The Effect of Financial Flexibility on Payout Policy

Anil Kumar and Carles Vergara-Alert*

Abstract

We use variation in real estate prices as exogenous shocks to firms' debt capacity to study the causal effect of financial flexibility on payout policy. We show that an increase in financial flexibility results in higher dividends, share repurchases, and payout flexibility. We find that a one-standard-deviation increase in the firms' collateral value results into a 0.26 and 0.55 percentage points increase in non-discretionary payout and discretionary payout, respectively. This effect is stronger for firms with few investment opportunities. Moreover, highly leveraged firms are more likely to cut dividends in response to a sharp decrease in their financial flexibility.

*Kumar, akumar@econ.au.dk, Department of Economics and Business Economics, Aarhus University; Vergara-Alert, cvergara@iese.edu, IESE Business School. We thank Jarrad Harford (the editor) and two anonymous referees for their helpful comments and guidance.We also thank Miguel Anton, Joao Cocco, John Core, Nicolae Garleanu, William Megginson, Gaizka Ormazabal, Albert Saiz, Martin Schmalz, Xavier Vives, and conference and seminar participants at the AFA 2017 Meetings, FMA 2016 Annual Meetings, Massachusetts Institute of Technology, Swiss Finance Institute–University of Zurich, University of Konstanz, Universite Paris Dauphine, Aarhus University, ESSEC Business School, ESCP Paris, Syracuse University, University of Barcelona, and IESE Business School for their helpful comments. We are especially thankful to Real Capital Analytics for providing us with the Commercial Property Price Index (CPPI) data. Kumar acknowledges the financial support by the Aarhus University Research Foundation (AUFF-E-2017-7-10). Vergara-Alert acknowledges the financial support by the Public-Private Sector Research Center at IESE, the Ministry of Economy of Spain (ref. ECO2015-63711-P) and AGAUR (ref: 2017-SGR-1244).

I. Introduction

Financial flexibility -the firm's capability to access financing in order to fund investment opportunities and unexpected expenses- has a significant impact on the decisions made by the firm's managers. In this paper, we investigate the causal effect of financial flexibility on payout decisions. We use variation in real estate prices as an experiment that generates exogenous shocks to firms' debt capacity and, therefore, to their financial flexibility. Most firms need real estate assets to run their businesses, and they need to choose between owning or leasing these assets.[1] One of the most important characteristics of corporate real estate (CRE) assets is that they can be used as collateral to obtain debt financing. In a world without asymmetric information between firms' managers and lenders, the value of the assets that can be used for collateral would be irrelevant. However, in the presence of information frictions, these assets can be used as collateral to help reduce lending costs. As a result, the value of CRE assets affects firms' borrowing capacity, their financial flexibility and, ultimately, their payout policies.

We use firm-level data for 4,994 US firms from 1993 through 2013 to examine whether changes in the firm's financial flexibility has any effect on its payout policy. Our fundamental empirical analysis can be summarized in four sets of results. First, we document the effects of financial flexibility on the firm's cash dividend payments. More specifically, we show that an increase in financial flexibility (i.e., a positive shock to real estate prices) leads to

[1] To own corporate real estate (CRE), firms must usually make a major investment, which has a significant impact on their financial statements. Zeckhauser and Silverman (1983) find that real estate assets represent between 25% and 41% of total corporate assets, depending on the industry. Veale (1989) reports that corporate real estate accounts for about 15% of firms' operating expenses or 50% of their net operating income. Chaney, Sraer, and Thesmar (2012) show that 59% of public firms in the United States have at least some real estate ownership and that the market value of real estate among these firms accounted for 19% of these firms' total market value in 1993.

an increase in the dividends paid to shareholders. Second, we reveal the implications of financial flexibility for share repurchases. Third, we show that shocks to financial flexibility have different effects on dividends and share repurchases. We find that an increase in financial flexibility leads to more payout flexibility, which is defined as the ratio of share repurchases to the total payout. Fourth, we demonstrate that the impact of shocks to financial flexibility is higher for discretionary payouts than for non-discretionary payouts. Overall, we document a significant effect of the increase in financial flexibility on firms payout: a one-standard-deviation increase in the value of firms' pledgeable collateral translates into a 0.26 percentage points increase in non-discretionary payout (i.e., 7.0% of a standard deviation increase) and a 0.55 percentage points increase in discretionary payout (i.e., 9.5% of a standard deviation increase) for a typical US firm.

Moreover, we study the mechanisms that generate payout responses to financial flexibility. Increases in real estate prices raise the level of financial flexibility and affect firms' payouts through two channels. First, a positive "collateral" effect is driven by increases in real estate prices that relax firms' borrowing constraints. Second, a positive "substitution" effect arises from the firm substituting capital from real estate services in the future with payouts in the present. The economic intuition is as follows: firms use CRE assets as collateral to obtain debt financing. Through this collateral channel, positive shocks to the value of CRE assets allow firms to increase their leverage in order to finance an increase in investments. In addition, firms can shift part of the cash flow generated by their businesses from investments to payout. If the collateral and substitution channels are in play, then we should expect: (i) a weaker or a negative effect of real estate prices on payouts in highly leveraged firms when financial flexibility is lower, and (ii) a stronger effect in firms with few investment opportunities.

We test these two propositions. First, we show that highly leveraged firms are likely to decrease their payout when the value of their pledgeable collateral decreases (i.e., financial flexibility is lower). Second, we demonstrate that firms with few investment opportunities (i.e., firms with low Tobin's Q) increase their payouts more when they experience an increase in their financial flexibility. We also show that among firms with fewer investment opportunities, financially constrained firms make more use of the collateral channel to increase their payouts than unconstrained firms.

Our goal is to identify the causal effect of financial flexibility on firms' payout policies using the variation in real estate prices as an exogenous shock to financial flexibility. However, two main sources of endogeneity may affect our empirical analysis. First, the variation in local real estate prices may be correlated with the firm's payout decisions. For example, an unobserved local economic shock could affect both real estate prices and the firm's payout policy. Such an unobserved shock would act as an omitted variable that could bias our estimates. As a positive local economic shock would increase both real estate prices and the firm's payout, this potential bias would be positive. To address this endogeneity issue, we adapt the instrumental variables (IV) approach developed in Himmelberg, Mayer, and Sinai (2005) and Mian and Sufi (2011) to our specific problem. Our goal is to isolate the variation in local real estate prices by making this variation orthogonal to the potentially omitted variables. We instrument local real estate prices using the interaction between the supply elasticity of the local real estate market and long-term interest rates, which enables us to pick up changes in housing demand. We also address the criticism of this instrument in Davidoff (2016) by controlling for the interaction between the supply constraint and time in the first stage as well as in the second stage IV specification. The second main source of endogeneity is that the decision to own or rent (lease) real estate assets could be correlated with the firm's payout policy. As we do not have a suitable instrument to tackle this endogeneity problem, we study the effects of the decision to own CRE assets on the firm's payout. Specifically, we control for the observable determinants of CRE ownership decisions and we find that our estimates do not change when we implement these controls.

We focus on other potential concerns in our robustness checks. First, we address the possibility that the payouts by large firms could increase local real estate prices. Second, we focus on the concern that firms may not be able to use their increased borrowing capacity immediately after an increase in CRE value. Third, we run a robustness test to address the concern that firms that pay higher dividends may choose to locate in an area experiencing high growth in real estate prices. Moreover, we show that our results are not driven by the fact that remotely located firms pay higher dividends because shareholders cannot perfectly monitor managers' decisions. Finally, we address the concern that the collateral channel might be used only to finance investments but not payouts.

Our paper contributes to the literature in two main ways. First, we contribute to a growing body of literature that focuses on financial flexibility as a determinant of corporate financing decisions. Chen, Harford, and Lin (2017) document that an increase in the firm's financial flexibility lowers its cash holdings and its marginal value of cash holdings. Bonaime, Harford, and Moore (2017) study the tradeoff between commitment and financial flexibility in firms' payout policies using SEC Rule 10b5-1 preset repurchase plans. They find that these repurchases plans, which allow firms to establish a preset repurchase plan with a third party, increase the commitment and reduce the financial flexibility provided by the open market repurchases. Bonaime, Hankins, and Harford (2014) shows that both risk management and payout decisions affect financial flexibility. Their study differs from ours because they focus on how payout decisions -together with risk management- affect financial flexibility. They argue that the choice of more repurchases relative to dividends increases the firm's financial flexibility. Our paper focus on the reverse analysis. We examine how financial flexibility affects payout choices, in a general context.

Second, our study also relates to a vast stream of literature that study the characteristics of payout flexibility and the firms' reluctance to decrease dividends. Brav, Graham, Harvey, and Michaely (2005) survey CFOs and document that they prefer decreasing investments rather than dividends. This rigidity in dividend payouts is consistent with the findings in Guay and Harford (2000), Jagannathan, Stephens, and Weisbach (2000), and Lie (2005) who show that firms with permanent operating cash flows tend to pay dividends, while firms with temporary cash flows tend to repurchase shares. In a complementary way, Leary and Michaely (2011) document that financially unconstrained firms present a high level of dividend smoothing, but they do not attempt to smooth share repurchases. Bliss, Cheng, and Denis (2015) document that firms with higher leverage are more likely to reduce their payout during a shock to the supply of credit. Farre-Mensa, Michaely, and Schmalz (2018) show that firms use external capital (both equity and debt) to finance their payout. Our results are consistent to their findings as we show that firms use collateralizable assets to raise debt, which increases their financial flexibility, and finance payout. However, none of these papers analyze the causal relationship between financial flexibility -induced through the collateral channel- and payout policy.

