

# Research Statement

## Overview

My research focuses on the *distributive* effects of financial frictions. How do financial institutions affect economic growth and inequality by changing the allocation of resources across heterogeneous agents and firms? This question does not neatly fit into any subfield of finance and therefore my work spans multiple areas, with a focus on three main themes: innovation and entrepreneurship, corporate investment, and household finance and financial inclusion.

So far, the academic literature in applied corporate finance has convincingly demonstrated the importance of a “**financing channel**,” i.e. that financial frictions affect aggregate investment by constraining investment by the average firm.<sup>1</sup>

However, recent developments in macroeconomics and macro-development have stressed the importance of not only taking into account the effect of financial frictions on the average firm, but also on the allocation of capital across firms. This “**misallocation channel**” is not about how much capital is available in the economy (the financing channel), but rather about *who* can access it. The (mis)allocation of capital has the potential to hamper aggregate productivity because resources can be allocated to the least productive production units, whether it is a tech firm employing too many STEM workers, a manufacturing firm consuming excessive inputs, or an untalented individual creating her firm and growing, while talented but poor aspiring entrepreneurs cannot. In all these examples, reallocating inputs across producers while keeping the overall supply of capital and labor fixed would increase productivity and fosters economic development.

Until recently, the literature on misallocation has focused on establishing its quantitative importance (e.g. Restuccia and Rogerson, 2008; Hsieh and Klenow, 2009). Largely unanswered are two central questions: what are the sources of misallocation and what can be done about misallocation?

My research makes progress on these fronts by examining: (1) how financial markets affect misallocation (2) how different public policies, notably fiscal policies, can affect the allocation of resources, with a particular emphasis on the role of fiscal policies, and (3) how policies that promote financial inclusion can reduce misallocation.

To make progress on these topics, one must provide causal evidence on the role of specific policies that affect the misallocation of production factors.<sup>2</sup> My work aims to provide clean, causal empirical evidence on the role of the “misallocation channel,” rather than solely employing the structural approaches that have mostly been the norm in this literature. I emphasise linking the theory precisely to the data, and I leverage the tools of applied micro-econometrics to estimate well-identified effects using large administrative datasets that also allow me to observe the underlying heterogeneity of firms and workers.

**Key findings.** My work on the role of financial markets on misallocation has generated three key findings. First, the *structure* and institutional organization of the financing sector matters a great deal,

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1. See among many others Bertrand, Schoar, and Thesmar (2007), Chaney, Sraer, and Thesmar (2012) or Benmelech, Bergman, and Seru (2021) and references therein.

2. Recent papers have started to stress the role of financial frictions for aggregate outcomes (e.g. Buera, Kaboski, and Shin, 2011; Midrigan and Xu, 2014; Moll, 2014), but have solely relied on a structural approach to study the role of capital misallocation on economic development, and have provided limited evidence of the role of specific policies.

while the literature has so far mostly focus on the level of “financial deepening” (i.e., how much capital is available) or on the degree of competition among private capital providers. Among the specific characteristics I analyzed are the size and geographic distribution of banks, together with their ability to process certain types of information (Hombert and Matray, 2017), the existence of rent controlled by local governments that can lead profit-maximizing, private banks to engage in “quid-pro quo” behaviors, the liability structure of banks and governmental policies that affect it (Duquerroy, Matray, and Saidi, 2021), or the restriction imposed on foreign investors (Bau and Matray, 2020).

Second, financial markets matter for misallocation not because of the amount of funding they provide to the economy, but because:

- a. The different frictions mentioned above affect the composition of loan and equity portfolio of capital providers. This can lead banks to reallocate credit: away from innovative projects and toward more traditional projects (Hombert and Matray, 2017); away from productive firms and toward firms in decline (Delatte, Matray, and Pinardon Touati, 2020); away from safe loans and toward loans with higher yields to protect their profits (Duquerroy, Matray, and Saidi, 2021); away from firms with high marginal returns to capital and toward more established firms (Bau and Matray, 2020).
- b. Financial markets affect the amount of information that are incorporated in prices and these prices are then used by firms and workers as imperfect signals on future investment opportunities to make their decisions, leading to potential under or over-investment (Dessaint, Foucault, Frésard, and Matray, 2018; Farboodi, Matray, Veldkamp, and Venkateswaran, 2021; Hombert and Matray, 2020).

