITs each year. The weights are calculated based on size of the properties. In the same spirit, we also control for the weighted average holding period of properties, for each REIT in each year. This is defined as the time since each property was acquired by the REIT, and hence would begin accumulating depreciation in its net book value as carried by the REIT.

Table 1 provides summary statistics of the main variables used in the study. The average Tobin's-Q is 1.37, suggesting that across REITs and across the time sample REITs overall created net value of 37% beyond the historical cost of their assets. On average 7.7% of REITs' asset value is itemized in the Property Development Pipeline. Average REIT leverage is 51% of book net assets (or $51/1.37 = 37.22\%$ of their enterprise market value based on the average Tobin's-Q – recall that Tobin's-Q is Market/Book Value of the firm). The weighted average age of the properties held by REITs during our sample period is 21 years and on an average REITs have held their existing properties for about 7 years.

[Insert Table 1 around here]

4 Results

In this section, we use the firm-level data and methodology described in the previous section to examine the effect of REITs' development exposure on the cross-section of their Tobin's-Q.

Table 2 reports the results of our main test. The dependent variable in all the columns is the Tobin's-Q for each REIT, each year. The key independent variable measuring RED activity across all the specifications is Property Development Pipeline. Recall that the Property Development Pipeline variable includes both Construction in Progress as well as the Unfunded Pipeline, but does not include land being held for development. We include Development Land separately in the analysis, in case there is an independent cross-sectional effect of land purely as a high Market/Book Value type of asset (simply reflecting land value growth since acquisition without necessarily implying any positive NPV).

[Insert Table 2 around here]

We find a positive and statistically significant Tobin's-Q effect of the RED variable (Property Development Pipeline) in all the specifications, most importantly in the last (column [9]) model, which includes all of the control variables. Development Land has a negative coefficient, with only marginal statistical significance in column [9].[16] All the columns include firm fixed effects and year fixed effects. Columns [2]-[9] also include property exposure of REITs in each of the top 25 RCA markets and exposure by property type fixed effects. We use the firm fixed effect specification to address (to an extent, if not entirely) the concern of possible endogeneity or omitted variables (including, as noted, corporate governance).

Column [1] displays the results of the simplest specification of equation (5) without any control variables. From columns [2] to [9], we step-wise add the set of controls typically used in the corporate finance and real estate literature and that we described in Section 3. The Property Development Pipeline Coefficient is positive and statistically significant at the 1% confidence level in columns [2]-[9] and at 5% confidence level in column [1]. This suggests that an increase in the development exposure of REITs results in a higher Tobin's-Q, thereby confirming the hypothesis of the Market Power Model of the RED business within REITs.[17]

In our main result in Table 2, the control firms are the "universe" of all REITs, whether they have any development assets or not. The advantage of including all the firms is that one overcomes possible concerns about the generality of the findings. However, by considering the universe of REITs, some characteristics of treated and control firms will inevitably be different. This could be problematic if there are reasons to believe that these characteristics could influence the firms' Tobin's Q beyond their development exposure. To deal with this concern, we match each firm with high development exposure (Property Development Pipeline $> 90^{th}$ percentile) to its closest control firm with very low development exposure (Property Development Pipeline $< 10^{th}$ percentile), identified based on firm size, leverage, cash holdings and exact matching on year. We perform our matching using the Abadie and Imbens (2006) bias-corrected matching estimator. After

[16] This suggests that REIT stockholders do not view land holding *per se* as a source of value creation. Land does not provide a source for the dividends that REIT stockholders tend to prize. Recall that the Development Land variable directly reflects only the Preliminary Phase of the RED business.

[17] Scatter plot analysis suggests that skewness in variables does not pose a concern. Analysis available from authors upon request.

matching on these characteristics, treated and control firms are similar. Table 3 shows descriptive statistics and distributional characteristics for the matched samples.[18]

[Insert Table 3 around here]

Table 4 then presents our results using the matched sample. Note that the coefficient estimates on the Property Development Pipeline variable remain positive and statistically significant across all the columns, thus confirming that our results remain robust using the matched sample.