II. Theoretical Predictions

In the Modigliani-Miller (MM) model, the split of retained earnings between dividends and new investments does not have any influence on the value of the firm. This "dividend irrelevance" for the value of the firm arises because shareholders are indifferent between obtaining dividends and investing the retained earnings in new opportunities with the same level of risk. Among other assumptions, the MM model assumes that firms' managers and shareholders have access to free information and that there are no information asymmetries among them. As a result, the value of collateralizable assets is irrelevant.

However, in the presence of information frictions, collateralizable assets can be pledged to lenders to reduce the costs of those frictions. Therefore, positive shocks to real estate prices make firms' collateral more valuable, which increases their debt capacity and financial flexibility.[2] Cvijanovic (2014) shows that most firms increase their leverage when they experience a positive shock to the value of their CRE assets (i.e., the "collateral" effect). Chaney et al. (2012) and Chen et al. (2017) demonstrate that such firms use this extra debt to finance part of their investments and reduce their cash holdings, respectively. As a result, these firms can shift some of their income from investments and/or cash reserves to payouts, which we call the "substitution" effect.[3] Therefore, the "collateral" and "substitution" effects serve as transmission mechanisms between financial flexibility and payouts in the form of dividends

[2]Besides, positive shocks to the value of CRE assets produce a negative "income" effect in the firm. As firms that own real estate are effectively paying rents to themselves, an increase in the value of real estate prices increases their implicit rents. At the same time, firms that own real estate experience a positive "endowment" effect. Standard economic theory (e.g., Sinai and Souleles (2005) and Buiter (2010)) shows that the income and endowment effects cancel each other out because the increase in real estate wealth (i.e., a positive endowment effect) offsets the increase in the cost of real estate services (i.e., a negative income effect).

[3]Note that without an increase in payouts, an increase in the value of collateralizable real estate assets would only reduce leverage if the firm does not incur in any changes in other costly corporate finance decisions (e.g., investments, cash holdings, working capital, etc.)

and share repurchases. We use variation in the value of collateralizable assets as exogenous shocks to firms' debt capacity and, consequently, to their financial flexibility. Hypotheses 1 and 2 summarize these basic predictions.

Hypothesis 1 *Cash dividends increase in the market value of firms' collateralizable assets.*

Hypothesis 2 *Share repurchases increase in the market value of firms' collateralizable assets.*

These two hypotheses raise the question of which form of payout –dividends or share repurchases– is more affected by changes in firms' financial flexibility. The extant corporate finance literature shows that firms are much more reluctant to cut dividends than to increase them because the negative reaction to a dividend decrease is stronger than the positive reaction to a dividend increase of the same magnitude (Ghosh and Woolridge (1988); Denis, Denis, and Sarin (1994); Yoon and Starks (1995)). This stream of literature also finds that this reaction is weaker for share repurchases (Jagannathan et al. (2000)). As a result, firms are more conservative when it comes to increasing dividends than when it comes to increasing share repurchases. Equivalently, repurchases provide managers with more discretion in terms of the amount and timing of the payout. If the main portion of a positive shock in real estate prices is temporary, then the increase in firm's financial flexibility is not permanent and we should expect greater increases in share repurchases than in dividends. Hypothesis 3 formalizes this prediction. To test this hypothesis, we use the measure of "payout flexibility" defined by Bonaime et al. (2014) as the ratio of share repurchases to total payout.

Hypothesis 3 *Payout flexibility increases in the market value of firms' collateralizable assets.*

Leary and Michaely (2011) show that firms are well aware of the penalties associated with dividend cuts. As a result, they smooth their dividend payouts.[4] They are usually conservative about increasing their dividends during periods of increasing real estate prices because they are reluctant to cut them later if bad times come. On the other hand, the costs of reducing share repurchases are lower and firms manage them in a more discretionary manner. Share repurchases are usually more volatile than dividends because firms increase their share repurchases when their financial flexibility improves (e.g., during periods of increasing real estate prices) and decrease them when their financial flexibility is lower (e.g., during periods of decreasing real estate prices). Therefore, we expect positive and negative shocks in financial flexibility to have different effects in dividends and share repurchases. Specifically, one might wonder whether the magnitude of the decrease in share repurchases resulting from the decrease in financial flexibility (i.e., the decrease in the value of CRE assets) is higher than the magnitude of the decrease in dividends. Therefore, we also study whether a decrease in financial flexibility has a higher effect on share repurchases than dividends.

We have previously discussed that firms use collateralizable assets to borrow from lenders. Notably, the collateral channel is highly used during periods of increasing real estate prices, but this channel is less powerful in periods of decreasing real estate prices. In these periods, highly leveraged firms find it difficult to increase their debt to finance payouts. For these firms, the collateral channel is no longer viable because real estate prices have decreased. Consequently, we expect these firms to cut their dividends and share repurchases in response to their decreased financial flexibility. On the other hand, less leveraged firms can use cash

[4] The online appendix provides a detailed analysis of the impact of real estate prices on dividend smoothing.

or raise debt to finance part of their dividend payout. Hence, we expect less leveraged firms to maintain their dividend payments in order to avoid the penalties associated with dividend cuts. As the costs associated with decreasing share repurchases are lower, we expect a smaller effect than the effect that we observe for cash dividends. Our fourth hypothesis summarizes these predictions. We make use of the recent bust in real estate prices (2008-2011) to study this effect.

Hypothesis 4 *Highly leveraged firms are more likely to decrease their payouts in response to a decrease in the value of their collateralizable assets.*

Finally, one may argue that when firms experience positive shocks in the value of their collateralizable assets, they should invest all of the extra capital that they can borrow in positive net present value projects instead of increasing their payouts. If firms have enough projects in which to invest, then this would be true. Therefore, firms with very few investment opportunities should use the collateral channel to increase their payouts when their financial flexibility improves (i.e., the value of their CRE assets increases). Hypothesis 5 formalizes this conjecture.[5]

Hypothesis 5 *The magnitude of the payout increase that occurs when the value of collateralizable assets increases is greater for firms with few investment opportunities.*

III. Data

Our sample contains firm-level observations for 21 years (1993 through 2013). We use all active firms listed in COMPUSTAT as of 1993 for which data on total assets was

[5] We provide additional evidence to motivate this hypothesis in the online appendix.

available. This provided us with a sample of 10,215 firms and a total of 116,044 firm-year observations over the focal period. We omitted firms not headquartered in the U.S. as well as firms not present in the sample for at least three consecutive years. As is standard practice in the literature, we also omitted firms that belong to the finance, insurance, real estate, construction, or mining industries, as well as non-profit and governmental organizations. This reduced our sample to 4,994 firms and 67,836 firm-year observations. Table 1 displays the summary statistics for the variables that we use in our empirical analysis.

[Insert Table 1 around here]

A. Accounting data

1. Corporate real estate assets

We follow Chaney et al. (2012) methodology for calculating the market value of corporate real estate assets. The accumulated depreciation on buildings (COMPUSTAT mnemonic: DPACB) is not reported in COMPUSTAT after 1993, which is why we restricted our sample to firms active in 1993 when measuring the market value of real estate assets.

To measure the market value of a firm's real estate collateral, we define the firm's real estate assets as the sum of the three major categories of property, plant, and equipment (PPE): PPE land and improvement at cost (mnemonic: FATP), PPE buildings at cost (mnemonic: FATB), and PPE construction-in-progress at cost (mnemonic: FATC). As these assets are valued at historical cost rather than marked-to-market, we determine their COMPUSTAT market value by calculating their average age and estimating their current market value using market prices.

More specifically, we took the following steps to determine the market value of a firm's real estate assets. First, we calculate the ratio of the accumulated depreciation of buildings (mnemonic: DPACB) to the historic cost of buildings (mnemonic: FATB) and multiply it by the assumed mean depreciable life of 40 years (see Nelson, Potter, and Wilde (2000)). This calculation approximates the age or the acquisition year of the firm's real estate assets. Second, to adjust real estate prices, we retrieve the state-level real estate price index from the Office of Federal Housing Finance Agency (FHFA) for the period starting in 1975, which was when the index became available. We use the consumer price index (CPI) for the period prior to 1975. We use the table that maps zip codes to metropolitan statistical area (MSA) codes provided by the U.S. Department of Labor's Office of Workers Compensation Programs (OWCP) as well as the zip codes for each firm from COMPUSTAT. Thereafter, we use the zip code as an identifier to match the MSA code and the MSA-level real estate price index with accounting data for each firm from COMPUSTAT. As a result, we obtain the yearly adjusted real estate price index. Finally, we estimate the market value of each firm's real estate assets for each year in the sample period (1993 through 2013) by multiplying the book value of the assets at acquisition (mnemonics: FATP + FATB + FATC) with the real estate price index for the given year.

2. Dividends and share repurchases

We use the ratio of dividends (COMPUSTAT mnemonic: DVC) to the previous year's property, plant, and equipment (PPE, lagged mnemonic: PPENT) as our main measure of dividends. Similarly, we calculate the ratio of share repurchases (mnemonic: PRSTKC) to the previous year's property, plant, and equipment (PPE), and use it as the main measure of repurchases. By normalizing both dividends and share repurchases by PPE, we make it easier to interpret the regression coefficients, as our independent variable (the market value of CRE assets) is also normalized by PPE.[6] In the corporate finance literature, the dividend payout ratio (i.e., dividends/net income) and the dividend yield (i.e., dividend per share/stock price) are the most commonly used measures of dividend payments. We do not use these measures in our study because changes in the market value of CRE assets may also affect share prices and net income, thereby making it difficult to identify the channel in which we are interested. Finally, we use the ratio of share repurchases to total payout (i.e., cash dividend + share repurchases) as the measure of payout flexibility.

