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Housing Booms and Productivity Growth

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ABSTRACT: This paper investigates the nexus between persistent house price increases and productivity growth in Canada, focusing on the collateral channel. We first present a stylized model explaining the mechanism of the colleteral channel. Using detailed firm-level data spanning from 2000 to 2023, the empirical analysis finds a negative correlation between firm productivity and its real estate holdings. Furthermore, rising house prices dampen investment for firms with fewer tangible assets but stimulate investment for those with more. At the industry level, while overall productivity may increase with rising house prices on average, industries with significant tangible asset holdings exhibit an opposite trend, suggesting potential resource misallocation associated with persistent housing market boom.

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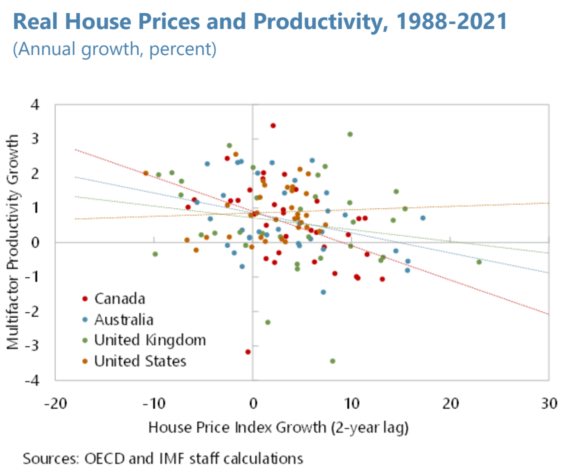
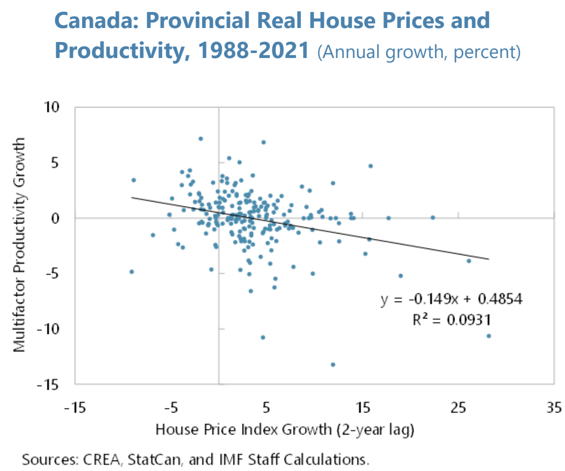
Introduction

Following a decade-long increase in house prices in Canada, the COVID-19 pandemic brought house prices to new historical highs. At the same time, productivity growth in Canada has remained sluggish over the past decades. As can be seen in Figure 1, this negative correlation between lagged real house price growth and productivity growth is evident not only in Canada at the aggregate and provincial level, but also in several other advanced economies, including Australia, the UK, and selected European countries.[1] Compared to other advanced economies, the relationship seems to be particularly strong in Canada and is evident in almost all Canadian provinces except Manitoba (see Appendix I).

Figure 1: House price and productivity growth in Canada and selected advanced economies





In this study, we examine the relationship between house prices and productivity in Canada by empirically testing the collateral channel. Specifically, in the presence of financial frictions, increases in real-estate values may disproportionately benefit firms holding such assets thereby leading to an inefficient reallocation of resources toward firms holding more real estate assets (see e.g., Rogoff and Yang, 2024a). We first use a highly stylized model to outline the intuition of the collateral channel and then test it empirically by employing a three-step empirical analysis using Compustat data on publicly traded Canadian firms. In the first step, we examine the relationship between firm productivity and real estate holdings. The second step tests how changes in real estate prices affect firm-level investment. Last, but not least, we test the aggregate effect of the collateral channel at the industry level.

Our main findings are threefold. First, we show that in Canada firms holding larger tangible assets on a gross basis (a proxy for real estate assets) at the beginning of the sample tend to be less productive. This finding is in line with the findings of Doerr (2020) who documented a similar relationship for the United States.[2] Second, we

[1] Annex I summarizes the relationship between house price and productivity growth for several additional advanced economies. As can be seen, there is a negative relationship at the aggregate level in all countries except for Germany, Japan and the US.

[2] This paper examines the relationship between housing booms, resource reallocation, and productivity with a focus on Canada by using the same empirical methodology and dataset as in Doerr (2020).

find that increases in real house prices lead to lower investment for firms holding a smaller share of tangible assets, but increase investment for those with larger tangible assets. Third, the results show that changes in house prices are in general positively correlated with average industry productivity, but the relationship turns negative for industries with larger average holdings of tangible assets, implying a redistribution effect. Overall, these findings provide direct evidence for the existence of a collateral channel and resource misallocation associated with the collateral channel at least in some Canadian industries.

The literature has identified three main channels explaining the negative correlation between growth in house prices and productivity. First, in the presence of financial frictions, an increase in real estate values can lead to an inefficient reallocation of resources across firms via the collateral channel (see e.g., Chaney, Sraer and Thiesmar, 2012 and Basco, Lopez-Rodriguez and Moral-Benito, 2023). As house prices increase, firms holding a large share of real estate assets experience a relatively stronger increase in the value of their collateral assets providing them easier access to financing. As a result, more resources are allocated to firms with high real estate holding. Doerr (2020) argues that this reallocation is inefficient because firms with more real estate holdings also display a lower productivity. This finding could arise because borrowers of low credit quality must pledge more collateral and therefore need to invest more in real estate assets (see e.g., Jimenez, 2006; Yang & Liu, 2020). Vice versa, high real estate holdings might reduce firms' productivity by crowding out other investment opportunities or by allowing inefficient incumbents to remain in the market.[3] We complement this literature by assessing the importance of the collateral channel in the Canadian environment.