[Insert Table 4 around here]

It is well known that the real estate industry tends to be strongly cyclical. Therefore, we also provide results contrasting the role of RED in value creation during boom and recession periods. Table 5 presents these results. To capture the effect of the differing regimes, we create boom and bust dummies. Specifically, Boom (Bust) Period is an indicator which takes value 1 if time period is 2002-2007 (2008-2011), and 0 otherwise. Columns [1]-[2] present our results while interacting Property Development Pipeline with the Boom Period dummy, while columns [3]-[4] show similar results while using the Bust Period dummy. These results indicate that while the boom period augmented the effect on the Tobin's-Q impact of RED projects, the bust significantly hampered REITs' RED value creation ability. This is not surprising, and no doubt many REITs would have delayed or abandoned many more recession period projects with the benefit of hindsight.

[Insert Table 5 around here]

As noted in Section 2, Tobin's-Q is the most widely used measure of firm performance and value creation in both Corporate Finance and Real Estate Finance literature. And we include several control variables to address the concern that denominator of our Tobin's-Q measure is in terms of book value rather than actual market based replacement cost. Nevertheless, to address this concern and provide a robustness check, we have analyzed an alternative definition of firm

[18]The p-values for the mean difference t-tests and the Wilcoxon-Mann-Whitney rank-sum distributional tests in the matched sample are all largely above the 10% threshold. This suggests that treated and control firms are similar in terms of characteristics and distributional assumptions in the matched samples.

performance. Specifically, we replace the Tobin's-Q with the price-to-net asset value (P/NAV) ratio as the dependent variable.

As shown in columns [1]-[9] of Table 6, our results are robust to using this alternative indicator of value creation. Overall, the results provide evidence that the development exposure of REITs is positively associated with their value creation ability.[19]

[Insert Table 6 around here]

The preceding analysis establishes the major finding that addresses the main question which motivated this paper, namely, that RED activity within REITs conforms to the Market Power Model of the RED business, which implies systematically positive NPV at the project level sufficient to more than offset search and overhead costs at the firm level. To summarize our major findings from this Section, we are able to reject the Search Model and the Production Model of RED as we have defined those in Section 2.2. The stock market clearly "thinks", on average, that the RED business provides positive NPV to the REITs that engage in it. To have the impact that we find on the Tobin's-Q, the RED positive NPV must be at the firm level, net of any overhead and search costs that are involved in the RED business. This would imply that at the project level relative to the direct costs of the individual RED projects, there must be even more positive NPV. Either positive NPV RED projects cause higher share values in the REITs that undertake such projects, or REITs that have higher share values have a strong statistically significant tendency to undertake RED projects (controlling for other influences). Either way, the implication is systematically positive NPV tendencies among REIT RED projects.[20]

[19] Although correlation does not necessarily imply causality, it would seem logical and likely that successful RED activity is indeed causing the associated higher firm share value, rather than vice versa. Furthermore, in our context, it is arguably an excessively semantic point to debate whether RED causes increased share value, or increased share value requires or necessarily leads to increased RED activity. Even the latter direction of causation would seem to require positive NPV in the RED business. This is similar to our previously noted point that we don't particularly care if good REIT management and governance is required for the RED business to add share value, the point is that the RED business must generate super-normal profit in order to add share value.

[20] To the extent REITs are acting as passive "money partners" in development projects, these findings would suggest that the (non-REIT) development firms that are leading and managing the projects are sharing the positive NPV in the projects with the REITs through the terms of the joint venture arrangements, even though the managing developer partners would presumably have actually created most if not all of the super-normal value in the projects. This would imply that there must be even more positive NPV in the underlying projects than just what is obtained by the REITs.

5 Conclusion

In this paper we study the question of super-normal profit in real estate development (RED) of commercial investment property. Our analysis is based on, and therefore applies directly only to, RED carried out by publicly traded REITs. However, this is a substantial amount of development nationwide, typically over $30 billion per year. And REITs are major players in the real estate investment industry, and an important sector of the stock market.