3. Other accounting data

We employ a set of variables commonly used in the corporate finance literature as part of our analysis. Retained earnings to total assets are computed as the ratio of retained earnings (COMPUSTAT mnemonic: RE) to the book value of assets (mnemonic: AT). Leverage is defined as the sum of short-term (mnemonic: DLC) and long-term (mnemonic: DLTT) debt divided by the book value of assets. The asset growth ratio is computed as the difference between the current and lagged book value of assets divided by the lagged book value of assets. Firm size is defined as the book value of total assets (mnemonic: AT). In line with Leary and Michaely (2011), we compute the market-to-book ratio as the market value of equity (product of mnemonics PRCC and CSHO) plus the book value of assets minus the book value of equity, all divided by the book value of assets. The book value of equity is

[6] This normalization by PPE is standard in the literature (see, e.g., Kaplan and Zingales (1997) or Almeida, Campello, and Weisbach (2004)). An alternative specification is to normalize all variables by lagged asset value (COMPUSTAT mnemonic: AT), as in Rauh (2006). However, this delivers notably lower ratios.

computed as the book value of assets minus the book value of liabilities (mnemonic: LT) minus preferred stock plus deferred taxes (mnemonic: TXDITC). The sales-growth ratio is defined as the difference in the current and lagged values of sales divided by the lagged value of sales (mnemonic: SALE). ROA is computed as operating income before depreciation minus depreciation and amortization normalized by total assets (mnemonic: OIBDP minus mnemonic: DP, all divided by mnemonic: AT). Cash holdings are defined as cash and short-term securities that can readily be converted into cash (mnemonic: CHE). Firm age is computed as the number of years since the firm first appeared in the COMPUSTAT database. As a measure of long-term interest rates, we use the "contract rate on 30-year, fixed rate conventional home mortgage commitments" from the Federal Reserve website.

We follow Chaney et al. (2012), in using the initial characteristics of firms to control for potential heterogeneity among our sample firms. These controls, measured in 1993, are firm size (book value of total assets (mnemonic: AT)), the return on assets (i.e., operating income before depreciation (mnemonic: OIBDP) minus depreciation (mnemonic: DP) divided by assets (mnemonic: AT)), age measured as the number of years since the firm's IPO, two-digit SIC codes, and the state in which the headquarters are located.

Finally, to ensure that our results are robust to the definition of the main payout and real estate variables, we winsorize all variables defined as ratios by using the median plus/minus five times the interquartile range as thresholds. Table 1 provides the summary statistics for the accounting variables used in the empirical analysis.

B. Real estate data

1. Real estate prices

We use both commercial and residential real estate prices in our empirical analysis. We obtain residential real estate indices at the state and MSA levels from the FHFA. The FHFA provides a house price index (HPI), which measures the dynamics of single-family home prices in the United States. State-level HPIs became available in 1975, and they were made available for most MSAs between 1977 and 1987. We match the state-level HPI to our accounting data using the state identifier from COMPUSTAT. To match the MSA-level HPI to our accounting data, we assign MSA codes to all COMPUSTAT items using an MSA zip-code-lookup file. Then, we use the MSA code of each firm to merge the MSA-level HPI information with COMPUSTATs firm-level data.

Moreover, we use the Moody's/RCA Commercial Property Price Indices (CPPI), which are provided by Real Capital Analytics (RCA). City-level CPPI are available from 2001 until 2013. They are weighted, repeat-sales indices that are computed using contemporaneous transaction- price-based data on private deals. Monthly CPPI data is available for the aggregate US housing market and for different property types, while quarterly data is available for the main MSAs in the US. As CPPI are not available from the first year of our sample time period, we use the state-level residential price index from 1993 until 2000 to calculate the market value of real estate assets. From 2001 onwards, we use the city-level CPPI to estimate the market value of CRE assets.

2. Measures of land supply

To address the potential endogeneity problem of local real estate prices, we follow Himmelberg et al. (2005) and Mian and Sufi (2011) in instrumenting local real estate prices using the interaction of long-term interest rates and local housing-supply elasticity. We use the local housing-supply elasticities provided in Saiz (2010) and Glaeser, Gyourko, and Saiz (2008). These measures capture the amount of developable land in each MSA, and are estimated by processing satellite-generated data on elevation and the presence of water bodies.

IV. Empirical Strategy

The variation in real estate prices provides and excellent natural setting to study the effects of financial flexibility on the payout policy. As previously discussed, variation in real estate prices represent exogenous shocks to firms' debt capacity and, therefore, exogenous shocks to their financial flexibility. In this section, we describe our main specification and discuss how to address potential endogeneity issues. Our empirical strategy adapts the analysis in Chaney et al. (2012) for the study of corporate investments to an analysis of payout policies. Consequently, we run the following specification for the payout of firm i with headquarters located in area l at year t:

$$Payout_{it}^{l} = \alpha_i + \delta_t + \beta \cdot REValue_{it}^{l} + \gamma \cdot P_t^{l} + Controls_{it} + \epsilon_{it} \qquad (1)$$

where $Payout_{it}^{l}$ represents two dependent variables: the ratio of the dividend to lagged PPE and the ratio of share repurchases to lagged PPE. $REValue_{it}^{l}$ denotes the ratio of the market value of the corporate real estate assets that firm i owns in location l in year t to the lagged PPE, while P_t^l controls for the level of prices in location l (state, MSA, or city) in year t.

$Controls_{it}$ denotes a set of firm-level controls. In line with the extant literature on payout policy, we control for: (1) earned/contributed capital mix (ratio of retained earnings to total assets); (2) leverage; (3) asset growth rate (AGR); (4) firm size; (5) market-to-book ratio; (6) sales-growth ratio; (7) return on assets (ROA); (8) cash holdings; and (9) the age of the firm. We also control for firm-fixed effects, α_i, as well as year-fixed effects, δ_t. Errors, ϵ_{it}, are clustered at the state, MSA, and city levels depending on the regression.

In the above specification, there are two possible sources of endogeneity. First, real estate prices could be correlated with the firm's payout policy. Second, a decision to hold real estate may not be random and could be related to the firm's payout policy. We adapt the empirical strategy found in Himmelberg et al. (2005) and Mian and Sufi (2011) to address the first endogeneity problem. More specifically, we instrument local real estate prices as the interaction between the elasticity of supply on the local real estate market and long-term interest rates to capture changes in real estate demand. We estimate the following first-stage regression to predict real estate prices, P_t^l, for location l at time t:

$$P_t^l = \alpha^l + \delta_t + \gamma \cdot Elasticity^l \cdot IR + u_t^l \quad (2)$$

where $Elasticity^l$ measures constraints on land supply at the MSA or city level, IR is the nationwide real interest rate at which banks refinance home loans; α^l is a location (MSA or city) fixed effect; and δ_t captures macroeconomic fluctuations in real estate prices, from which we want to abstract.[7]

One may argue that the orthogonality condition of supply of elasticity is unlikely to be satisfied because land availability and land-use regulations are likely to be correlated with local demand for real estate assets and, therefore, the instrument does not isolate the supply effects of real estate assets (see Davidoff (2016)). To address this concern, we control for the interaction of the supply constraint and year dummies in both first and second stage regressions of our IV specification, as discussed in Davidoff (2016). Given that the interaction term $supplyconstraint \times realinterestrate$ is highly correlated with $supplyconstraint \times year$, we control for the interaction term ($supplyconstraint \times year$) in the IV specification to ensure that our results are not purely due to the passage of time during the boom period during which firms would increase payout.

To address the second endogeneity problem, we control for interaction between the initial characteristics of firms and real estate prices. If these controls identify characteristics that make firm i more likely to own real estate and if those characteristics also make firm i more sensitive to fluctuations in real estate prices, then controlling for the interaction between these controls and the contemporaneous real estate prices allows us to separately identify the channels in which we are interested. Control variables that might play an important role in the ownership decision are age, assets, and return on assets, as well as two-digit industry dummies and state dummies. We perform two analyses in this regard. First, we run cross-sectional OLS regressions of a dummy equal to 1 when the firm owns real estate, REOwner,

[7]Results for the first-stage regression are provided in the online appendix.

on the initial characteristics mentioned above. Second, we run the same regression using the market value of the firms real estate assets as the dependent variable.[8] Both analyses show that larger, more profitable, and older firms are more likely to own real estate. Our concerns about the second endogeneity problem are mitigated by controlling for these characteristics in interaction with the real estate prices in our main specifications.

Throughout our empirical analyses, we estimate the following instrument variable (IV) specification while controlling for the observed determinants of real estate ownership. We do so to ensure that any interaction between CRE value changes and the firms payout policy comes only from shocks to the values of the firms' collateral.

$$(3) \qquad Payout^{l}_{it} = \alpha_i + \delta_t + \beta \cdot REValue^{l}_{it} + \gamma \cdot P^{l}_{t} + \sum_{k} \kappa_k X^{i}_{k} \cdot P^{l}_{t} + Controls_{it} + \epsilon_{it}.$$

In equation (3), X^{i}_{k} denotes the controls that might play an important role in the decision to own real estate assets. Real estate prices, P^{l}_{t}, are obtained from the first−stage regression.[9]

Finally, to test the effect of a change in the value of CRE assets on payout flexibility, we replace the dependent variable in equation (3) with payout flexibility, which is defined as the ratio of share repurchases to total payout.

V. Main Results

In this section, we use the firm-level data described in Section III and the empirical strategy developed in Section IV to test the five hypotheses developed in Section II. In the

[8]In the online appendix, we provide the results of both analyses.

[9]Our results are robust to the use of land-supply elasticity interacted with the lagged nationwide real interest rate as an alternative IV.

following subsections, we present our results.