The other two main channels identified by the literature include the crowding-out channel and the labor mobility channel. Intuitively, if banks credit supply is inelastic, an increase in mortgage demand may crowd out commercial lending, hampering firms' investment and productivity growth. Thereby, house price appreciations could have negative spillovers to the real economy.[4] (Rogoff and Yang, 2020, 2021, 2024b, 2024c) Short-run effects might differ from longer-term implications: For example, Moral-Benito and Schmitz (2019) argue that while higher housing credit demand initially reduces non-housing credit supply, housing booms eventually increase banks net worth thereby expanding credit supply. Relatedly, several studies have also argued that credit booms that are accompanied by a house price boom are more likely to end in systemic crises which typically also result in significant productivity losses (see e.g., Gorton and Ordonez, 2016 and Richter, Schularick and Wachtel, 2017). More recently, a growing body of research has been dedicated to the flow of credit supply to the non-tradable sector, most notably the real estate sector, from the more productive tradable sector and how this reallocation of capital has affected productivity growth. (e.g., Mian et al., 2020; Muller and Verner, 2024).

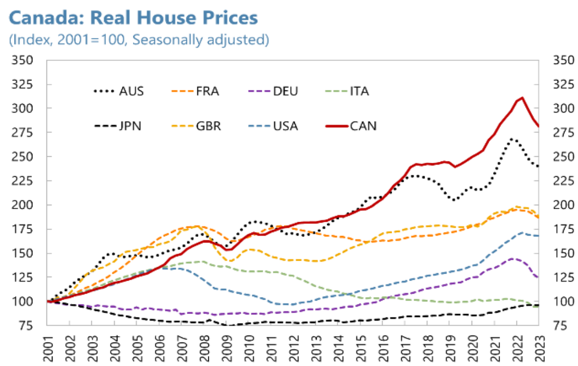
Third, housing boom and bust cycles can affect labor mobility and productivity growth through the ownership channel. For example, Hsieh and Moretti (2019) argue that stringent restrictions to new housing supply in the most productive US cities effectively limit the number of workers that have access to high productivity jobs. In addition, sharp declines in house prices during downturns can force homeowners to remain in their houses for financial reasons, thereby limiting labor mobility (Bergy, 2010). While this study focuses on the collateral channel, it is important to note that multiple channels may operate simultaneously.

[3] To the extent that real interest rates are a key driver of real estate prices, the latter channel is also in line with the finding of Liu, Mian and Sufi (2019) showing that falling interest rates increase industry concentration and thereby reduce productivity growth.

[4] Empirical evidence for the crowding-out channel is provided by Martin, Moral-Benito and Schmitz (2019) for Spain and by Charakroborty, Goldstein and MacKinlay (2018) for the US, among others.

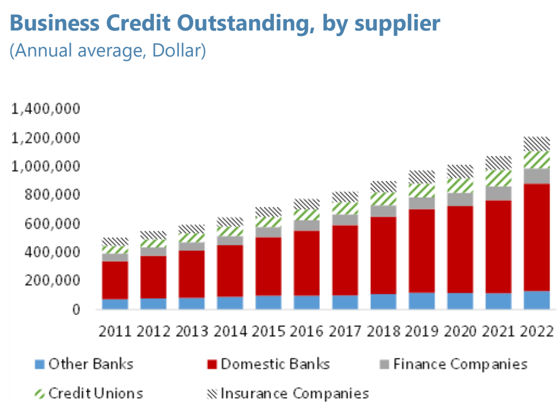
Our focus on the collateral channel is motivated by three key observations. First, Canadian firms rely heavily on bank financing with more than 73 percent of outstanding business credit held by banks in 2022 (see figure 3). Second, the Canadian economy is characterized by a large number of small and medium-sized enterprises (SMEs), and the collateral channel is particularly relevant for these firms due to their heavy reliance on collateral to secure bank lending. According to the credit condition survey of Statistics Canada (StatCan), more than 58 percent of small business, representing represent 98 percent of all Canadian businesses and employing 67.7 percent of the private sector labor force, were asked to pledge collateral to secure their loans in 2021. Third, as Canada experiences an extremely robust housing boom, decades-long house price appreciations driven by strong fundamentals have made housing an ideal and significant form of collateral.[5]

Figure 2: House price appreciation in Canada



Sources: OECD and IMF Staff Calculations

Figure 3: House price and productivity growth in Canadian provinces



Sources: StatCan and IMF Staff Calculations

[5] While an assessment of the importance of the bank-lending channel could be of interest as well, this would also require detailed loan-level data together with banks' balance sheet information, which is, to the best of our knowledge, not available for Canada and thus beyond the scope of this project.

The rest of the paper is structured as follows. Section 2 provides a theoretical framework of the main channels identified in the literature that could explain the observed negative correlation at the aggregate level. Section 3 describes our data. Section 4 outlines our empirical methodology and presents the results. And Section 5 concludes.

Stylized Model

Consider a highly stylized partial equilibrium model with one period and a continuum of firms indexed by i. Firms are endowed with $h_i \in [\bar{h}, \underline{h}]$ units of real estate holdings and ω_i units of liquid funds. In addition, firms can borrow funds d_i from banks subject to the real interest rate R. Financial markets are subject to frictions because firms can avoid total repayment of debt in which case they receive a fraction θ of the market value of their collateralized assets. This gives rise to the following collateral constraint:

$$Rd_i \leq \theta\,[P^* h_i + \omega_i], \tag{1}$$

were P^* denotes the real price of real estate assets. For simplicity we assume that funds are provided by a representative bank that sets the interest rate competitively and has access to an unlimited amount of funds. Banks also have access to a storage technology which implies $R \geq 1$. Firms can use their liquid funds and loans to invest in capital subject to the technology $f(k_i)$ where $f'(.) > 0$ and $f''(.) < 0$. Firms budget constraint reads:

$$k_i + s_i \leq \omega_i + d_i, \tag{2}$$

where s_i is a storage technology with zero net return.[6]