Third, the access to financial markets (the “extensive margin”) is as important as the amount of capital available (the “intensive margin”), and financial inclusion can have large effect on wealth inequality (Célerier and Matray, 2019) and earnings inequality (Fonseca and Matray, 2021).

My work on the effect of taxes and subsidies on misallocation is more preliminary and more systematic evidence needs to be brought up, but so far, the main results are that the misallocation of capital can go down when taxes on dividends increase (Boissel and Matray, 2021) and R&D subsidies increase, if they allow firms to relax their financial constraints. More broadly, my research on taxes and subsidies show that fiscal policies can be a first order determinant of misallocation. While the public finance literature so far has mostly thought about the incidence of taxes (e.g. “who end up paying it?”) and the effect on the average firm or worker (e.g. “do corporate taxes affect investment?”), it has rarely looked at the distributional effects across heterogeneous firms and the possible effect of fiscal policies on misallocation.

**Methodological contributions.** Across my different papers, I ended up making three main methodological contributions. First, in Bau and Matray (2020), we show how to leverage micro-econometric techniques to address the important problems of measurement errors and model misspecifications that have become central in the misallocation literature. We also developed a new way to aggregate reduced-form estimates that is less sensitive to measurement errors and to cleaning procedures, which will help the comparisons of policies across countries and periods.

Second, in Hombert and Matray (2019), we show that the workhorse model in trade and innovation that is used to understand how trade affects innovation, the “inverted-U shape” of Aghion et al. (2005) yields different predictions once we introduced frictions (e.g., credit constraints) in the firm’s optimal R&D policy, that might be affected directly by trade shocks. We first develop a method that allows us to

estimate how the return to innovation varies with trade shocks that is not biased by this problem, and second, our framework provides a richer setting to reconcile different studies looking at how trade affects innovation.

Third, I developed new tools to measure the amount of information in stock prices and study its impact on the real economy. In **dessaint2018 (dessaint2018)**, we show how to decompose asset prices into a fundamental and a noise components to study how noise in prices can have real effects. In Farboodi, Matray, Veldkamp, and Venkateswaran (2021), we show that previous reduced-form measures of “price informativeness” actually capture many fundamental parameters (e.g., variance in stock price and cash-flows) that prevent studying how the information contained across assets change in the time series. We build a new, simple structural model that allows us to back out information from standard firm balance-sheet and stock price data.

## **Question 1: how do financial markets affect misallocation?**

Financial markets include a multitude of institutions (e.g., domestic banking markets, international capital markets, domestic equity markets) each of which is sufficiently unique to require being studied separately. My first set of work examines how these institutions can affect the (mis)allocation of human and physical capital.

### **The domestic banking market**

In **Hombert and Matray (2017): “The Real Effects of Lending Relationships on Innovative Firms and Inventor Mobility” (*Review of Financial Studies*)**, we show that the structure of the banking market that funds innovation as an important effect on the type of innovation produced. We find that the banking deregulation of the 1970s and 1980s across U.S. states increased competition and fostered the development of large, hierarchical bank-holding companies, which then changed the nature of the relationship between bankers and innovative firms. These relationships became more arm-length, which consequently changed the nature of information that could be exchanged between borrowers and lenders where soft information was replaced by hard, codifiable information. This affected the nature of projects funded where riskier, cutting-edge innovative projects were replaced with less innovative but well-established projects with higher collateral values. This reallocation of credit led to a reallocation of inventors whereby young and productive inventors left small firms and moved out of geographical areas where lending relationships were hurt. Our paper was one of the first to show that credit markets can affect not only the level of innovative activity, but also the distribution of human capital across firms and space.