A. The effect of financial flexibility on dividends

First, we test whether cash dividends increase in line with financial flexibility, that is, with the market value of firms' collateralizable asset (Hypothesis 1) by estimating different specifications of our baseline equation (3). Table 2 exhibits the results of this test. Specifications [1] to [3] use residential price indices at the state level to compute the value of collateralizable real estate assets, [4] to [6] use residential price indices at the MSA level, and [7] to [9] use commercial price indices at the city level. In support of Hypothesis 1, we find positive and significant $REValue$ coefficients in all specifications.[10]

[Insert Table 2 around here]

Column [1] displays the results of the simplest specification of equation (3) without any additional controls. The $REValue$ coefficient in [1] is 0.0030, which is significant at the 1% confidence level. This indicates that a $1 increase in real estate value increases cash dividends by 0.30 cents. Specification [2] includes initial controls interacted with real estate prices, which accounts for observed heterogeneity in ownership decisions. In column [3], we add the set of firm-level controls typically used in the payout literature (see Section III). Specification [4] is the same as specification [3] except that we calculate real estate value using MSA-level residential indices. Columns [5], [6], [8], and [9] implement the IV strategy in which real estate prices are instrumented using the interaction between interest rates and

[10]The $REValue$ coefficient captures the average response of the firm's payout to increases and decreases in the value of CRE assets. Note that these coefficients are relative to the firm's mean value during the sample period.

local constraints on land supply. In columns [6] and [9], we also control for the interaction *supply constraint* $\times$ *year dummies* to address the possibility that our instrument variable might be correlated with local demand for real estate assets and, as such, may not isolate the supply effects of these assets. By controlling for the interaction $supply\,constraint \times year$, we ensure that our findings are not the result of the passage of time.

We also present the results obtained when estimating the market value of corporate real estate assets using commercial price indices at the city level instead of residential price indices. Columns [7], [8], and [9] use the same specifications as those in columns [4], [5], and [6], respectively, except that in the former we estimate the market value of CRE assets using the Moody's/RCA Commercial Property Price Indices instead of residential real estate indices. The $REValue$ coefficients are positive and significant at the 1% confidence level.[11]

Overall, these results indicate that an increase in financial flexibility as a result of increasing real estate prices leads to an increase in cash dividends. This effect is quantitatively important because real estate represents a sizable fraction of the tangible assets that firms hold on their balance sheets.

B. The effect of financial flexibility on share repurchases

Second, we test whether share repurchases increase with financial flexibility, that is, with the market value of collateralizable assets (Hypothesis 2). Table 3 presents the results of this test. The regression specifications are the same as in Table 2 except that the dependent variable is share repurchases over lagged PPE. We use the same control variables, which

[11] In a robustness test reported in the online appendix, we show the effect of real estate prices on dividends and share repurchases for firms that are real estate owners by interacting $REValue$ with a dummy variable for real estate ownership.

allows us to compare the magnitude of the estimates in both sets of tests. In support of Hypothesis 2, we find that an increase in financial flexibility -induced by an increase in the value of collateralizable real estate assets- results in an increase in share repurchases. Columns [1], [2], and [3] use the state residential index; [4], [5], and [6] use the MSA residential index; and [7], [8], and [9] use the city-level commercial price index to calculate the market value of real estate assets.

[Insert Table 3 around here]

All specifications with firm-level controls result in positive and significant coefficients for the variable $REValue$ at the 1% confidence level. These results indicate that an increase in financial flexibility as a result of increasing real estate prices leads to an increase in share repurchases. In the robustness section, we show that our results are not driven by the large firms. Small firms might have very few or no CRE assets in their balance sheets, which might raise sample-selection issues. To address this potential concern, we present an additional test in which we separate CRE owners from non-owners. We run our main specification by interacting $REValue$ with a dummy variable for real estate ownership. We find that the coefficient of the interaction $REValue \times$ CRE ownership is positive and significant for both dividends and share repurchases (see the online appendix).

C. The effect of financial flexibility on payout flexibility and discretionary payout

Third, we test whether payout flexibility (i.e., the ratio of share repurchases to total payout) increases in line with the market value of collateralizable assets (Hypothesis 3). Table

4 shows the results of this test. Panel A presents the results for payout flexibility. We obtain a positive and significant coefficient for $REValue$ using different specifications. As payout flexibility is measured as the ratio of share repurchases to total payout, a positive $REValue$ coefficient means that the effect of financial flexibility is higher for share repurchases than for dividends.

[Insert Table 4 around here]

These results are consistent with the payout policy literature, which demonstrates that markets impose higher penalties on dividend cuts than on equivalent decreases in share repurchases (e.g., Denis et al. (1994), and Yoon and Starks (1995)) and that managers are therefore reluctant to decrease dividends (DeAngelo and DeAngelo (1990); Leary and Michaely (2011)). Guay and Harford (2000) show that firms choose dividend increases to distribute relatively permanent cash-flow shocks, while they rely on repurchases to distribute more transient shocks. Because many shocks to real estate prices are not permanent, managers have an incentive to allocate more of the increases in debt capacity to share repurchases than to dividends.

We also show that changes in financial flexibility have asymmetrical effects on payout flexibility. In other words, while firms increase both dividends and share repurchases when financial flexibility improves, they do not cut dividends to a similar extent (to avoid the penalty of a dividend cut) when financial flexibility worsens. We test this conjecture by including a dummy, *Bust dummy*, for a decrease in real estate prices in the base specifications of this panel. The dummy is set equal to one if the real estate return falls from its historical average by at least one standard deviation. Columns [3], [4], [5], and [6] present the results for both the OLS and IV specifications when including *Bust dummy*. We find that periods of sharply decreasing real estate prices negatively affect payout flexibility when compared to other time periods. The positive coefficient obtained for the interaction of the *Bust dummy* with real estate value indicates that a decrease in the value of collateralizable assets (i.e., a decrease in financial flexibility) results in less payout flexibility.

Moreover, Farre-Mensa et al. (2018) show that many firms increase their debt level in order to directly finance their dividend payments. They split payout into two parts – discretionary and non-discretionary– and show that firms increase their debt level to finance discretionary payouts. The discretionary payout is the sum of: (i) extra dividends (above the regular dividend), (ii) special dividends, and (iii) share repurchases. A non-discretionary payout is defined as the minimum of (i) the firm's regular dividend and (ii) its prior-year regular dividend. Given these results, we test the effect of changes in firms' financial flexibility on their discretionary and non-discretionary payouts. By definition, discretionary payouts are flexible because they are not expected to be maintained. As shocks to real estate prices tend to be temporary in nature, we expect the effect of financial flexibility on discretionary payouts to be higher than their effect on non-discretionary payouts. Panel B of Table 4 shows the test of this conjecture.

We show that the effect of financial flexibility on discretionary payouts has a magnitude more than twice that of the effect on non-discretionary payouts. Specifically, a one-standard-deviation increase in the value of the firm's pledgeable collateral translates into a 0.26 percentage points increase in non-discretionary payout (i.e., 7.0% of a standard deviation increase) and a 0.55 percentage points increase in discretionary payout (i.e., 9.5% of a standard deviation increase).[12]

D. Leverage effect during periods of decreasing real estate prices

Fourth, we study how the impact of financial flexibility on payout is affected by the firm's leverage. More specifically, we test whether highly leveraged firms are more likely to decrease their payout in response to decreasing financial flexibility during the periods of decreasing real estate prices (Hypothesis 4). Firms with high leverage do not have much flexibility to increase their level of debt in order to finance dividend payments. Moreover, the collateral channel is weak during periods of decreasing real estate prices, which may lead highly leveraged firms to cut their dividends. On the other hand, firms with low leverage are still capable of raising funding from capital markets even when collateral channel cannot be used. Hence, such firms are unlikely to decrease their dividends when real estate prices fall.

In our sample period, the US economy experienced a strong decrease in real estate prices from 2008 to 2011. This allows us to provide empirical evidence of the leverage effect using the recent period of bust in real estate prices. Table 5 exhibits the effect of a decrease in financial flexibility (i.e., a reduction in the pledgeable collateral) and firm's leverage on payout during this period. In Panel A, the dependent variable is cash dividends over lagged PPE. Columns [1] and [2] show that $REValue$ coefficients become statistically insignificant during this period of decreasing real estate prices. These results are aligned with the fact that firms are reluctant to cut their dividends and the potentially low use of the collateral

[12] The REValue coefficient for non-discretionary payout is 0.0023 (i.e., the IV specification in column 4, panel B of table 4) and for discretionary payout is 0.0049 (i.e., column 2). The standard deviation of the REValue/PPE ratio is 1.129. Therefore, a one-standard-deviation increase in the value of the firms pledgeable collateral has an effect of 0.26 (0.0026=0.0023*1.129) percentage points and 0.55 percentage points (0.0055=0.0049*1.129) in the non-discretionary and discretionary payout, respectively.

channel during periods of decreasing real estate prices. However, high leveraged firms show a negative effect (i.e, positive sign for decreasing real estate prices in columns [3] and [4]) while low leveraged firms show a positive effect (i.e., negative sign for decreasing real estate prices in columns [5] and [6]) during the period 2008-2011.

[Insert Table 5 around here]

Panel B presents the equivalent results for share repurchases. The $REValue$ coefficients for the different specifications are not significant. Columns $[3]-[6]$ in Panel B present the results for share repurchases for high and low leveraged firms during the bust period in real estate prices $(2008-2011)$. These two classes of firms are defined in the same manner as in panel A. The dependent variable is share repurchases over lagged PPE. Columns [3] and [4] present the results of our main specification for highly leveraged firms, while columns [5] and [6] present the results for low leveraged firms. We find that the $REValue$ coefficients are positive for highly leveraged firms. This suggests that these firms cut share repurchases when real estate prices fall. On the other hand, the $REValue$ coefficients in columns [5] and [6] are negative, which suggests the opposite effect for firms with low leverage during the same years. As opposed to the estimates for dividends in panel A, the estimates for share repurchases are not significant.