Following Basco, Lopez-Rodrigues and Moral Benito (2021) we assume that the supply of housing is given by $H^S = P^\varepsilon$, where ε is the elasticity of housing supply. The demand for housing is given by $H^D = (\sigma + B)$, where σ denotes the fundamental demand for housing. Thereby, for $B > 0$, this specification implies a decoupling of demand with respect to fundamental demand σ. In the following, we refer to a situation with $B > 0$ as a housing boom. Combining housing supply and demand yields the equilibrium house price[7]

$$P^* = (\sigma + B)^{1/\varepsilon}. \tag{3}$$

Firms take aggregate prices $\{P^*, R^*\}$ as given and choose investment $\{k_i, s_i\}$ and borrowing d_i to maximize profits subject to the collateral constraint and the budget constraint:

$$\max_{\{k_i, s_i, d_i\}} \Pi^F = f(k_i) - R\,d_i + s_i\,, \tag{4}$$

$$\text{s.t.} \qquad k_i + s_i \leq \omega_i + d_i,$$

$$R\,d_i \leq \theta\,[P\,h_i + \omega_i],$$

which yields the following first order and complementary slackness conditions:

[6] As will become clear below, this storage technology is required to ensure a non-negative return to firm's investment.
[7] Note that this equilibrium housing price arises form an ad-hoc supply and demand function. A fully micro-founded real estate market could be introduced by assuming a construction sector which produces real estate subject to convex costs $K(h_i)$. As Goldstein and Gupta (2021) show, in this framework, a pecuniary externality may arise allowing for (additional) welfare improving interventions in the real estate markets. For the purely illustrative focus of this section, however, we focus on the simplest possible version of the model.

$$f'(k) = \lambda_1, \quad (k_i)$$

$$R\,(1+\lambda_2) = \lambda_1, \quad (d_i)$$

$$1 \leq \lambda_1 \quad (s_i)$$

$$\lambda_1\,(\omega_i + d_i - k_i - s_i) = 0, \quad (BC)$$

$$\lambda_2\,(\,\theta\,[P\,h_i + \omega_i] - Rd_i\,). \quad (CC)$$

where λ_1 is the multiplier of the budget constraint and λ_2 denotes the multiplier of the collateral constraint. Note that the budget constraint is strictly binding as the net marginal return on investment is non-negative, i.e., $\lambda_1>0$.[8] The collateral constraint is binding if firm's endowment does not exceed a certain threshold $\bar{h}$.[9] While the unconstrained equilibrium is characterized by the standard condition equalizing the marginal return of capital investment to the costs of borrowing, i.e., $f'(k_i^*) = R$, our focus lies on the constrained equilibrium were $\lambda_2>0$ and $f''(k_i^*) > R$. Using the equilibrium conditions defined above, the closed form solution for the equilibrium capital stock in the constrained equilibrium is given by:

$$k_i^* = \theta/R\,[P^*\,h_i + \omega_i] + \omega_i = \theta/R\;\;P^*\,h_i + (1+\theta/R\,) + \omega_i. \quad (5)$$

Finding 1: In an economy that experiences a housing boom, investment rates increase. To see how capital investment k_i responds to a change in the house price (ΔB), we take the partial derivative of equilibrium investment k_i with respect to the house price change ΔB. Combining conditions (5) with $P^* = (\sum_I h_i + B)^{1/\varepsilon}$, yields:

$$k_i^* = \theta/R\;\;(\textstyle\sum_i h_i + B)^{1/\varepsilon}\,h_i + (1+\theta/R\,)\,\omega_{i.} \quad (6)$$

Taking the partial derivative of capital investment with respect to the price change $\partial k_i\,/\,\partial B$ yields:

$$\partial k_i\,/\,\partial B = \theta/(\varepsilon R)\;\;(\textstyle\sum_i h_i + B)^{(1/\varepsilon\,-1)}\;\;h_i > 0 \quad (7)$$

Intuitively, this is a direct implication of the collateral constraint which is, holding everything else constant, less stringent in case of higher real estate prices.

Finding 2: Firms with a higher initial stock of real estate assets increase their capital investment rates relatively more compared to firms with a lower stock of real estate assets. To show how the increase in capital investment following an increase in the real estate price depends on the initial real estate holdings of firm *i*, we take the partial derivative of the expression above with respect to h_i:

$$\partial\, dk_i/\mathrm{dB}\,/\,\partial\, h_i = \theta/(\varepsilon R)\;\;(\textstyle\sum_I h_i + B)^{(1/\varepsilon\,-1)} \;+\; \theta/(\varepsilon R)\;(1/\varepsilon\,-1)\,h_i\,(\textstyle\sum_i h_i + B)^{(1/\varepsilon\,-2)}$$
$$= \theta/(\varepsilon R)\;\;(\textstyle\sum_I h_i + B)^{(1/\varepsilon\,-2)}\,(\textstyle\sum_{i\neq i} h_i + B + \;h_i/\varepsilon) > 0 \quad (8)$$

[8] The non-negative net return on investment is ensured by the storage technology s_i.

[9] The collateral is binding if $h_i < [Rk^{UC} - (R+\theta)\,\omega_i]\,/\,\theta P^* = \bar{h}$ where $k^{UC}=f'(1)^{(-1)}$ denotes the optimal level of capital in the unconstrained equilibrium.

i.e., firms with higher initial real estate holding tend to invest more as real estate prices increase (interaction term in the regression analysis below).