We find strong evidence of super-normal profit, positive NPV, in REIT RED activity. The evidence is in the impact of RED activity on REITs' Tobin's-Q values (as well as P/NAVs), and therefore is at the firm level. This means that the RED activity positive NPV, which can only be generated by the construction projects that actually get built, must be sufficient to not only exceed project-level direct costs, but also to more than cover the overhead and search costs associated with the RED business, that is, including covering the resources expended on "gleam-in-the-eye" projects that don't get built. Thus, REITs create value through their RED projects. This can only be consistent with a Market Power business model of RED activity. It is beyond the scope of the present paper to attempt to answer the question of exactly how such a business model can be sustained by REITs, but our analysis is designed to discover secular, on-going super-normal profitability at the firm level, not one-off, unique "news" or announcement effects associated with specific projects. Perhaps such market power might derive from innovative design and management, from uniqueness of location and site interacted with the built structure, from local political connections, from synergy with other existing assets owned by the REIT, or other sources.

The findings in this study beg the question of the degree to which the systematic super-normal profits found here are broadly characteristic of the RED industry, versus being a reflection of the particular types of firms that are publicly traded in the stock market as REITs. Perhaps the liquidity and informational efficiency of the stock market provide a means of attracting, supporting, or cultivating firms that are particularly capable in the RED field. Are we observing a characteristic of the RED industry, or of the stock market? (Of course, it could be both, to some degree.) Perhaps related to this question is the question of why REITs don't engage in more RED activity, up until there is no super-normal profit? But our analysis measures average profitability of the REIT RED activity, not its profitability on its margin.

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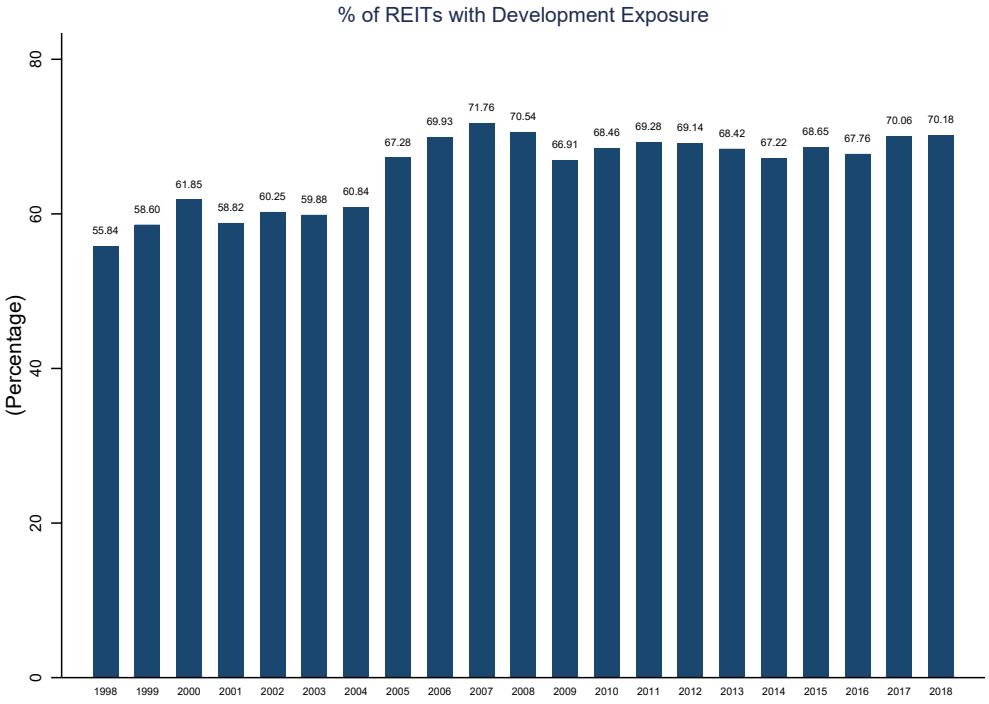
Figure 1: **REITs' Development Exposure.** This graph presents percentage of REITs doing real estate development (top graph) and REITs' aggregate development real estate (bottom graph) by year during the sample period 1998 – 2018. REITs' development exposure data is from the S&P Global SNL Financial Database.