Given this evidence of the leverage effect of decreasing financial flexibility on payout using the recent period of real estate bust, we provide a formal test of Hypothesis 4 in Table 6. To test this hypothesis, we define a dummy variable, *Bust dummy*, which is set equal to one if the real estate return falls from its historical average by at least one standard deviation. We also define a a *High leverage dummy*, which is set equal to one if the firm has above median leverage. We obtain a negative and significant coefficient for *Bust dummy* for all of the specifications, which indicates that the effect of sharply decreasing CRE prices (i.e., a real estate bust) on payout is the opposite of the effect of non-bust periods. The negative and significant sign for *High leverage dummy* for all of the specifications show that high leveraged firms tend to payout less. We add the triple interaction among *Bust dummy*, a *High leverage dummy*, and *RE value*. Overall, we find a strong effect of a decrease in financial flexibility on dividends for highly leveraged firms during periods of sharp decrease in the value of collaterizable assets.

[Insert Table 6 around here]

E. Availability of investment opportunities and financial constraints

Fifth, we examine why firms use the collateral channel to fund not only their investments but also their payouts. More specifically, we empirically test whether the magnitude of the payout increase resulting from an increase in financial flexibility is higher for firms with fewer investment opportunities (Hypothesis 5). We do so by categorizing firms depending on the availability of investment opportunities. Firms with the most (least) investment opportunities are defined as the firms in the top (bottom) three deciles of the Tobin's Q distribution. Table 7 presents the results of this test. Panel A examines the effect of financial flexibility on dividends and panel B examines this effect on share repurchases. Columns [1] and [2] show the specifications for the firms with more investment opportunities, while columns [3] and [4] exhibit the specifications for the firms with fewer investment opportunities.

We find that the $REValue$ coefficients in columns [3] and [4] are significantly higher than the coefficients in columns [1] and [2]. This indicates that firms pay higher dividends when they have fewer investment opportunities. This finding supports the extant literature, which shows that firms prefer investments to payouts. However, when firms do not have enough positive NPV projects available in which to invest, they make payouts to shareholders, which might reduce the agency problems associated with holding cash.

Similarly, panel B presents the results for share repurchases. The $REValue$ in columns [3] and [4] are consistently higher than their counterparts in columns [1] and [2]. This suggests that firms with fewer investment opportunities make more share repurchases than firms with more investment opportunities. Interestingly, the $REValue$ in columns [1] and [2] are negative (albeit insignificant). Therefore, in the presence of enough investment projects, firms either do not repurchase shares or decrease the number of shares they repurchase.

[Insert Table 7 around here]

These results show that changes in financial flexibility have significant effects on dividends and share repurchases only when firms have fewer investment opportunities. We further study the effects of financial constraints in firms with less investment opportunities. In the event of increase in the market value of CRE assets, constrained firms increase their debt level more than unconstrained firms (Cvijanovic (2014)). Hence, we expect a higher effect on payouts for constrained firms. Columns [5] and [6] in Table 7 provide the results of this analysis. As this study focuses on payouts, we utilize Hadlock and Pierce (2010) SA index as the measure of financial constraint.[13] Financially constrained firms are defined as

[13] The SA index for financial constraints is calculated as $(-0.737 * size) + (0.043 * size^2) - (0.040 * age)$,

the firms in the top three deciles of the SA index. Columns [5] and [6] present the results of our main specification for financially constrained firms. In both panels A and B, the $REValue$ coefficient for constrained firms is higher than the coefficient for the entire sample (i.e., columns [3] and [4]). This suggests that financially constrained firms make greater use of the collateral channel to increase their payouts when they have little or no investment opportunities.

VI. Robustness Tests

In this section, we discuss five robustness tests of the main results presented in Section V. First, we address the concern that the large firms' dividends and share repurchases could increase real estate prices in their respective MSAs. Second, we analyze the possibility that firms may not be able to use their increased borrowing capacity immediately after an increase in CRE value. Third, we address the question of whether firms that pay higher dividends choose to locate in areas experiencing high growth in real estate prices. Fourth, we study whether our results are driven by the fact that firms located far from metropolitan areas pay higher dividends because it is costly for shareholders to monitor managers. Finally, we address the concern that the collateral channel might be used to finance investments but not payouts.

---

where size equals the log of inflation-adjusted book assets and age is the number of years the firm is listed with stock prices on COMPUSTAT. In calculating this index, firm size is winsorized (i.e., capped) at (the log of) $4.5 billion and age is winsorized at thirty-seven years.

A. Large versus small firms

First, we analyze whether payouts by large firms may increase local real estate prices. We categorize firms as small or large according to their total assets, and we categorize MSAs as small or large based on their population. More specifically, we classify the firms in the lowest three quartiles of size as small, and we categorize MSAs as large if they are among the top 20 populated MSAs. Columns [1] and [3] in Table 8 report the estimates of equation (3) for a subsample of small firms in large MSAs for the dependent variables cash dividends and share repurchases.[14] We find that $REValue$ coefficients are positive and significant at the 1% confidence level for both specifications. Therefore, our results are robust when we only consider small firms and large MSAs in our sample.

[Insert Table 8 around here]

B. Payout over subsequent three years

In a second robustness test, we address the concern that firms may not be able to use their increased borrowing capacity immediately after an appreciation in real estate value. The renegotiation of debt contracts may take time, such that firms could benefit from an increase in their borrowing capacity in the years after a positive shock to real estate prices. Columns [2] and [4] of Table 8 display the estimates of equation (3) when considering the average cash dividends and share repurchases over the subsequent three years as the dependent variables. In line with our previous results, the $REValue$ coefficients remain positive and significant.

[14]The baseline specification is denoted by column [4] of Tables 2 and 3 for cash dividends and share repurchases, respectively.

C. Choice of firm location

Our third robustness test addresses the concern that firms that pay higher dividends may choose to locate in a state or MSA experiencing high growth in real estate prices. To address this possible endogeneity problem, we follow Almazan, De Motta, Titman, and Uysal (2010) and present regressions that replicate our main results for a sample of firms that have been listed on the stock exchange for at least 10 years. To the extent that unobserved characteristics that may influence a firm's location choice become less important over time, we argue that the observed effect on the payout decisions of older firms that chose locations many years ago are unlikely to reflect a location-selection effect. For the same reason, we run our main specification for older firms to test the robustness of our results.

Table 9 displays the results of this robustness test. The dependent variable in columns [1], [2], and [3] is cash dividends over lagged PPE, while it is share repurchases over lagged PPE in columns [4], [5], and [6]. Columns [1], [2], and [3] in panel A show that an increase in real estate value results in an increase in dividend payouts for older firms. These coefficients are similar in magnitude to the baseline results presented in Table 2. Column 1 uses real estate values based on state-level residential prices. In column 2, real estate values are calculated using MSA-level residential prices. Column 3 presents the results using an IV estimation. Panel B reports the results from equivalent regressions when using the ratio of share repurchases to lagged PPE as the dependent variable. As expected, the coefficients for share repurchases displayed in panel B are of the same magnitude as those in our baseline results (see Table 3).

[Insert Table 9 around here]

D. Geography and agency costs

John, Knyazeva, and Knyazeva (2011) show that remotely located firms pay higher dividends because shareholders cannot perfectly monitor managers' decisions. This gives rise to the concern that the results in our paper might be derived from agency costs associated with the information asymmetries between firms' shareholders and managers rather than changes in financial flexibility driven by shocks to CRE values. We mitigate this concern by testing our main specification while controlling for a central location dummy and the interaction of central location dummy with real estate value. John et al. (2011) classify firms as centrally located if they are headquartered in one of the ten largest consolidated MSAs based on population size as reported in the 2000 census. These MSAs are: New York City, Los Angeles, Chicago, Washington-Baltimore, San Francisco, Philadelphia, Boston, Detroit, Dallas, and Houston, and their suburbs. We create a central location dummy that equals one if the firm is located in a top-ten metropolitan area, and zero otherwise.

Table 10 exhibits the results of our main specification while controlling for the *Central location* dummy. The dependent variable is cash dividends over lagged PPE. $REValue$ coefficients remain positive and significant. Similar to John et al. (2011), *Central location* is negative and mostly significant. This result shows that firms located in the ten largest U.S. MSAs (i.e., central locations) pay less dividends compared to firms not located in these largest MSAs.

[Insert Table 10 around here]

E. Investments

In a fifth robustness test, we address the concern that the collateral channel could be used to increase investments but not the firm's payout. To do so, we add a control for investments to the regressions defined by equation (3) for dividends and share repurchases. This control variable is capital expenditure (COMPUSTAT mnemonic: CAPX normalized by lagged PPE, mnemonic: PPENT). For dividends and share repurchases, the $REValue$ coefficient remains positive and significant. This means that the appreciation in the collateral value –and not the investments– explains the higher payouts. Overall, our results are robust to the inclusion of investments as a control variable.[15]

VII. Conclusions

A change in financial flexibility has a clear impact on the decisions made by the firm's managers, especially decisions related to payouts. This paper examines the impact of financial flexibility on firms' payout policies. We use variation in real estate prices as exogenous shocks to firms' debt capacity and, therefore, to their financial flexibility. CRE assets often represent an important part of a firm's total assets and firms use these assets as collateral to obtain debt financing. Through this collateral channel, positive shocks to the value of CRE assets increase the firms' financial flexibility and, as a result, they increase their payout.

We find strong evidence that an increase in finacial flexibility (i.e., an appreciation in the collateral value of CRE assets) leads to an increase in cash dividends, share repurchases,

[15]We report the results of this test in the online appendix.

and payout flexibility. Our empirical analysis shows that a one-standard-deviation increase in the value of firm pledgeable collateral assets results in a 0.26 percentage points increase in non-discretionary payout and a 0.55 percentage points increase in discretionary payout.

We also document that as firms are reluctant to decrease their dividends, the decrease in dividends is either small or insignificant when their financial flexibility worsens (i.e., when the value of their CRE assets decreases and during real estate "busts"). However, we find that high leveraged firms decrease their dividends and share repurchases during periods of decreasing real estate prices, that is when the collateral channel is less available for them. We also demonstrate that the effects of financial flexibility on dividends and share repurchases are stronger for firms with few investment opportunities and for financially constrained firms.