To see how changes in real estate prices could impact aggregate productivity, we now introduce aggregate productivity A_i using a standard Cobb-Douglas production function, i.e. $f(k_i) = A_i k_i^{\alpha}$. For illustrative purposes, we assume that there are only two types of firms where type 1 firms hold real estate assets only and type two firms hold no real estate assets but liquid assets only. Firms also differ in terms of their productivity where we assume $A_1<A_2$, consistent with our empirical findings below. The capital stock of type 1 and type 2 firms, respectively, can be summarized by:

$$k_1^* = \theta/R\, [\, h_1 + B]^{(1/\varepsilon)}\, h_1$$
$$k_2^* = (1+ \theta/R\,)\, \omega_2.$$

Weighted average industry productivity is then given by

$$TFP_1^* = A_1 K_1^* / (K_1^* + K_2^*) + A_2 K_2^* / (K_1^* + K_2^*)$$
$$= [A_1\, \theta/R\, h_1\, [\, h_1 + B]^{(1/\varepsilon)} + A_2\, (1+ \theta/R\,)\, \omega_2] \,/\, [\theta/R\, [\, h_1 + B]^{(1/\varepsilon)}\, h_1 + (1+ \theta/R\,)\, \omega_2] \qquad (9)$$

Finding 3: Average industry productivity is decreasing with real estate prices. To see this, we take the partial derivative of the weighted average industry productivity with respect to a change in real estate prices:

$$\partial\, TFP / \partial\, B = A_1/(R\varepsilon)\, \theta\, h_1\, [\, h_1 + B]^{(1/\varepsilon-1)}\, [\theta/R\, [\, h_1 + B]^{(1/\varepsilon)}\, h_1 + (1+ \theta/R\,) + \omega_2]$$
$$-\; [A_1\, \theta/R\, h_1\, [\, h_1 + B]^{(1/\varepsilon)} + A_2\, (1+ \theta/R\,) + \omega_2]\;\; \theta/(R\varepsilon)\, [\, h_1 + B]^{(1/\varepsilon-1)}\, h_1$$

$$= \theta/(R\varepsilon)\; h_1(1+ \theta/R)\, \omega_2\, [\, h_1 + B]^{(1/\varepsilon -1)}\, (A_1\text{-}A_2) \qquad < 0.$$

Data

The data for the study are taken from three primary sources-- the Canadian Real Estate Association (CREA), Statistics Canada (StatCan), and Compustat Financials.

Housing price data is collected from CREA. While several Canadian housing price series are available, such as those from CREA, RPS (Real Property Solutions), and StatCan, the MLS home price index published by CREA has been used by the Bank of Canada (BoC) in its Monetary Policy Report, and it is thus our preferred measure. It would be ideal to also examine the impact of commercial real estate (CRE) price changes on productivity and misallocation, long-duration and high-quality CRE data disaggregated at the city level are not readily available. That said, housing prices and CRE prices are typically highly correlated. Using housing price series could also shed light on the broader effects of real estate booms on other sectors and the overall economy. (Barkema et al., 2021)

We use firm-level data from Compustat, which contains annual and quarterly financial data on publicly traded companies in North America. This database encompasses a wealth of information on firms' income statements, balance sheets and statements of cash flows. For this study, we obtain annual data for firms headquartered in Canada, including their total assets; property, plant and equipment; depreciation, depletion, and amortization; capital expenditure; cost of goods sold; revenue; number of employees; and IPO date. Following Doerr (2020), we exclude firms operating in the finance and mining industries due to their distinct investment patterns, and end up with a sample of 7,091 firm-year observations spanning the period from 2000 to 2023.[10]

Establishing the causal effect of house prices on productivity raises endogeneity concerns, as both may be influenced by common shocks or productivity changes could potentially drive fluctuations in house prices. For identification purposes, we draw on an established body of literature that employs an instrumental variable approach, using housing supply elasticity multiplied by long-term interest rates as instruments for housing prices (e.g., Saiz, 2010), with the assumptions that reductions in long-term interest rates stimulate housing demand and the extent to which house prices respond hinges on local supply elasticity.

This identification implies, however, that interest rates influence productivity through housing prices. To mitigate potential bias, we include industry-time fixed effects to control for aggregate trends in interest rates and other macroeconomic factors.

A further challenge to establishing causality arises from the fact that housing supply elasticities are themselves shaped by demand-side factors (Davidoff 2016, Piazzesi and Schneider 2020, Goldsmith-Pinkham et al., 2020). More specifically, areas that are land-constraint often have higher incomes, attract high-skilled workers and tourists, and experience faster productivity growth. (Cherif et al., 2020; Bakker et al., 2024) These same factors can increase demand for housing and drive up prices, creating a spurious positive association between housing prices and productivity. That said, this endogeneity concern would typically bias the results toward a positive relationship. The fact that we consistently find a negative association between housing prices and productivity—despite these upward pressures—strengthens our interpretation of a misallocation channel and supports the core argument of the paper.

[10] We exclude all firms in the finance, and mining industries which have distinctive investment patterns, and firms that operate for less than two years.

Empirical Analysis

We employ a three-step empirical analysis to test the collateral channel. In the first step, we examine the relationship between firms' initial real estate holdings and their productivity. The second step tests how changes in real estate prices affect firm-level investment. Last, but not least, the final step tests the aggregate effect of the collateral channel at the industry level. The exact specifications are described below.

Step 1. Real estate holdings and firm productivity

To examine the relation between firm productivity and initial real estate, we estimate variants of:

$$y_{i,t} = \alpha + \beta initial\ tangible\ assets_{i} + controls_{i,t-1} + controls_{i,t} + \tau_{t} + \varphi_{j,t} + \omega_{k} + \varepsilon_{i,t}$$

The dependent variable is firm productivity, for which we propose three measures. We first compute labor productivity defined as the natural logarithm of value added per employee. We then compute two additional measures based on the control function approaches developed by Olley and Pakes (1996) and Levinson and Petrin (2003).[13] As a robustness exercise, we calculate sales-based productivity measures following the same three approaches described above.