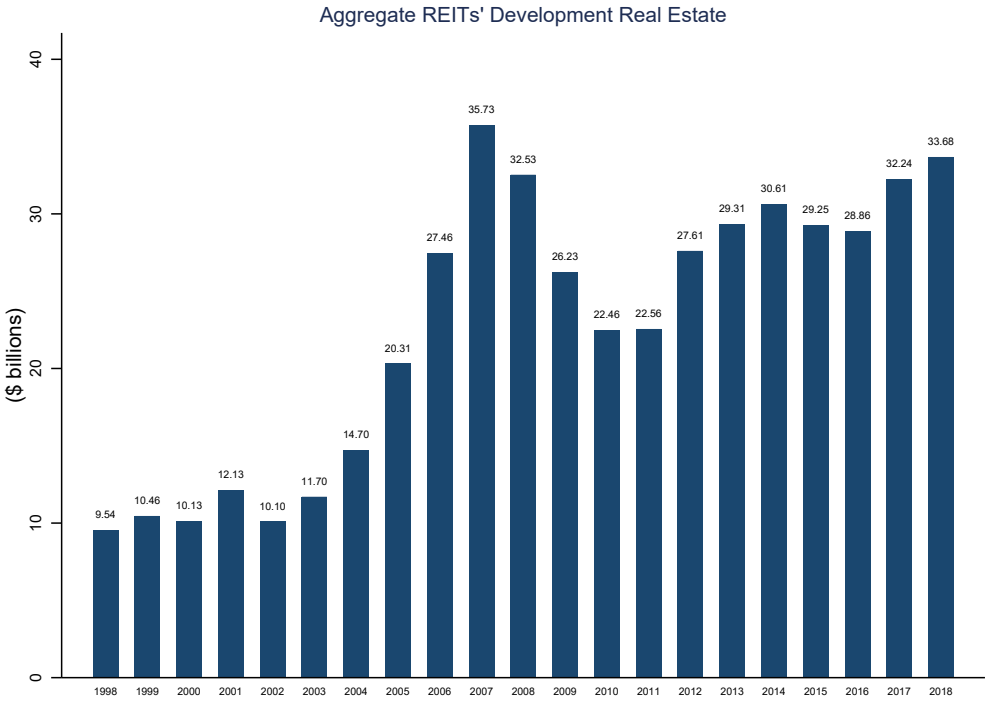


Table 1: **Detailed summary statistics.** The table presents summary statistics of the variables employed in this study for the period $1998 - 2018$. REITs level and property asset level data are from the S&P Global SNL Financial Database. Tobin's Q is defined as the ratio of firm's market value to total assets. Property Development Pipeline is the publicly stated projection of the total costs to be incurred in the construction of new real estate developments, scaled by total assets. Property Development Pipeline includes both the cost incurred in the construction as well as the unfunded pipeline commitment (amount that is still outstanding of the publicly stated projection of the total costs to be incurred in the construction of new real estate developments). Development Land is the book value on nondepreciable land held for the purpose of future development. P/NAV is the ratio of firm's share price to net asset value per share. Log (Assets) is the natural logarithm of firms total assets. Leverage is the ratio of total debt to total assets. Cash is defined as the ratio of cash and cash equivalents to total assets. Age and holding period is calculated as the weighted average age of the properties held by REITs and weighted average holding period of properties by REITs, respectively.