In **Delatte, Matray, and Pinardon Touati (2020): “Private Credit Under Political Influence: Evidence from France” (*Working Paper*)**, we show how profit-driven private banks have an incentive to cater to powerful politicians around elections, and that this behavior distorts the allocation of credit. We use administrative data covering the universe of loans and firms in France and exploit close-race elections where powerful incumbents are at risk of losing in order to causally demonstrate the existence of this quid pro quo arrangement. We find that credit to the private sector increases the year a powerful incumbent faces a contested election (the “quid”) and targeted at sectors in decline (i.e., with a higher probability of bankruptcy and lower value-added per asset) at the expense of more productive sectors, amplifying credit misallocation. We then provide evidence that politicians return the favor. Reelected incumbents

allocate their public entities loans to those banks that had granted more credit in election years (the “pro quo”).

In “**The Allocative Effects of Banks’ Funding Costs**” (Duquerroy, Matray, and Saidi (2021), *Working Paper*), we study how changes in funding costs not only affect the total supply of credit, but also the *composition* of credit in the French economy. We find that to insulate their profits from negative funding costs, banks shift their portfolios toward higher-yielding loans: long term loans and loans to smaller and more opaque firms. Our research has important implications for macro models of the transmission of monetary policy. First, it shows that due to the rebalancing of banks’ loan portfolio across heterogeneous firms, changes in funding costs can have aggregate effects even if banks’ profits are not affected. In the presence of misallocation, this simple reshuffling of loans will affect aggregate output. Second, it implies that funding costs can have a direct effect on bank behaviors, irrespective of their ultimate effect on bank net worth. This does not imply that net worth does not matter. On the contrary, we uncover an important feedback effect: by depressing bank net worth, higher funding costs adversely affect banks’ overall intermediation costs, implying: (i) important non-linearities in the effect of funding cost shocks on credit supply and (ii) that the heterogeneities of banks is an important determinant of the magnitude of the effect of funding costs shocks.

### **The international equity market**

Poorly functioning domestic banking markets are the usual suspect for explaining the large extent of capital misallocation in developing countries. As a result, opening up to international capital markets is often promoted by international organizations as a simpler lever to pull instead of reforming the domestic banking market. But to what extent can foreign capital act as a substitute for a more efficient domestic banking sector? In **Bau and Matray (2020): “Misallocation and Capital Market Integration: Evidence from India” (R&R Econometrica)**, we exploit the staggered deregulation of Foreign Direct Investment (FDI) across industries in India to study how easier access to foreign equity markets affects misallocation. Our contribution is three-fold. First, on the policy side, we show that FDI deregulation has a large effect on reducing capital misallocation, and that the effects of liberalization are largest in areas with less developed local banking sectors, indicating that foreign capital partially substitutes for an inefficient banking sector. Second, on the methodology side, we show how using reduced-form estimation techniques can absorb many unobserved heterogeneities across firms and allow us to quantify the relative costs of misallocation. This methodology presents a solution to the issue of unobserved firm heterogeneity that has so far plagued the measurement of the effects of changing misallocation. Third, we develop a new method to aggregate causally estimated parameters from natural experiments to bound the effect of changes in misallocation on treated industries’ aggregate productivity. This method requires fewer assumptions about the structure of the economy or the functional forms of production functions than, for instance, the standard method of Hsieh and Klenow (2009), and it is more robust to outliers and noise in the measurement of ex-ante dispersion in the marginal return to capital. This tool can ease comparisons across countries, across different natural experiments, and has already been re-used in various other studies.

### **The domestic equity market**

The domestic equity market can also distort the allocation of resources either because it directly affects who is financed, or because it affects the production of information that is then used by agents as signals

about future profitable investments.