References

Almazan, A., De Motta, A., Titman, S., Uysal, V., 2010. Financial structure, acquisition opportunities, and firm locations. Journal of Finance 65, 529–563.

Bliss, B. A., Cheng, Y., Denis, D. J., 2015. Corporate payout, cash retention, and the supply of credit: Evidence from the 2008–2009 credit crisis. Journal of Financial Economics 115, 521–540.

Bonaime, A., Hankins, K., Harford, J., 2014. Financial flexibility, risk management, and payout choice. Review of Financial Studies 27, 1074–1101.

Bonaime, A., Harford, J., Moore, D., 2017. Commitment versus financial flexibility in payout decisions. Working Paper .

Brav, A., Graham, J., Harvey, C., Michaely, R., 2005. Payout policy in the 21st century. Journal of Financial Economics 77, 483–527.

Buiter, W., 2010. Housing wealth isn't wealth. Economics-The Open-Access, Open-Assessment E-Journal 4, 1–29.

Chaney, T., Sraer, D., Thesmar, D., 2012. The collateral channel: How real estate shocks affect corporate investment. American Economic Review 102, 2381–2409.

Chen, T., Harford, J., Lin, C., 2017. Financial flexibility and corporate cash policy. HKIMR Working Paper .

Cvijanovic, D., 2014. Real estate prices and firm capital structure. Review of Financial Studies 27, 2690–2735.

Davidoff, T., 2016. Supply constraints are not valid instrumental variables for home prices because they are correlated with many demand factors. Critical Finance Review 5, 177–206.

DeAngelo, H., DeAngelo, L., 1990. Dividend policy and financial distress: An empirical investigation of troubled nyse firms. Journal of Finance 45, 1415–1431.

Denis, D., Denis, D., Sarin, A., 1994. The information content of dividend changes: Cash flow signaling, overinvestment, and dividend clienteles. Journal of Financial and Quantitative Analysis 29, 567–587.

Farre-Mensa, J., Michaely, R., Schmalz, M., 2018. Financing payouts. Ross School of Business Paper .

Ghosh, C., Woolridge, R., 1988. An analysis of shareholder reaction to dividend cuts and omissions. Journal of Financial Research 11, 281–294.

Glaeser, E., Gyourko, J., Saiz, A., 2008. Housing supply and housing bubbles. Journal of Urban Economics 64, 198–217.

Guay, W., Harford, J., 2000. The cash-flow permanence and information content of dividend increases versus repurchases. Journal of Financial Economics 57, 385–415.

Hadlock, C. J., Pierce, J. R., 2010. New evidence on measuring financial constraints: Moving beyond the kz index. Review of Financial Studies 23, 1909–1940.

Himmelberg, C., Mayer, C., Sinai, T., 2005. Assessing high house prices: Bubbles, fundamentals and misperceptions. Journal of Economic Perspectives 19, 67–92.

Jagannathan, M., Stephens, C., Weisbach, M., 2000. Financial flexibility and the choice between dividends and stock repurchases. Journal of Financial Economics 57, 355–384.

John, K., Knyazeva, A., Knyazeva, D., 2011. Does geography matter? firm location and corporate payout policy. Journal of Financial Economics 101, 533–551.

Leary, M., Michaely, R., 2011. Determinants of dividend smoothing: Empirical evidence. Review of Financial Studies 24, 3197–3249.

Lie, E., 2005. Financial flexibility, performance, and the corporate payout choice. The Journal of Business 78, 2179–2202.

Mian, A., Sufi, A., 2011. House prices, home equity–based borrowing, and the us household leverage crisis. American Economic Review 101, 2132–2156.

Nelson, T., Potter, T., Wilde, H., 2000. Real estate assets on corporate balance sheets. Journal of Corporate Real Estate 2, 29–40.

Saiz, A., 2010. The geographic determinants of housing supply. Quarterly Journal of Economics 125, 1253–1296.

Sinai, T., Souleles, N., 2005. Owner-occupied housing as a hedge against rent risk. Quarterly Journal of Economics 120, 763–789.

Veale, P., 1989. Managing corporate real estate assets: Current executive attitudes and prospects for an emergent management discipline. Journal of Real Estate Research 4, 1–22.

Yoon, P. S., Starks, L., 1995. Signaling, investment opportunities, and dividend announcements. Review of Financial Studies 8, 995–1018.

Zeckhauser, S., Silverman, R., 1983. Rediscover your company's real estate. Harvard Business Review 61, 111–117.

TABLE 1
Summary Statistics

This table provides the summary statistics for the main variables that we use in the paper. δ_{Div} and δ_{Rep} are dummy variables that take the value of one if the firm pays cash dividends or repurchases shares, respectively. Dividend/lagged PPE is the ratio of cash dividend to previous year property, plant and equipment (PPE). Share repurchases/lagged PPE is the ratio of shares repurchased to previous year PPE. Discretionary payout is the sum of: (i) extra dividends (above the regular dividend), (ii) special dividends, and (iii) share repurchases. Non-discretionary payout is the minimum of (i) the firm's regular dividend and (ii) its prior-year regular dividend. RETA is the ratio of retained earnings to book value of assets. Leverage is the sum of short-term and long-term debt normalized by book value of assets. Asset growth ratio is the difference in current and lagged book value of assets divided by lagged book value of assets. Firm size is defined as the book value of total assets. Market to book ratio is the market value of equity plus the book value of assets minus the book value of equity, all divided by the book value of assets. Sales growth ratio is the difference in current and lagged value of sales divided by lagged value of sales. ROA is the operating income before depreciation minus depreciation and amortization, all divided by book value of assets. Cash holdings account for cash and short term securities. Age is the number of years since the firm first appeared in the Compustat database. RE Value is the ratio of market value of real estate normalized by previous year PPE. Residential real estate prices are the Federal Housing Finance Association's (FHFA) House Price Index (HPI) and commercial real estate prices are the Real Capital Analytics' Commercial Property Price Index (CPPI). Local housing supply elasticity comes from Saiz (2010).

	Mean	Median	Std. Dev.	p25	p75	Obs.
δ_{Div}, firms paying dividends	0.350	0.000	0.477	0.000	1.000	26,643
δ_{Rep}, firms repurchasing shares	0.417	0.000	0.493	0.000	1.000	26,643
δ_{Payout}, firms paying dividends or repurchasing shares	0.558	1.000	0.497	0.000	1.000	26,643
Dividend on common equity (all firms)	46.516	0.000	285.770	0.000	3.547	26,504
Div. on common equity (only δ_{Div}=1 firms)	134.140	11.140	473.020	3.066	57.223	9,191
dividend/lagged PPE	0.025	0.000	0.046	0.000	0.030	26,504
Share repurchase	66.704	0.000	497.660	0.000	1.388	25,002
Share repurchase (only δ_{Rep}=1)	175.960	5.450	796.320	0.583	49.430	9,478
Share repurchase/lagged PPE	0.027	0.000	0.048	0.000	0.027	25,002
Discretionary payout	0.028	0.000	0.058	0.000	0.030	26,643
Non−Discretionary payout	0.020	0.000	0.037	0.014	0.023	26,643
RETA (Retained Earnings/Total Assets)	-0.331	0.113	1.204	-0.374	0.359	26,339
Leverage	0.272	0.209	0.318	0.047	0.373	26,518
Asset growth ratio	0.096	0.046	0.334	-0.054	0.174	23,939
Firm size	2232.900	143.950	11531.000	26.640	801.220	26,587
Market-to-book ratio	2.046	1.486	1.567	1.101	2.289	23,790
Sales growth ratio	0.239	0.068	3.380	-0.032	0.191	23,648
ROA	0.001	0.069	0.245	-0.013	0.122	26,496
Cash holdings	191.320	9.581	1199.000	1.417	52.382	26,582
Age of the firm (years)	20.303	17.000	13.311	9.000	30.000	26,643
RE Value (State level - Residential)	0.864	0.364	1.329	0.000	1.105	26,643
RE Value (MSA level - Residential)	0.787	0.318	1.145	0.000	1.060	23,198
RE Value (City level - Commercial)	0.776	0.314	1.129	0.000	1.047	23,184
State residential price index	0.735	0.677	0.218	0.564	0.922	26,643
MSA residential price index	0.767	0.708	0.240	0.560	0.954	23,209
City commercial price index	0.708	0.670	0.244	0.524	0.871	23,196
Local housing supply elasticity	1.284	1.100	0.708	0.650	1.940	20,277

TABLE 2
Financial Flexibility and Dividends

This table reports the results of the OLS and IV estimates of the specifications in equations (1) – (3). The dependent variable is cash dividends over lagged PPE. RE Value is the ratio of market value of real estate normalized by previous year PPE. MSA and state level residential real estate prices are obtained from the website of Federal Housing Finance Association (FHFA). City level commercial real estate prices are provided by the Real Capital Analytics. Supply elasticity is the local housing supply elasticity in Saiz (2010). Columns [1] – [4] and [7] show the results of the OLS specification. Columns [5] – [6] and [8] – [9] show the results of the IV estimation. The instrument in the first stage is the land supply elasticity interacted with the nationwide real interest rate. IV specifications in columns [6] and [9] also control for the interaction of housing supply elasticity and year. Columns [2] – [9] control for initial firm level characteristics interacted with real estate prices. All the regressions except for columns [1] & [2], control for ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, and cash holdings. All the specifications include firm- and year-fixed effects. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	OLS [1]	OLS [2]	OLS [3]	OLS [4]	IV [5]	IV [6]	OLS [7]	IV [8]	IV [9]
RE Value (State resid. prices)	0.0030***	0.0032***	0.0033***						
	(11.21)	(11.60)	(10.40)						
RE Value (MSA resid. prices)				0.0034***	0.0044***	0.0044***			
				(8.51)	(9.57)	(9.57)			
RE Value (City comm. prices)							0.0035***	0.0040***	0.0040***
							(8.49)	(9.06)	(9.03)
State resid. prices	0.0043*	0.3325***	0.3453***						
	(1.65)	(8.37)	(7.60)						
MSA resid. prices				0.0091	0.0206	−0.0167			
				(0.10)	(0.29)	(-0.22)			
City comm. prices							−0.0100	−0.0087	−0.0340
							(-0.11)	(-0.12)	(-0.45)
Supply elasticity * Year						−0.0003			−0.0003**
						(-1.36)			(-2.78)
Firm level controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial Controls * State resid. prices	No	Yes	Yes	No	No	No	No	No	No
Initial Controls * MSA resid. prices	No	No	No	Yes	Yes	Yes	No	No	No
Initial Controls * City Comm. prices	No	No	No	No	No	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	26,481	25,898	20,795	18,323	15,973	15,973	18,326	15,976	15,976
R^2	0.739	0.751	0.780	0.784	0.781	0.781	0.783	0.780	0.781