The variable, initial tangible assets, denotes firm's beginning of period fixed assets, measured by the sum of property, plant, and equipment, over total assets. Control variables include log total assets and firm age.[14] Furthermore, we include various fixed effects to account for unobservable factors that vary with time, location, and industry. The inclusion of industry*time fixed effects accounts for time-varying changes in industry dynamics. Robust standard errors clustered at the city level are reported.[15]

The results of the first empirical step are summarized in Table 1 and show that a higher initial tangible asset ratio is indeed associated with significantly lower productivity, conditional on firm size, firm age, and unobservable trends at the industry level. This finding is robust across all three specifications.

Table 1. Firm Productivity and Tangible Asset Holdings

Variable	Labor Productivity	TFP (LP)	TFP (OP)
Initial Tangible Assets	-0.131*	-0.092***	-0.371***
	(0.079)	(0.012)	(0.021)

[13] Levinson and Petrin (2003) suggest using intermediate inputs as proxy variable which we define as sales minus value added. Olley and Pakas (1997) proposed firm investment as proxy variable which was defined as capital expenditures. We derive labor costs by multiplying the number of employees at the firm level from Compustat by the average weekly earnings by industry provided by Statistics Canada. A similar definition has, e.g., been used by Doerr (2020).

[14] Given the persistence of productivity levels over time, we also include the lagged dependent variable in additional, untabulated specifications and the results remain robust to this inclusion.

[15] Clustering standard errors at the firm level does not change the results.

Firm Size	0.038	-0.022**	0.177***
	(0.047)	(0.011)	(0.013)
Firm Age	-0.099	-0.057*	-0.037
	(0.228)	(0.033)	(0.055)
Lagged Firm Size	0.154***	0.028***	-0.134***
	(0.047)	(0.011)	(0.012)
Lagged Firm Age	0.092	0.033	0.041
	(0.156)	(0.023)	(0.038)
Constant	4.574***	1.736***	0.754***
	(0.227)	(0.034)	(0.056)
Year FE	YES	YES	YES
Location FE	YES	YES	YES
Industry FE	YES	YES	YES
Industry#Year FE	YES	YES	YES
No. of Obs.	7,091	5,404	5,384
R2	0.490	0.579	0.571

***p<0.01, **P<0.05, *p<0.1

Owning property ties firms to specific locations, reducing their ability to relocate or restructure in response to changing market conditions or labor availability, which is especially problematic when housing booms increase local living costs and talent becomes harder to attract.

And as firms direct capital toward acquiring or holding onto real estate assets and enjoy rapid capital gains as these assets appreciate, they may become less interested in productivity-enhancing activities such as innovation, technology upgrades, workforce development, or operational improvements. Managers might treat real estate as a speculative asset rather than a means to support core business functions. This shift in priorities can undermine productivity and long-term competitiveness, which we will show in the following sections.

Step 2: Housing price increases and firm investment

Next, we estimate the following regression model, in order to show how increases in housing prices could affect the investment decisions of firms, conditional on their real estate holdings.

$$\Delta Size_{i,t} = \beta_0 + \beta_1 \Delta HP_{k,t-1} \times Initial\ Tangible\ Assets_i + \beta_2 \Delta HP_{k,t-1} + \beta_3 Initial\ Tangible\ Assets_i + controls_{i,t-1} + \tau_t + \varphi_{j,t} + \omega_k + \varepsilon_{i,t}$$

The dependent variable is the change in the firm's assets, a direct measure of a firm's expansion. HP denotes change in average housing prices in city k. Hence a positive coefficient of the interaction term (β_1) suggests that increases in real house prices lead to lower investment for firms holding a smaller share of tangible assets, but increase investment for those with larger tangible assets, therefore confirming the collateral channel. As in previous steps, all regressions include firm size and age as firm-level controls as well as time, location, and industry-year fixed effects. To address potential problems associated with OLS estimates, we instrument house price growth by using the interaction between municipality-level housing supply elasticity and the aggregate long-term real interest rate of home mortgages.[16]

$$\Delta HP_{k,t} = \alpha_0 + \alpha_1 HSE_k \times R_t + \tau_t + \varepsilon_{k,t}$$

Our hypothesis that housing booms tend to benefit firms with more real estate holdings via the collateral channel is confirmed in our second stage assessing the relationship between firm size, tangible assets and house prices. As shown in table 2, our results reveal that firms owning more real estate have seen a significant expansion of both overall firm size and gross assets during periods of housing price appreciation (positive and significant interaction term).

Consistent with the crowding out channel where capital flows boost domestic demand for non-tradable goods and induces a reallocation of activity from the tradable sector to the less productive non-tradable sector, (Benigno et al., 2025) our findings indicate that a similar effect could arise in the presence of house prices increases if the non-tradable sector is more collateral dependent.

Table 2. Rising house prices and firm size

Variable	∆Firm Size	∆Gross Assets
∆ln(Real House Price)*Initial Tangible Assets	4.861***	5.246***
	(1.320)	(1.472)
∆ln(Real House Price)	-1.985*	-2.064*
	(1.147)	(1.118)
Initial Tangible Assets	-0.206***	-0.233***
	(0.068)	(0.077)
Firm Size	-0.024***	-0.016***
	(0.004)	(0.005)
Firm Age	0.021*	0.012
	(0.011)	(0.008)
Constant	0.239	0.236*
	(0.152)	(0.140)
Year FE	YES	YES
Location FE	YES	YES
Industry#Year FE	YES	YES

[16] We are grateful to Nuno Marques da Paixao of the Bank of Canada for kindly sharing the subnational housing supply elasticity data for Canada.