In **dessaint2018 (dessaint2018): “Noisy Stock Prices and Corporate Investment” (Review of Financial Studies)**, we provide evidence that managers use stock prices as signals about their investment opportunities but have limited ability to filter out the noise when prices change. There are two challenges to establishing this relationship. First, the econometrician is never able to observe the information set of the managers. Therefore, the correlation between stock prices and investment might simply be driven by the fact that both investment and stock prices respond to a third omitted variable (e.g., demand). Second, even if there were exogenous shocks to the part of the stock price that the managers use to form anticipation, changes in stock prices can have direct effects on firm investment by changing the firm's cost of capital. We address these two challenges by first decomposing stock price fluctuations into a non-fundamental component (noise) and a fundamental component. To do so, we exploit fire-sale induced price dislocation, which happens when mutual funds experience large investors' redemptions. This ensures that reactions to noise cannot be driven by managers directly observing the firm's investment opportunities. Second, we focus on how managers react to their peers' stock prices to control for the direct effect that firm stock prices have on the firm's own investment policy (e.g., change in cost of capital). We find that firms significantly reduce their investment in response to nonfundamental drops in the stock price of their product-market peers and that this also affects firms not facing severe financing constraints or agency problems. Our findings offer a novel perspective on how stock market inefficiencies can distort the allocation of investment, even in the absence of financing or agency frictions. They are also important because a vast theoretical literature studies the amount of noise in asset prices, and justify the importance of the question by arguing that prices precisely are used as a signal for future investment opportunities. Yet, there was no causal evidence for this possible important channel before our paper.

Managers of listed firms are not the only ones potentially fooled by deviations in stock prices from their fundamental values. In **Hombert and Matray (2020): “Technology Boom, Labor Reallocation, and Human Capital Depreciation” (Working Paper)**, we study how the large deviation from stocks' fundamental values during the dot-com bubble of the late 1990s can also affect the allocation of skilled labor across sectors and firms. We use administrative matched employer-employee data from France to implement a within and across cohort empirical design that allows us to control for endogenous sorting of workers across firms, space and occupation. We find that new skilled workers disproportionately go in the Information and Communication Technology (ICT) sector during the boom, and end up with wages that are lower than similarly skilled workers who joined the non-tech sector during this period. We show that these lower wages cannot be explained by selection, job losses or sector specific shock to ICT firms. Instead, it is consistent with technical skills becoming obsolete at a faster pace during a technological boom. These results suggest that transient sectoral booms like the dot-com bubble can create a misallocation of talent, which can have negative long-lasting effects due to the consequences on workers' long-term human capital.

These two papers look at the reallocation of resources (capital and skilled labor) following shocks to noise in stock prices. I also study how the development of “big data” can affect the reallocation of the production of information contained in stock prices, which has implications for who gets funded. In **Farboodi, Matray, Veldkamp, and Venkateswaran (2021): “Where Has All the Data Gone?” (Review of Financial Studies, forthcoming)**, we show how the development of big data led to a reallocation of the processing of information toward large-growth firms at the expense of all others. The increase in average stock market efficiency documented, for instance, by Bai, Philippon, and Savov (2016), in fact

masks a large *divergence* in the ability of stock prices to predict future cash-flows. Our contribution is also methodological. We develop a simple structural model that shows how data is related to and yet distinct from concepts like price informativeness, and we derive a formula to correct a price information measure for the effect of asset characteristics. This allows us to obtain a pure measure of how much data is produced by financial markets, that can be backed-out from standard datasets on stock prices and firm balance-sheets.

## **Question 2: how do fiscal policies affect misallocation?**

Fiscal policies can have large impact on firms, in particular in the way they interact with firms' financial constraints. These policies have two components: taxes and subsidies. I study how both aspects can affect innovation and the investment of entrepreneurs.

In **Hombert and Matray (2018): "Can Innovation Help U.S. Manufacturing Firms Escape Import Competition from China?"** (*Journal of Finance*), we study how the return to innovation changes when import competition increases. We find that R&D-intensive firms are more resilient to trade shocks because R&D allows firms to increase product differentiation. For identification, we instrument past R&D by exploiting differences in R&D tax credits across states. In addition, our paper makes a methodological contribution to the literature studying how trade affects innovation. In general, this literature documents how firms endogenously adjust their R&D investment after an increase in import competition, which is interpreted as reflecting firms' expectations as to whether R&D is an effective shield against import competition.

We show this intuition to be incorrect, when we introduce the possibility that trade shocks affect financial constraints, and that such constraints enter in the R&D decision. This has two implications. First, our new framework offers a different lens through which to reconcile the existing results in the literature on the effect of import competition on innovation,<sup>3</sup> other than the classic "inverted-U shaped" of Aghion et al. (2005). Second, although the structural returns to innovation increases following a trade shock, firms might not be able to innovate more if for instance the trade shock simultaneously affects their financial constraints.