	Mean	Median	Std. Dev.	p25	p75	Obs.
Tobin's Q	1.373	1.312	0.365	1.128	1.558	1,093
Property Development Pipeline/Total Assets	0.077	0.043	0.093	0.000	0.119	1,093
Development Land/Total Assets	0.011	0.000	0.020	0.000	0.014	1,093
P/NAV	0.977	0.972	0.147	0.890	1.069	966
Log (Total Assets)	15.033	15.081	1.091	14.403	15.713	1,093
Leverage	0.510	0.501	0.140	0.436	0.591	1,093
Cash	0.021	0.009	0.038	0.004	0.022	1,093
Wghtd Avg Age of Properties	20.505	18.986	10.459	13.832	25.094	957
Wghtd Avg Holding Period of Properties	7.393	7.070	4.676	4.075	10.021	961

Table 2: **Development Exposure and Tobin's Q.** This table reports the results of the main specification. The dependent variable is Tobin's Q which is defined as the ratio of firm's market value to total assets. The independent variable is Property Development Pipeline scaled by total assets, where Property Development Pipeline is the publicly stated projection of the total costs to be incurred in the construction of new real estate developments. Property Development Pipeline includes both the cost incurred in the construction as well as the unfunded pipeline commitment. Development Land is the land held for the purpose of future development. LogAssets is the natural logarithm of firms total assets. Leverage is the ratio of total debt to total assets. Cash is defined as the ratio of cash and cash equivalents to total assets. We also control for weighted average age of the properties held by REITs, age square, as well as weighted average holding period of properties. All the columns include firm fixed effects and year fixed effects. Columns [2]-[9] also include exposure of REITs in top 25 Real Capital Analytics (RCA) markets and exposure by property type fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Tobin's Q								
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Property Development Pipeline	0.464^{**}	0.450^{***}	0.452^{***}	0.438^{***}	0.460^{***}	0.458^{***}	0.469^{***}	0.472^{***}	0.486^{***}
	(2.41)	(2.79)	(2.85)	(2.69)	(2.67)	(2.67)	(2.69)	(2.75)	(3.09)
Development Land			−0.230	−0.261	−0.551	−0.547	−0.803	−0.813	-1.520^{*}
			(-0.27)	(-0.32)	(-0.67)	(-0.66)	(-0.98)	(-0.98)	(-1.81)
LogAssets				-0.069^{*}	-0.079^{**}	-0.078^{**}	-0.085^{**}	-0.085^{**}	−0.028
				(-1.96)	(-2.38)	(-2.34)	(-2.50)	(-2.51)	(-0.94)
Leverage					0.486	0.496	0.688	0.686	0.507
					(1.39)	(1.36)	(1.53)	(1.54)	(1.17)
Cash						0.092	0.137	0.136	0.313
						(0.38)	(0.43)	(0.43)	(0.96)
Wghtd Avg. Age of Properties							-0.008^{**}	−0.006	−0.009
							(-2.21)	(-0.67)	(-1.13)
Square of Wghtd Avg. Age of Properties								−0.001	−0.001
								(-0.21)	(-0.27)
Wghtd Avg. Holding Period of Properties									0.042^{***}
									(5.16)
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Exposure by Geographical Location	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Exposure by Property Type	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,093	1,070	1,070	1,070	1,070	1,070	957	957	949
Within R^2	0.376	0.513	0.513	0.518	0.536	0.536	0.548	0.548	0.588

Table 3: **Matched-Sample: Mean Difference and Distributional Tests for Treated and Control Firms.** This table reports the mean difference t-test p-value and the Wilcoxon-Mann-Whitney rank-sum test p-value of Size, Leverage, and Cash Holdings for treated firms (property development pipeline $> 90^{th}$ percentile) and control firms (property development pipeline $< 10^{th}$ percentile) identified from the universe of U.S. equity REITs. In the matched sample, we use the Abadie and Imbens' (2006) bias-corrected matching estimator. We match on LogAssets, Leverage, Cash, and exact matching on year. LogAssets is the natural logarithm of firms total assets. Leverage is the ratio of total debt to total assets. Cash is defined as the ratio of cash and cash equivalents to total assets.