TABLE 3
Financial Flexibility and Share Repurchases

This table reports the results of the OLS and IV estimates of the specifications in equations (1)-(3). The dependent variable is share repurchases over lagged PPE. RE Value is the ratio of market value of real estate normalized by previous year PPE. MSA and state level residential real estate prices are obtained from the website of Federal Housing Finance Association (FHFA). City level commercial real estate prices are provided by the Real Capital Analytics. Supply elasticity is the local housing supply elasticity in Saiz (2010). Columns [1] – [4] and [7] show the results of the OLS specification. Columns [5] – [6] and [8] – [9] show the results of IV estimation. The instrument in the first stage is the land supply elasticity interacted with the nationwide real interest rate. IV specifications in columns [6] and [9] also control for the interaction of housing supply elasticity and year. Columns [2] – [9] control for initial firm level characteristics interacted with real estate prices. All the regressions except for columns [1] & [2], control for ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, and cash holdings. All the specifications include firm- and year-fixed effects. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	OLS [1]	OLS [2]	OLS [3]	OLS [4]	IV [5]	IV [6]	OLS [7]	IV [8]	IV [9]
RE Value (State resid. prices)	0.0009**	0.0008*	0.0029***						
	(1.99)	(1.72)	(5.23)						
RE Value (MSA resid. prices)				0.0033***	0.0041***	0.0041***			
				(4.51)	(4.97)	(4.97)			
RE Value (City comm. prices)							0.0034***	0.0038***	0.0038***
							(4.60)	(4.83)	(4.83)
State resid. prices	−0.0080*	0.0354	0.1194						
	(-1.88)	(0.53)	(1.42)						
MSA resid. prices				−0.0841	−0.0063	−0.0759			
				(-0.50)	(-0.05)	(-0.53)			
City comm. prices							−0.0932	0.0048	−0.0043
							(-0.55)	(0.03)	(-0.03)
Supply elasticity * Year						−0.0005			−0.0001
						(-1.45)			(-0.58)
Firm level controls	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Initial Controls * State resid. prices	No	Yes	Yes	No	No	No	No	No	No
Initial Controls * MSA resid. prices	No	No	No	Yes	Yes	Yes	No	No	No
Initial Controls * City Comm. prices	No	No	No	No	No	No	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Firm FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	24,986	24,480	19,620	17,235	15,035	15,035	17,239	15,039	15,039
R^2	0.397	0.410	0.444	0.449	0.455	0.455	0.450	0.455	0.455

TABLE 4
Financial Flexibility, Payout Flexibility and Discretionary Payout

This table tests the effect of financial flexibility on the payout flexibility (Panel A), discretionary payout and non-discretionary payout (Panel B). Payout flexibility is defined as the ratio of share repurchases to total payout. Discretionary payout is the sum of regular dividend increase, special dividends, and share repurchases. Non-discretionary payout is defined as the minimum of firms regular dividend and its prior-year regular dividend. RE Value is the ratio of market value of real estate normalized by previous year PPE. Bust dummy is set equal to one if the real estate return falls from its historical average by at least one standard deviation and is set equal to zero otherwise. MSA residential real estate prices are obtained from the Federal Housing Finance Association (FHFA). Columns [1], [3], and [5] in panel A and columns [1] and [3] in panel B show the results of the OLS specification. Columns [2], [4], and [6]in panel A and columns [2] and [4] in panel B show the results of IV estimation using land supply elasticity interacted with the nationwide interest rate as the instrumental variable. All the regressions control for initial firm level characteristics interacted with real estate prices and also control for ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, and cash holdings. All the specifications include firm- and year-fixed effects. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

Panel A: Payout flexibility

	OLS [1]	IV [2]	OLS [3]	IV [4]	OLS [5]	IV [6]
RE Value (MSA resid. prices)	0.0315***	0.0358***	0.0299***	0.0343***	0.0286***	0.0331***
	(4.26)	(4.29)	(4.03)	(4.10)	(3.84)	(3.94)
Bust dummy			−0.0322**	−0.0326**	−0.0943***	−0.0820***
			(-2.16)	(-1.97)	(-3.30)	(-2.61)
Bust dummy * RE Value					0.0371**	0.0305*
					(2.55)	(1.85)
MSA resid. prices	0.1413	-0.1173	0.2233	-0.0563	0.1789	-0.0656
	(0.09)	(-0.09)	(0.14)	(-0.04)	(0.11)	(-1.05)
Observations	9,599	8,284	9,599	8,284	9,599	8,284
R^2	0.656	0.657	0.656	0.658	0.656	0.658

Panel B: Discretionary and non-discretionary payout

	Discretionary payout		Non-discretionary payout	
	OLS [1]	IV [2]	OLS [3]	IV [4]
RE Value (MSA resid. prices)	0.0039***	0.0049***	0.0017***	0.0023***
	(4.45)	(4.98)	(5.65)	(6.97)
MSA resid. prices	-0.2463	-0.3592	-0.0063	0.0023
	(-0.30)	(-0.32)	(-0.02)	(0.01)
Observations	18,341	15,990	18,341	15,990
R^2	0.391	0.396	0.825	0.822

TABLE 5
Dividends and Share Repurchases: The Effect of Firm Leverage in the Real Estate Bust of 2008-2011

This table shows the effect of financial flexibility on the dividends and share repurchases during the recent real estate bust (2008 – 2011) period. It also presents the effect of financial flexibility on the dividends and share repurchases for very high and very low leveraged firms during this period. Leverage is defined as the sum of short-and long-term debt normalized by book value of assets. High leveraged firms are defined as the firms in the top 3 deciles of leverage. The dependent variable in panel A of this table is cash dividend over lagged PPE and in panel B is share repurchase over lagged PPE. The regressions used in panel A and panel B are same as the ones presented in columns [4] – [5] of table 2 (for panel A) and of table 3 (for panel B). RE Value is the ratio of market value of real estate normalized by previous year PPE. MSA level residential real estate prices are obtained from the website of Federal Housing Finance Association (FHFA). All the regressions control for initial firm level characteristics interacted with real estate prices and also control for ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, and cash holdings. All the specifications include firm- and year-fixed effects. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	All sample		High leveraged firms		Low leveraged firms	
	OLS	IV	OLS	IV	OLS	IV
	[1]	[2]	[3]	[4]	[5]	[6]
Panel A: Dividends						
RE Value (MSA resid. prices)	−0.0002	−0.0016	0.0065*	0.0054	−0.0193***	−0.0270***
	(-0.09)	(-0.59)	(1.76)	(1.19)	(-2.59)	(-3.14)
MSA resid. prices	0.3879	−0.0113	0.4253	−0.1801	−6.8753	3.6221
	(0.60)	(-0.05)	(0.41)	(-0.54)	(-1.41)	(0.18)
Observations	2,196	1,922	611	532	661	583
R^2	0.898	0.893	0.961	0.955	0.881	0.882
Panel B: Shares repurchases						
RE Value (MSA resid. prices)	0.0069	0.0056	0.0069	0.0083	−0.1060	−0.0097
	(1.58)	(1.18)	(0.90)	(0.93)	(-0.85)	(-0.68)
MSA resid. prices	1.4966	−0.7364*	−0.5357	−0.5313	3.5702	5.9283
	(1.31)	(-1.72)	(-0.22)	(-0.80)	(0.44)	(0.19)
Observations	2,100	1,842	587	508	624	550
R^2	0.691	0.685	0.841	0.835	0.708	0.770

