

Research Statement

Mario Rafael Silva

I am a macroeconomist who focuses on household and firm liquidity, endogenous variety, and search frictions in the markets for goods, labor, and credit. My work explores and quantifies the interaction between liquidity constraints, aggregate demand, and product creation.

The article “Liquidity, Unemployment, and the Stock Market”, co-authored with William Branch and currently in submission, focuses on the comovement between stock prices, unemployment, and interest rate spreads. Motivated by empirical evidence from [Hall \(2017\)](#) and [Farmer \(2012\)](#) about the negative relationship between the stock market and unemployment, we develop a liquidity channel through which stock market prices influence economic activity. The environment features a Mortensen-Pissarides economy in which households receive uninsurable idiosyncratic preference shocks, and, due to limited commitment, self-insure by accumulating shares of a mutual fund. The mutual fund consists of claims on firm profits and government bonds, providing a role for both private and public liquidity. Thus, these two assets play a role analogous to capital in [Aiyagari \(1994\)](#). The limited commitment friction is that consumers face uncertainty in their access to credit. This simple twist imparts a key role to the stock market in generating booms and busts. Higher stock market valuations relax consumers’ liquidity constraints, thereby creating an aggregate demand channel that strengthens firms’ hiring incentives. Job creation, likewise, enhances market capitalization and feeds back into consumer demand. Thus, a strong stock market does not just reflect but also promotes a robust labor market.

To develop more evidence on the comovement of these variables, we first regress stock market capitalization on real interest rates and vacancy creation costs. The regression is motivated by a generalized version of the free entry condition in labor search models. We find that a one standard deviation increase in the interest rate spread (≈ 30 basis points) is associated with a 3.09% reduction in the stock-market capitalization to GDP ratio and is statistically significant. Given the endogeneity of the interest rate, however, we also use a structural vector autoregression with sign and zero restrictions to identify a stock price shock. We find that the median stock price

jumps to 2%, and the median interest rate spread falls by 6 basis points. Unemployment declines and the 68% equal-tailed probability bands do not contain zero for over 3 years after the initial shock.

We calibrate the model to long-run properties of the United States economy and examine the responses of the stock market, unemployment, and interest rate spreads in two related exercises. First, we compute the impulse response to the MIT stock market capitalization shock. That is, beginning from steady state, the stock market is subject to a one-time shock from which we compute the perfect foresight path back to the unique steady state. In line with the structural VAR evidence, we perturb the stock market by a 2% per annum shock. Unemployment and the interest rate spread decline and converge to the steady state slowly. Replacing rational expectations with adaptive learning generates a hump-shaped response in the stock market and interest rate spread and raises the series' persistence.

Second, we examine the effects of an expectations shock in a counterfactual in which aggregate demand effects are strong and there is multiplicity of equilibria. In particular, expenditure risk is high, firms have little revenue in the absence of expenditure shocks, and public liquidity is low. In this scenario, there are three steady states, with the high and low ones being determinate. The expectations shock produces an immediate and large decrease in the stock market, slightly overshooting the intermediate steady state. The interest-rate spread increases, more than doubling its original value. The combination of lower firm values and a higher real interest rate generate a substantially higher unemployment rate that peaks at 11%. The dependence on private liquidity thus makes the economy susceptible to self-fulfilling crashes.

William Branch and I have recently started a follow-up paper in which households can augment their portfolio by holding money, and we aim to assess the relevance of inflation for the Phillips curve. The mechanism we wish to explore is that inflation reduces liquidity in money holdings by lowering its rate of return but also triggers Tobin-like substitution into other assets (i.e. stock).

In 'Corporate Finance, Monetary Policy, and Aggregate Demand', published at the Journal of Economic Dynamics and Control, I study how heterogeneity of financial frictions and monopolistic competition influence the pass through of the nominal interest rate to the real lending rate, its transmission into investment, and its effect on corporate cash holdings. Firms finance stochastic investment opportunity using bank-issued credit or money. Underlying the paper is strong empir-

ical evidence that the effects of monetary policy differ markedly by industries and are influenced by financial constraints of firms. I explore heterogeneity in the pledgeability of assets, following the theory of [Kiyotaki and Moore \(1997\)](#) and empirical studies of [Berger et al. \(1996\)](#) and [Almeida and Campello \(2007\)](#). Heterogeneous financial frictions are particularly important in the presence of demand linkages from monopolistic competition, in which firms' desired investment depends on output overall. The model implies that financially constrained firms hold more cash and that, for financiall constrained firms, cash holdings rise with competition. I verify both implications on Compustat data from 1964-2017, where I measure competition in one of two ways. The first uses the sales-to-cost margin; the second estimates it using the production approach, following [De Loecker and Eeckhout \(2017\)](#). I also find that financial constraints raise firms' sensitivity to monetary policy, that the aggregate demand externality from monopolistic competition raises transmission and interacts with financial frictions, and that a mean-preserving spread of financial frictions reduces investment and output, strengthens transmission, and reduces the external share of finance.