No. of Obs.	4,288	4,209
R2	0.135	0.135

***p<0.01, **P<0.05, *p<0.1

Step 3. Aggregate effects at the industry level

Our findings so far confirm our hypotheses that 1) firms holding more real estate tend to be less productive, 2) housing booms characterized by persistent housing price increases disproportionately benefit these firms. We now turn to the final stage of the analysis, where we examine how the resource reallocation across firms is reflected in aggregate productivity at the industry. To do this, we run the following model:

$$y_{j,t} = \alpha + \beta \Delta HP_{k,t-1} \times Initial\ Tangible\ Assets_j + \gamma \Delta HP_{k,t-1} + \delta Initial\ Tangible\ Assets_j + controls_{j,t} + controls_{j,t-1} + \tau_t + \varphi_j + \omega_k + \varepsilon_{j,t},$$

where the index *j* refers to industries, and the dependent variable is the industry-average initial tangible assets as share of total assets at time *t*. Firm assets and age are averaged at the industry level and included as control variables to help account for confounding factors that could influence productivity outcomes independently of our main variable of interest. Time, location, and industry fixed effects are also included. As in step 2, houses prices are proxied using an instrumental variable approach.

The results, summarized in Table 3, show that in response to rising house prices, productivity declines significantly more in industries with a higher share of initial tangible assets, as indicated by the negative and statistically significant interaction term between real house prices and initial tangible assets. These findings confirm the existence of a crowding-out mechanism through which housing booms could affect productivity. During booms, property-rich but less productive firms may gain easier access to credit due to higher collateral value, while more productive but asset-light firms may be starved of capital, leading to inefficiencies at the aggregate level.

Table 3: Aggregate effects at the industry level

Variable	Labor Productivity	TFP (LP)	TFP (OP)
∆ln(Real House Price)*Initial Tangible Assets	-52.370***	-5.005***	-13.311*
	(17.919)	(1.487)	(6.882)
∆ln(Real House Price)	13.005***	1.320***	5.144
	(3.604)	(0.331)	(3.483)
Initial Tangible Assets	1.955*	0.082	0.168
	(1.143)	(0.082)	(0.354)
Firm Size	0.186***	0.011***	0.035***

	(0.012)	(0.002)	(0.008)
Firm Age	-0.086***	-0.001	0.001
	(0.015)	(0.008)	(0.017)
Constant	-0.489	1.509***	0.172
	(0.855)	(0.037)	(0.509)
Year FE	YES	YES	YES
Location FE	YES	YES	YES
Industry#Year FE	YES	YES	YES
No. of Obs.	1,782	1,896	1,891
R2	0.291	0.414	0.057

***p<0.01, **P<0.05, *p<0.1

Conclusions

In this study, we used a stylized theoretical framework to outline one potentially important channel linking house price booms and productivity at the aggregate level, and presented empirical evidence in support of our theoretical predictions. We show that firms with lower productivity stand to benefit disproportionately from real estate booms, because they typically hold more real estate assets and can secure greater lending from banks following an increase in collateral values (i.e. tangible assets). In combination, the three empirical steps presented in our study confirm the existence of a collateral-induced misallocation of capital in Canada.

It is important to acknowledge that while we made serious efforts in this paper to establish causality, our results could be improved by using more robust instrumental variables. Furthermore, the use of more nuanced real estate price data, including both residential and commercial real estate, could potentially enhance the granularity and comprehensiveness of our analyses. While our dataset contains a rich set of information on publicly traded firms, it is important to recognize that the data is not fully representative of the entire spectrum of Canadian firms,[17] and thus the outcomes in this study may not be directly generalizable to all firms or industries.

Taken together, our paper provides evidence for a novel channel through which house price booms affect productivity. It is important to note that the slow productivity growth observed in Canada during past decades has been attributed to various other factors, including e.g., the low stock of capital investment (Voss, 2002), the investment climate (Lutz, Yang and Huang, 2024), declining business dynamism (Diez et al., 2021), and the existence of zombie firms (Amundsen, 2023). We see these as complementary factors contributing to the low productivity growth observed at the aggregate level.

[17] Small businesses, which comprised 98% of all employer business and employed about two thirds of all employees in 2022, are typically not well represented. This distinction should be taken into account when interpreting findings.