Characteristics of Treated and Control Firms: Matched Sample		Mean	Treated-Control	Mean Difference t-Test p-value	Wilcoxon-Mann-Whitney rank-sum Test p-value	No. of Matched Firms
LogAssets	Treated	14.875	0.080	0.676	0.790	39
	Control	14.795				32
Leverage	Treated	0.504	0.023	0.413	0.304	39
	Control	0.481				32
Cash	Treated	0.017	-0.005	0.616	0.755	39
	Control	0.022				32

Table 4: **Development Exposure and Tobin's Q: Matched-Sample Analysis.** This table presents estimations using matched sample which includes treated firms (property development pipeline $> 90^{th}$ percentile) and control firms (property development pipeline $< 10^{th}$ percentile) identified from the universe of U.S. equity REITs based on LogAssets, Leverage, Cash, and exact matching on year using the Abadie and Imbens' (2006) bias-corrected matching estimator. The dependent variable is Tobin's Q which is defined as the ratio of firm's market value to total assets. The independent variable is Property Development Pipeline scaled by total assets, where Property Development Pipeline is the publicly stated projection of the total costs to be incurred in the construction of new real estate developments. Property Development Pipeline includes both the cost incurred in the construction as well as the unfunded pipeline commitment. Development Land is the land held for the purpose of future development. LogAssets is the natural logarithm of firms total assets. Leverage is the ratio of total debt to total assets. Cash is defined as the ratio of cash and cash equivalents to total assets. We also control for weighted average age of the properties held by REITs, age square, as well as weighted average holding period of properties. All the columns include firm fixed effects and year fixed effects. Columns [2]-[9] also include exposure of REITs in top 25 Real Capital Analytics (RCA) markets and exposure by property type fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Tobin's Q								
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Property Development Pipeline	0.411*	0.313*	0.320*	0.312*	0.339*	0.336*	0.350*	0.380*	0.420**
	(1.98)	(1.76)	(1.80)	(1.75)	(1.74)	(1.75)	(1.70)	(1.88)	(2.22)
Development Land			−0.845	−0.746	−0.889	−0.876	−1.203	−1.251	−1.228
			(-0.78)	(-0.73)	(-0.76)	(-0.75)	(-0.85)	(-0.88)	(-0.85)
LogAssets				−0.076	−0.079	−0.077	−0.095	−0.092*	−0.031
				(-1.52)	(-1.40)	(-1.36)	(-1.64)	(-1.78)	(-0.75)
Leverage					0.548	0.562	0.786	0.748	0.579
					(0.93)	(0.88)	(1.10)	(1.09)	(0.90)
Cash						0.096	0.203	0.196	0.462
						(0.22)	(0.44)	(0.43)	(1.02)
Wghtd Avg. Age of Properties							−0.008**	0.006	0.006
							(-2.14)	(0.50)	(0.45)
Square of Wghtd Avg. Age of Properties								−0.001	−0.001
								(-1.16)	(-0.94)
Wghtd Avg. Holding Period of Properties									0.056***
									(4.60)
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Exposure by Geographical Location	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Exposure by Property Type	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	532	515	515	515	515	515	455	455	447
Within R^2	0.332	0.443	0.444	0.449	0.474	0.474	0.483	0.487	0.553