This has important implications for the possible misallocation of innovation, as it means that heightened credit constraints following a trade shock can reduce innovation for innovative but cash-strapped firms, even though returns to innovation increase. Ongoing projects with Johan Hombert and Chenzi Xu, explore which firms face the highest increase in credit constraints and if less innovative but large / cash-rich firms can keep innovating, while innovative but more financially constrained firms cannot.

In **Boissel and Matray (2021): "Higher Dividend Taxes, No Problem! Evidence from Taxing Entrepreneurs in France"** (conditionally accepted, *American Economic Review*), we show that an increase in dividend taxation for closely-held private firms results not only in an increase in investment, but also in a better allocation of investment across firms. Indeed, investment increases relatively more for firms with higher investment opportunities and higher ex-ante marginal returns to capital. Our paper uses administrative tax data covering the universe of firms in France and applies a difference-in-differences design to an unexpected three-fold increase in the French dividend tax rate that affected private firms with a specific legal status. Heterogeneity analyses show that firms with high demand and returns on capital responded most while no group of firms cut their investment. This implies a reduction in capital misallocation. Our results can be rationalized by models of intertemporal tax arbitrage, whereby

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3. See for instance the surveys of Shu and Steinwender (2019) or Melitz and Redding (2021).

entrepreneurs cut their dividends and increase their undistributed earnings, which relaxes their credit constraints and allow them to seize new investment opportunities.

In ongoing work exploiting US census data, I study further how dividend tax can affect the allocation of capital by exploiting the 2004 Bush dividend tax cut. In theory, dividends can have positive reallocation effects if the funds distributed are reallocated to firms with higher returns to capital. This can occur through two channels: shareholders reinvesting their dividends in other firms directly or via intermediaries (e.g., mutual funds), or depositing them into their saving accounts, which then increases banks' credit supply. By employing a "local lending market approach," I can identify locations dependent on capital income, that experience an increase in deposits following the increase in dividends paid due to the tax cut and see if the change in credit supply affects the allocation of capital across firms in these areas.

### **Question 3: should policies promote financial inclusion?**

My papers on the role of domestic banking markets show that the reallocation of credit across existing borrowers can have important effects for the misallocation of inputs across heterogeneous firms. Such credit reallocation of credit can happen following a change in the nature of relationships between banks and firms (Hombert and Matray, 2017), the existence of "quid pro quo" phenomena (Delatte, Matray, and Pinardon Touati, 2020), funding cost shocks (Duquerroy, Matray, and Saidi, 2021) or a heightened competition with foreign capital (Bau and Matray, 2020). These papers focus mostly on the intensive margin, i.e. for borrowers already having access to financial services. But the extensive margin might also be important both if low-income households can accumulate wealth, or if talented but poor individuals can become entrepreneurs and finance their business. These are among the rationales for financial inclusion.

In **Célerier and Matray (2019): "Bank-Branch Supply, Financial Inclusion, and Wealth Accumulation" (Review of Financial Studies)** we study how an increase in financial inclusion affects wealth accumulation of low-income households, and reduce inequality in wealth accumulation by disproportionately helping low-income households. Exploiting the U.S. interstate branching deregulation between 1994 and 2005, we find that an exogenous expansion of bank branches increases low-income household financial inclusion. We then show that financial inclusion fosters household wealth accumulation. Relative to their unbanked counterparts, banked households accumulate assets in interest-bearing accounts, invest more in durable assets such as vehicles, have better access to debt, and have a lower probability of facing financial strain. The results suggest that promoting financial inclusion for low-income populations can improve household wealth accumulation and financial security.