Annex I. House Price and Productivity Growth in Canadian Provinces

Figure I.1: House price and productivity growth in Canadian provinces

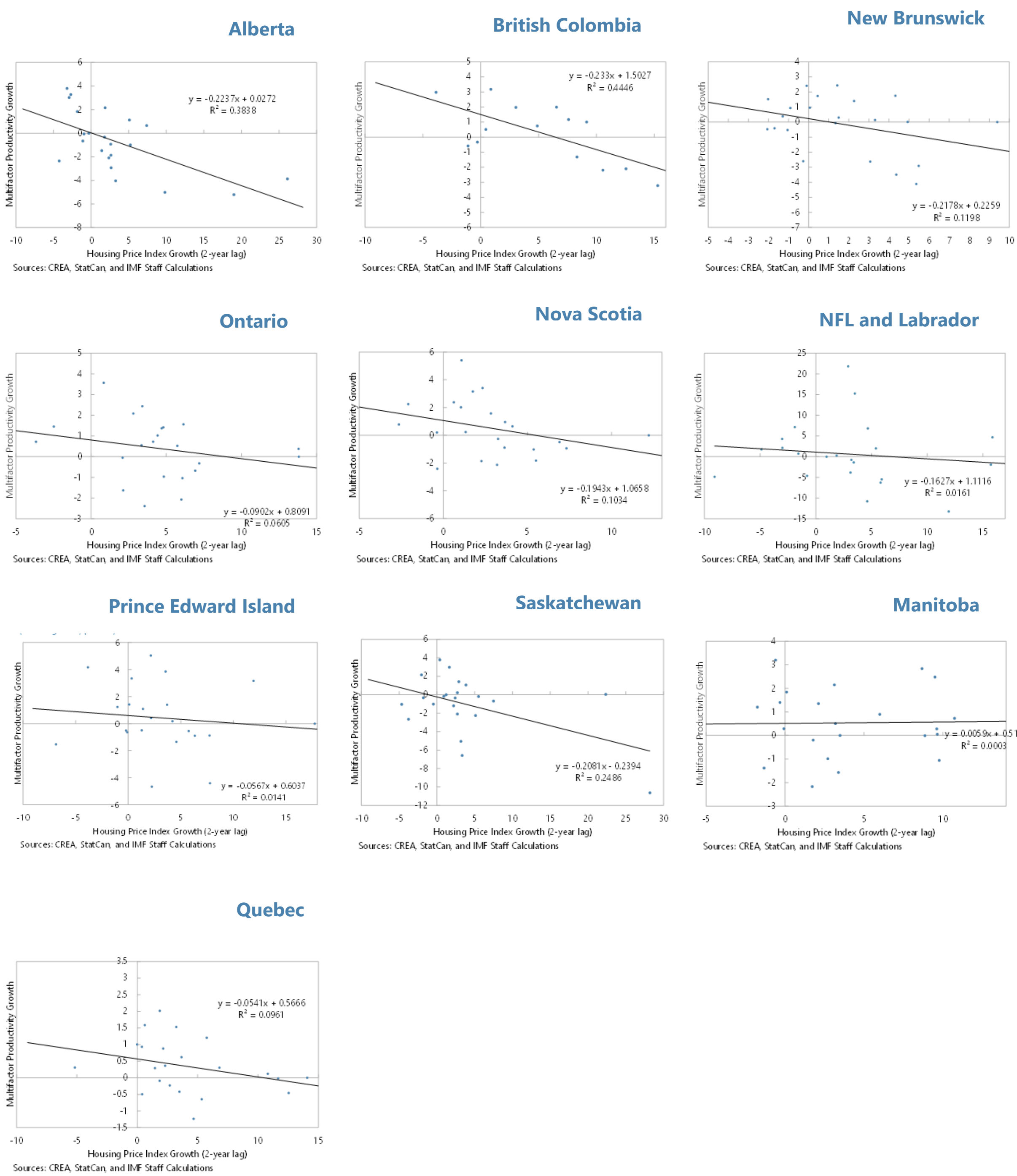
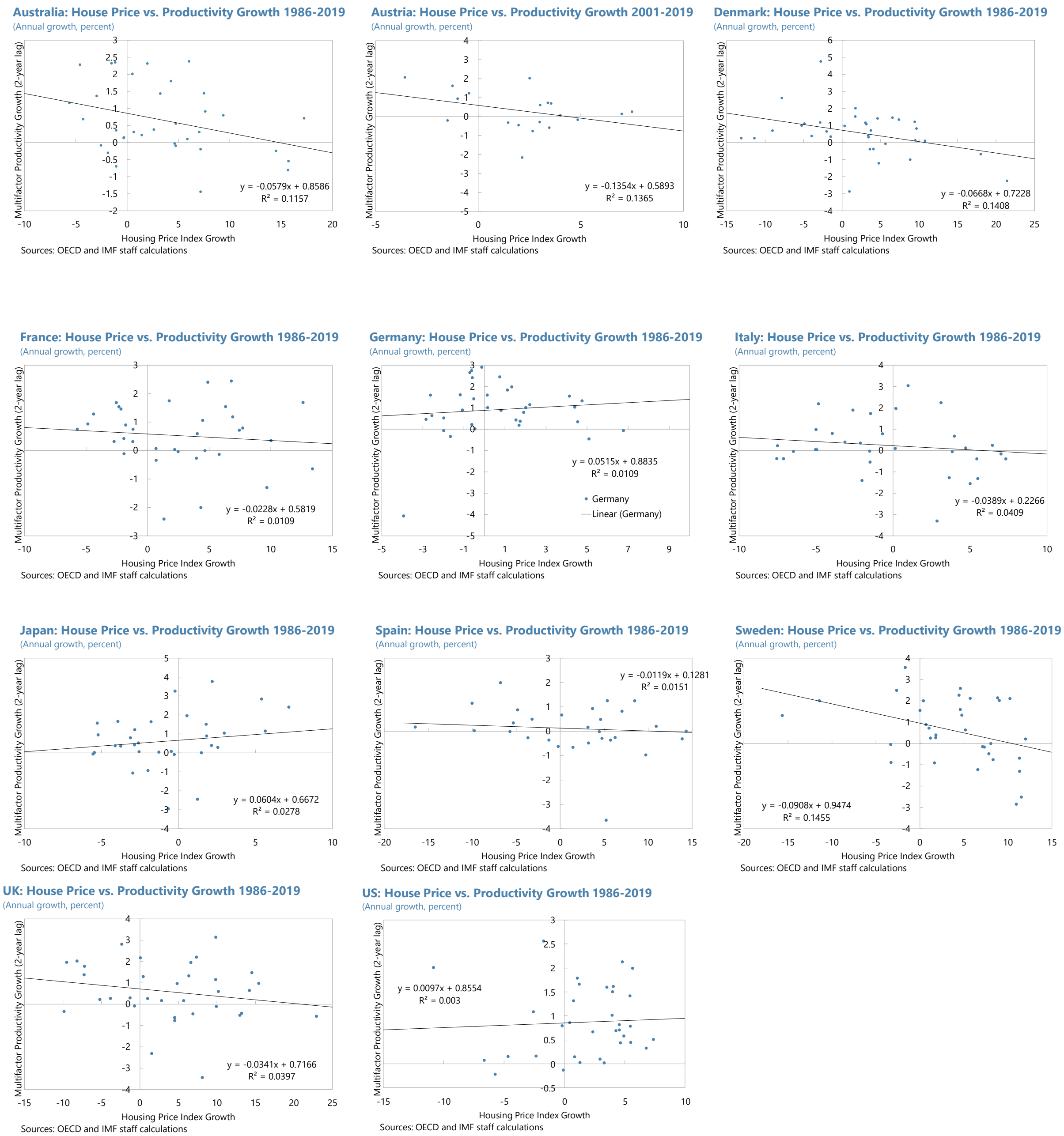


Figure I.2: House price and productivity growth in Advanced Economies



References

Amundsen A., Lafrance-Cooke A., and Leung D., 2024. Winter is coming? Zombie firms and ownership type in Canada. Unpublished Working Paper.