Table 5: **Development Exposure and Tobin's Q: Boom vs Bust Period.** This table presents the results of the main specification, while interacting property development pipeline with the boom period (2002-2007) and bust period (2008-2010) dummies. The dependent variable is Tobin's Q which is defined as the ratio of firm's market value to total assets. Column [1]-[2] ([3]-[4]) interact boom (bust) period dummy with Property Development Pipeline scaled by total assets, where Property Development Pipeline is the publicly stated projection of the total costs to be incurred in the construction of new real estate developments. Property Development Pipeline includes both the cost incurred in the construction as well as the unfunded pipeline commitment. Development Land is the land held for the purpose of future development. LogAssets is the natural logarithm of firms total assets. Leverage is the ratio of total debt to total assets. Cash is defined as the ratio of cash and cash equivalents to total assets. We also control for weighted average age of the properties held by REITs, age square, as well as weighted average holding period of properties. All the columns include firm fixed effects, year fixed effects, exposure of REITs in top 25 Real Capital Analytics (RCA) markets, and exposure by property type fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	Tobin's Q			
	[1]	[2]	[3]	[4]
Property Development Pipeline	0.343^{**}	0.381^{**}	0.556^{***}	0.631^{***}
	(2.18)	(2.24)	(3.13)	(3.63)
Boom Period	0.132^{*}	0.008		
(2002 – 2007)	(1.68)	(0.07)		
Property Development Pipeline ×	0.375	0.362^{*}		
Boom Period	(1.51)	(1.73)		
Bust Period			0.269^{***}	0.126
(2008 – 2011)			(3.99)	(1.14)
Property Development Pipeline ×			-0.533^{**}	-0.772^{***}
Bust Period			(-2.01)	(-3.31)
Development Land		-1.581^{*}		-1.384^{*}
		(-1.85)		(-1.73)
LogAssets		−0.027		−0.023
		(-0.89)		(-0.73)
Leverage		0.508		0.538
		(1.16)		(1.26)
Cash		0.341		0.326
		(1.04)		(0.99)
Wghtd Avg. Age		−0.008		−0.008
of Properties		(-1.01)		(-1.08)
Square of Wghtd Avg.		−0.001		−0.001
Age of Properties		(-0.44)		(-0.25)
Wghtd Avg. Holding		0.042^{***}		0.041^{***}
Period of Properties		(5.42)		(5.27)
Firm Fixed Effect	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes
Property Exposure by Geographical Location	Yes	Yes	Yes	Yes
Property Exposure by Property Type	Yes	Yes	Yes	Yes
Observations	1,070	949	1,070	949
Within R^2	0.516	0.591	0.517	0.597

Table 6: **Development Exposure and Price-to-NAV (P/NAV) Ratio.** This table reports the results of the main specification with dependent variable as P/NAV ratio, which is defined as the ratio of firm's share price to net asset value per share. The independent variable is Property Development Pipeline scaled by total assets, where Property Development Pipeline is the publicly stated projection of the total costs to be incurred in the construction of new real estate developments. Property Development Pipeline includes both the cost incurred in the construction as well as the unfunded pipeline commitment. Development Land is the land held for the purpose of future development. LogAssets is the natural logarithm of firms total assets. Leverage is the ratio of total debt to total assets. Cash is defined as the ratio of cash and cash equivalents to total assets. We also control for weighted average age of the properties held by REITs, age square, as well as weighted average holding period of properties. All the columns include firm fixed effects and year fixed effects. Columns [2]-[9] also include exposure of REITs in top 25 Real Capital Analytics (RCA) markets and exposure by property type fixed effects. Standard errors are clustered at the firm level. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Dep. variable:	P/NAV								
	[1]	[2]	[3]	[4]	[5]	[6]	[7]	[8]	[9]
Property Development Pipeline	0.126**	0.121*	0.124*	0.153**	0.152**	0.153**	0.150**	0.158**	0.145**
	(1.99)	(1.81)	(1.85)	(2.47)	(2.43)	(2.45)	(2.19)	(2.25)	(2.12)
Development Land			−0.216	−0.118	−0.104	−0.126	−0.207	−0.228	−0.082
			(-0.62)	(-0.32)	(-0.28)	(-0.33)	(-0.56)	(-0.61)	(-0.22)
LogAssets				0.087***	0.088***	0.083***	0.097***	0.097***	0.091***
				(4.06)	(4.04)	(3.86)	(4.17)	(4.11)	(3.97)
Leverage					−0.025	−0.044	−0.002	−0.006	0.030
					(-0.24)	(-0.42)	(-0.02)	(-0.05)	(0.25)
Cash						−0.243	−0.229	−0.233	−0.253
						(-1.44)	(-1.27)	(-1.31)	(-1.43)
Wghtd Avg. Age of Properties							−0.001	0.003	0.004
							(-0.51)	(0.73)	(0.81)
Square of Wghtd Avg. Age of Properties								−0.001	−0.001
								(-1.20)	(-1.23)
Wghtd Avg. Holding Period of Properties									−0.007*
									(-1.68)
Firm Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year Fixed Effect	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Exposure by Geographical Location	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Property Exposure by Property Type	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	1,043	1,035	1,035	1,035	1,035	1,035	932	932	924
Within R^2	0.445	0.491	0.491	0.524	0.524	0.526	0.553	0.555	0.559