I also study the implication of fostering financial inclusion on firm dynamics and earnings' inequality in **"The Real Effects of Banking the Poor: Evidence from Brazil" (Fonseca and Matray, 2021, Working Paper)**. We study the program "A Bank for All" in Brazil, which led to the entry of government-owned banks in cities that were essentially living in financial autarky, with no or very limited bank presence, whether government-owned or private. Using administrative, matched employer-employee data covering the universe of workers in Brazil, we find that the expansion of access to banking services due to this program led to a large increase in firm dynamism, with the increase in new firms being accompanied by the increase in exit from low-productivity incumbents. This raised the demand for labor, and in particular skilled labor. As a result, while the average wage went up and every worker was better-off, inequalities substantially increased because wage growth at the top of the earning distribution was much faster than

at the bottom. This paper has implications for recent models of macro-finance development (e.g., Buera, Kaboski, and Shin, 2011, Ji, Teng, and Townsend, 2021), as we provide a series of well-identified moments and new stylized facts that can be used to develop more realistic structural models. By exploiting rich socio-demographics information on workers and entrepreneurs, the paper also allows us to study not only how financial inclusion affects the (mis)allocation of capital across existing firms, but also how it can affect the misallocation of talents across occupational choices (e.g., worker in the traditional sector, employee in the manufacturing sector, or entrepreneur).

## Other research

In **Matray (2021): “The Local Innovation Spillovers of Listed Firms”** (*Journal of Financial Economics*, *forthcoming*) I provide evidence of the existence of local innovation spillovers. First, I document that exogenous shocks to innovation by listed firms increase innovation by private firms in the same geographical area. I also find that such local innovation spillovers decline rapidly with distance. Second, I find that local innovation spillovers stem at least in part from knowledge diffusing locally through two channels: learning across local firms and inventors moving from their employer to both existing firms and newly started spin-outs.

In **Dessaint and Matray (2017): “Do Managers Overreact to Salient Risks? Evidence from Hurricane Strikes”** (*Journal of Financial Economics*), we show that managers, when assessing risks, display behaviors consistent with the “availability heuristic.” We find that the sudden shock to the perceived liquidity risk leads managers to increase corporate cash holdings and to express more concerns about hurricane risk in 10-Ks/10-Qs, even though the actual risk remains unchanged. Both effects are temporary. Over time, the perceived risk decreases, and the bias disappears. The distortion between perceived and actual risk is large, and the increase in cash is suboptimal.

## Ongoing research

I plan to keep working on these questions of misallocation using applied micro-econometric tools, in particular along three main questions: the effect of financial inclusion on low-income consumption, saving pattern and occupational choices, the effect of financial constraints on the (mis)allocation of trade and innovation, and the consequences of international capital on input allocation and household welfare.

Projects representative of my planned future work on international capital include one with Natalie Bau and Manisha Shah on the consequences of the liberalization of FDI in manufacturing and services for structural change and the income distribution, for which we received an NSF grant.<sup>4</sup> We are harmonizing large datasets in India and using a local labor market approach to study how FDI liberalization accelerated the process of structural transformation. Specifically, we will ask whether liberalization leads to a movement of employment from the agricultural sector to the manufacturing and service sectors, greater educational investment, and/or the entry of women into the labor force. We also intend to study the social and distributional consequences of foreign capital liberalization policies especially for vulnerable groups such as women, lower-caste individuals, and minorities. Do foreign capital liberalization policies lead to economic growth that improves outcomes for all vulnerable groups, or are there winners and losers from these policies? If these policies have important distributional consequences, does this lead to changes in political attitudes, populism, and/or discrimination against the vulnerable?

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Representative projects of my planned future work on the effect of financial inclusion on low-income consumption, savings, and occupational choices are projects with Julia Fonseca, where we got access to data from the largest mobile payment firm in Brazil. That firm created debit and saving cards specifically for low-income households and randomly allocated them among their existing clients. This setting will allow to understand the effect of improving access to financial products for low-income households on their consumption and saving behavior.

Representative projects of my planned future work on the effect of financial constraints on the (mis)-allocation of trade and innovation are a series of projects with Chenzi Xu using both modern US census data and historical trade data to study how financial shocks affect the extensive and intensive margins of trade. In particular, we want to study if transient financial shocks affect who export and import in the long-run, and whether such financial shocks can prevent productive but financial constraints firms to export, while less productive but not financially constraints firms can.

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