Bakker, B., Chen S., Vasilyev D., Bespalova O., Chin M., Kolpakova D., Singhal A., Yang Y., 2024. What Can Artificial Intelligence Do for Stagnant Productivity in Latin America and the Caribbean? IMF Working Paper 24/219.

Barkema, J., Mircheva B., Mrkaic M., and Yang Y., 2021. License to Spill: How Do We Discuss Spillovers in Article IV Staff Reports. IMF Working Paper No. 2021/134.

Basco, S. and Lopez Rodriguez, D. and Moral-Benito, E. 2021. House Prices and Misallocation: The Impact of the Collateral Channel on Productivity. Banco de Espana Working Paper No. 2135. SSRN: https://ssrn.com/abstract=3927727 or http://dx.doi.org/10.2139/ssrn.3927727

Benigno, G., Fornaro, L., Wolf, M., 2025. The Global Financial Resource Curse, American Economic Review 115 (1) : 220-62.

Bergy, K., 2010. The Effects of the Housing Crisis on Labor Mobility and Unemployment. *Honors Projects*. 55. https://scholarworks.gvsu.edu/honorsprojects/55

Chakraborty, I. and Goldstein, I. and MacKinlay, A., 2018. Housing Price Booms and Crowding-Out Effects in Bank Lending. The Review of Financial Studies. 31(7). 2806-2853. https://doi.org/10.1093/rfs/hhy033

Chaney, T. and Sraer, D and, Thesmar, D., 2012. The Collateral Channel: How Real Estate Shocks Affect Corporate Investment. J American Economic Review. 102(6). 2381-2409.

Cherif, R., Dhungana S., Fang X., Gonzalez-Garcia J.R., Yang Y., Yenice M., Yoon J.E., 2020. Competition, Competitiveness, and Growth in Sub-Saharan Africa, IMF Working Paper 2020/30.

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(2): 177-206.

Diez, F.J., Fan J., and Villegas-Sanchez C., 2021. Global Declining Competition? Journal of International Economics 132: 103492.

Doerr, S., 2020. Housing booms, reallocation and productivity. BIS Working Papers 904, Bank for International Settlements. https://ideas.repec.org/p/bis/biswps/904.html

Goldsmith-Pinkham, P., Sorkin, I., and Swift, H., 2020. Bartik Instruments: What, When, Why, and How. American Economic Review 110(8): 2586-2624.

Gorton, G. and Ordoñez, G. 2019. Good Booms, Bad Booms. Journal of the European Economic Association. 18(2). 618 – 665. https://doi.org/10.1093/jeea/jvy058

Hsieh, C. and Moretti, E., 2019. Housing Constraints and Spatial Misallocation. American Economic Journal: Macroeconomics. 11(2). 1-39. https://www.aeaweb.org/articles?id=10.1257/mac.20170388

Jiménez, G. and Salas, V. and Saurina, J., 2006. Determinants of collateral. Journal of Financial Economics. 81(2). 255-281. https://doi.org/10.1016/j.jfineco.2005.06.003.

Liu, E. and Sufi, A. and Mian, A., 2019. Low Interest Rates, Market Power, and Productivity Growth. 2019 Meeting Papers 83, Society for Economic Dynamics. https://ideas.repec.org/p/red/sed019/83.html

Lutz, F., Yang Y., and Huang C., 2024. Public Perceptions of Canada's Investment Climate. IMF Working Paper No. 2024/165.

Martín, A. and Moral-Benito, E. and Schmitz, T., 2021. The Financial Transmission of Housing Booms: Evidence from Spain American Economic Review. 111(3). https://www.aeaweb.org/articles?id=10.1257/aer.20191410

Mian, A., Sufi, A., and Verner, E., 2020. How does Credit Supply Expansion Affect the Real Economy? The Productive Capacity and Household Demand Channels. Journal of Finance 75 (2): 949-994.

Müller, K., and Verner, E., 2024. Credit Allocation and Macroeconomic Fluctuations, The Review of Economic Studies 91(6): 3645-3676.

Piazzesi, M., and Schneider., 2016. Handbook of Macroeconomics, 2: 1547-1640.

Rogoff, K., and Yang Y., 2020. Peak China Housing, NBER Working Paper No. 27697.

Rogoff, K., and Yang Y., 2021. Has China's Housing Production Peaked? China and the World Economy 21(1): 1-31.

Rogoff, K., and Yang Y., 2024a. Rethinking China's Growth, Economic Policy 39 (119): 517-548.

Rogoff, K., and Yang Y., 2024b. A Tale of Tier 3 Cities. Journal of International Economics 152, 103989.

Rogoff, K., and Yang Y., 2024c. China's Real Estate Challenge, Finance & Development 61(004).

Schularick, M. and Wachtel, P. and Richter, B., 2017. When to Lean Against the Wind. CEPR Discussion Papers 12188, C.E.P.R. Discussion Papers. https://ideas.repec.org/p/cpr/ceprdp/12188.html

Voss, G.M., 2002. Public and Private Investment in the United States and Canada, Economic Modelling 19 (4): 641-664.

Yang, Y., and Liu, Y., 2020, Credit Expansion and Misallocation, Journal of Applied Finance and Banking 10: 4,5.

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