TABLE 6
Dividends and Share Repurchases: Real Estate Busts and Firm Leverage

This table tests the differential effect of financial flexibility on the dividends and share repurchases for high leveraged firms during the periods of high decrease in real estate prices. Bust dummy is set equal to one if the real estate return falls from its historical average by at least one standard deviation and is set equal to zero otherwise. Leverage is defined as the sum of short-and long-term debt normalized by sum of the market value of equity and the book value of debt. High leveraged firms are defined as the firms above median leverage. The dependent variable in panel A of this table is cash dividend over lagged PPE and in panel B is share repurchase over lagged PPE. The regressions used in panel A and panel B are same as the ones presented in columns [4] – [5] of table 2 (for panel A) and of table 3 (for panel B). RE Value is the ratio of market value of real estate normalized by previous year PPE. MSA level residential real estate prices are obtained from the website of Federal Housing Finance Association (FHFA). All the regressions include firm- and year-fixed effects and control for firm characteristics: ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, cash holdings, as well as the interaction between the initial controls and the MSA residential real estate prices. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	OLS	IV	OLS	IV
	[1]	[2]	[3]	[4]
Panel A: Dividends				
RE Value (MSA resid. prices)	0.0030***	0.0039***	0.0042***	0.0052***
	(7.27)	(8.43)	(9.09)	(10.02)
Bust dummy	−0.0073***	−0.0085***	−0.0029	−0.0041
	(-2.78)	(-2.87)	(-1.05)	(-1.33)
High leverage dummy	−0.0016**	−0.0021***	0.0014*	0.0011
	(-2.41)	(-2.90)	(1.73)	(1.34)
(Bust dummy * High leverage dummy)			−0.0087***	−0.0089***
			(-6.11)	(-5.83)
(High leverage dummy * RE Value)			−0.0025***	−0.0026***
			(-5.75)	(-5.51)
(Bust dummy * RE Value)			−0.0016***	−0.0006
			(-2.63)	(-0.94)
(Bust dummy * High leverage dummy * RE Value)			0.0031***	0.0017*
			(3.36)	(1.69)
MSA resid. Prices	0.0089	0.0182	0.0040	0.0104
	(0.10)	(0.26)	(0.05)	(0.15)
Observations	18,323	15,973	18,323	15,973
R^2	0.785	0.782	0.786	0.783
Panel B: Shares repurchases				
RE Value (MSA resid. prices)	0.0021***	0.0029***	0.0035***	0.0047***
	(2.92)	(3.52)	(4.29)	(5.05)
Bust dummy	0.0039	0.0030	0.0066	0.0067
	(0.84)	(0.57)	(1.36)	(1.25)
High leverage dummy	−0.0028**	−0.0026**	0.0002	0.0012
	(-2.34)	(-2.00)	(-0.14)	(0.76)
(Bust dummy * High leverage dummy)			−0.0031	−0.0054**
			(-1.21)	(-1.98)
(High leverage dummy * RE Value)			−0.0024***	−0.0029***
			(-3.10)	(-3.52)
(Bust dummy * RE Value)			−0.00003	0.0002
			(-0.03)	(0.15)
(Bust dummy * High leverage dummy * RE Value)			−0.0021	−0.0021
			(-1.34)	(-1.19)
MSA resid. Prices	−0.0895	−0.0118	−0.0911	−0.0200
	(-0.51)	(-0.09)	(-0.54)	(-0.15)
Observations	17,235	15,035	17,235	15,035
R^2	0.455	0.461	0.456	0.462

TABLE 7

Financial Flexibility, Dividends, and Share Repurchases: Investment Opportunities and Financial Constraints

This table tests the effect of financial flexibility on the dividends and share repurchases conditioned on the availability of investment opportunities. Firms in bottom 3 deciles of Tobins Q are defined to proxy for less investment opportunities. Similarly, firms in top 3 deciles of Tobin's Q are defined to proxy for high investment opportunities. It also presents the relative effect for financially constrained firms. Firms in top 3 deciles of SA index are defined as financially constrained firms. The dependent variable in panel A of this table is cash dividend over lagged PPE and in panel B is share repurchase over lagged PPE. The regressions used in panel A and panel B are same as the ones presented in columns [4] – [5] of table 2 (for panel A) and of table 3 (for panel B). RE Value is the ratio of market value of real estate normalized by previous year PPE. MSA level residential real estate prices are obtained from the Federal Housing Finance Association (FHFA). All the regressions include firm- and year-fixed effects and control for firm characteristics: ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, cash holdings, as well as the interaction between the initial controls and the MSA residential real estate prices. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Firms with more investment opportunities		Firms with less investment opportunities			
	All sample		All sample		Financially constrained firms	
	OLS	IV	OLS	IV	OLS	IV
	[1]	[2]	[3]	[4]	[5]	[6]
Panel A: Dividends						
RE Value (MSA resid. prices)	0.0007	0.0011	0.0016***	0.0021***	0.0034**	0.0060***
	(0.82)	(1.14)	(2.47)	(2.85)	(1.98)	(2.94)
State resid. Prices						
MSA resid. Prices	−0.0007	−0.1951	0.0461	0.2835	−0.0018	−0.5040
	(-0.00)	(-0.45)	(0.07)	(0.41)	(-0.00)	(-0.28)
Observations	5,494	4,835	5,494	4,697	1,442	1,265
R^2	0.903	0.905	0.747	0.736	0.688	0.687
Panel B: Shares repurchases						
RE Value (MSA resid. prices)	−0.0005	−0.0008	0.0042***	0.0051***	0.0071**	0.0068**
	(-0.26)	(-0.40)	(3.71)	(3.94)	(2.67)	(2.29)
State resid. Prices						
MSA resid. Prices	−0.1953	−0.1780	−0.1653	0.0060	−0.0028	3.4850
	(-0.44)	(-0.13)	(-0.14)	(0.01)	(-0.00)	(1.29)
Observations	5,027	4,450	5,273	4,494	1,360	1,207
R^2	0.626	0.635	0.488	0.49	0.608	0.607

TABLE 8
Financial Flexibility and Payout: Robustness Tests 1 and 2

This table tests the robustness of the effect of financial flexibility on the payout policy of the firm. The baseline regression is the specification in column [4] of Table 4. Dependent variables in columns [1] and [3] are the ratio of cash dividend to lagged property, plant and equipment (PPE) and share repurchases to lagged PPE, respectively in lower 3 quartile of firm size and in the largest 20 MSAs. Dependent variables in columns [2] and [4] are the average dividend over the next 3 years normalized by lagged PPE, and average share repurchases over next 3 years normalized by lagged PPE. RE Value is the ratio of market value of real estate normalized by previous year PPE. MSA level residential real estate prices are obtained from the website of Federal Housing Finance Association (FHFA). All regressions use MSA-level residential prices, year and firm fixed effect, control for ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, cash holdings, and initial controls interacted with MSA-level residential prices. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Dividends		Share repurchases	
	Large MSAs and small firms [1]	3-year mean dividend [2]	Large MSAs and small firms [3]	3-year mean repurchase [4]
RE Value (MSA resid. prices)	0.0054***	0.0068***	0.0035***	0.0117***
	(8.09)	(12.09)	(2.95)	(6.24)
MSA resid. prices	−0.2469	0.0653	−0.4036	0.0979
	(-0.40)	(0.07)	(-0.38)	(0.03)
Observations	7,890	14,933	7,401	13,260
R^2	0.778	0.784	0.457	0.579

TABLE 9
Financial Flexibility and Payout: Robustness Test 3

In this table, we test the robustness of the effect of financial flexibility on the payout policy of the firm for older firms to mitigate the endogeneity problem associated with choice of being located in a particular state or MSA. The dependent variable in columns [1] – [3] is cash dividend over lagged PPE and in columns [4] – [6] is share repurchases over lagged PPE. The regressions used in columns [1] – [3] are same as the ones presented in columns [3], [4], and [5] of table 2 but run on the sample of firms which have been public for at least 10 years. Similarly, regressions used in columns [4] – [6] are same as the ones presented in columns [3], [4], and [5] of table 3 but run on the sample of older firms. RE Value is the ratio of market value of real estate normalized by previous year PPE. All the regressions include firm- and year-fixed effects and control for firm characteristics: ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, cash holdings, as well as the interaction between the initial controls and the state or MSA residential real estate prices. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	Dividends			Share repurchases		
	OLS	OLS	IV	OLS	OLS	IV
	[1]	[2]	[3]	[4]	[5]	[6]
RE Value (State resid. prices)	0.0031***			0.0029***		
	(8.65)			(4.88)		
RE Value (MSA resid. prices)		0.0036***	0.0046***		0.0031***	0.0038***
		(7.86)	(8.84)		(4.01)	(4.33)
State resid. prices	0.1743**			0.0212		
	(2.12)			(0.15)		
MSA resid. prices		0.2026	0.0646		−0.4336	−0.4534*
		(0.89)	(0.46)		(-1.15)	(-1.94)
Observations	16,419	14,467	12,590	15,603	13,703	11,926
R^2	0.792	0.794	0.792	0.475	0.478	0.483

TABLE 10
Financial Flexibility and Dividend Payout: Robustness test 4

This table tests the effect of financial flexibility on the dividend payout accounting for location of firms. The dependent variable is cash dividend over lagged PPE. The regressions used are same as the ones presented in columns [1] – [5] of table 2 with addition of location dummy and interaction of real estate value with location dummy. Central location dummy is equal to one if a firm is headquartered in one of the ten largest MSAs, and zero otherwise. All the regressions except in column [1] and [2] control for ratio of retained earning to total assets, leverage, asset growth ratio, firm size, market to book ratio, firm age, sales growth ratio, ROA, and cash holdings. Columns [2] – [5] control for initial firm level characteristics interacted with real estate prices. RE Value is the ratio of market value of real estate normalized by previous year PPE. All the specifications include firm- and year-fixed effects. T-statistics are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% level, respectively.

	OLS [1]	OLS [2]	OLS [3]	OLS [4]	IV [5]
RE Value (State resid. prices)	0.0026***	0.0019***	0.0016***		
	(7.82)	(5.71)	(4.23)		
RE Value (MSA resid. prices)				0.0025***	0.0035***
				(5.32)	(6.26)
Central location	−0.0010	−0.0041*	−0.0061***	−0.0047**	−0.0049*
	(-0.68)	(1.93)	(-2.91)	(-2.17)	(-1.82)
Central location * RE Value	0.0011**	0.0009*	0.0013**	0.0018*	0.0001
	(2.21)	(1.81)	(2.49)	(1.76)	(0.15)
State resid. prices	0.0081***	0.1379***	0.1236***		
	(3.20)	(3.83)	(3.00)		
MSA resid. prices				−0.0070	−0.0064
				(-0.08)	(-0.10)
Firm level controls	No	No	Yes	Yes	Yes
Initial Controls * State resid. prices	No	Yes	Yes	No	No
Initial Controls * MSA resid. prices	No	No	No	Yes	Yes
Observations	24,155	23,632	19,217	18,336	15,986
R^2	0.057	0.350	0.417	0.419	0.422