I recently submitted a paper titled "Consumption variety from shopping time and net product creation in an estimated model". It studies the relative contribution of shopping time and product development to consumption diversity, and examines how they affect the business cycle. The article is motivated by the fact that though the search literature has emphasized goods market frictions from its inception (i.e., [Diamond \(1982\)](#)), and a more recent literature examines the dynamics of sluggish firm entry over the business cycle (i.e., [Bilbiie et al. \(2012\)](#)), these insights have not been integrated. Both margins affect households' consumption variety and give rise to additional intratemporal and intertemporal effects. Frictional firm entry provides a propagation mechanism for shocks separate from capital accumulation; it captures the property that, under positive productivity or demand shocks, incumbents generate higher sales and profits initially but gradually lose market share to entrants. Shopping time, in turn, raises consumers' willingness to pay, the demand for labor, and firm value.

Accordingly, I estimate a multisector model in which product diversity arises from both entry and shopping time alongside alternatives in which either component is absent. Aside from fitting the data well, the model generates mildly procyclical firm entry and shopping time, a positive response of firm entry to demand shocks, and more volatile consumption diversity than the alter-

natives. For each model, intratemporal preference shocks explain nearly 40% of the variation in consumption and 55% of the variation in labor. Technology shocks explain most of output, and innovations to the discount rate account for at least two thirds of investment. Shocks to entry costs explain nearly all consumption diversity under entry, but preference shocks are the most important source in the absence of entry.

There are a number of papers which exploit shopping time (or search effort) in the goods market to explain productivity (Bai et al. (2012), Huo and Ríos-Rull (2016)), labor market persistence (Petrosky-Nadeau and Wasmer (2015)), and other phenomena. The results of this article lead me to strongly recommend the inclusion of both shopping time and frictional firm entry in such applications. A reasonable follow-up is to incorporate endogenous utilization as in Huo and Ríos-Rull (2016) and estimate the model with the Solow residual alongside the series used in this paper.

In “Unsecured Credit, Product Variety, and Unemployment Dynamics,” published at Macroeconomic Dynamics, I develop a theory of feedback between revolving credit and product development and examine its ability to explain labor market volatility. I document how revolving credit is the primary determinant of short-run household liquidity, credit limits vary substantially over the cycle, and credit comoves positively with product variety and negatively with unemployment. I thereby extend the Mortensen-Pissarides model with an endogenous borrowing constraint and free entry of monopolistically competitive firms. Higher debt limits encourage firm entry and raise product variety (the entry channel), and greater variety renders default more costly and thereby raises the equilibrium debt level (the consumption value channel). The model explains the stylized facts in the data and can reasonably fit historical time series on unemployment, vacancies, and revolving credit under both financial shocks and productivity shocks. In particular, it reproduces the rise in unemployment during the Great Recession. The fit is noticeably worse, however, under productivity shocks alone, showcasing the importance of disturbances originating in financial markets.

I limit discussion of research due to succinctness. However, I welcome you to visit mariorafaelsilva.com for information on other papers.

References

- Aiyagari, S. R., 1994. Uninsured idiosyncratic risk and aggregate saving. *The Quarterly Journal of Economics* 109 (3), 659–684.
- Almeida, H., Campello, M., 2007. Financial constraints, asset tangibility, and corporate investment. *The Review of Financial Studies* 20 (5), 1429–1460.
- Bai, Y., Rios-Rull, J.-V., Storesletten, K., 2012. Demand shocks as productivity shocks. Federal Reserve Board of Minneapolis.
- Berger, P. G., Ofek, E., Swary, I., 1996. Investor valuation of the abandonment option. *Journal of financial economics* 42 (2), 259–287.
- Bilbiie, F. O., Ghironi, F., Melitz, M. J., Apr. 2012. Endogenous Entry, Product Variety, and Business Cycles. *Journal of Political Economy* 120 (2), 304–345.
- De Loecker, J., Eeckhout, J., 2017. The rise of market power and the macroeconomic implications.
- Diamond, P. A., 1982. Aggregate demand management in search equilibrium. *The Journal of Political Economy*, 881–894.
- Farmer, R. E., 2012. Confidence, crashes and animal spirits. *The Economic Journal* 122 (559), 155–172.
- Hall, R. E., 2017. High discounts and high unemployment. *American Economic Review* 107 (2), 305–330.
- Huo, Z., Ríos-Rull, J.-V., 2016. Financial frictions, asset prices, and the great recession. CEPR Discussion Paper No. DP11544.
- Kiyotaki, N., Moore, J., 1997. Credit cycles. *Journal of political economy* 105 (2), 211–248.
- Petrosky-Nadeau, N., Wasmer, E., 2015. Macroeconomic dynamics in a model of goods, labor, and credit market frictions. *Journal of Monetary Economics* 72, 97–113.