

Research Statement - Isaac Baley

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Economies are exposed to technology, monetary, and many other aggregate shocks that give rise to fluctuations in activity. Micro-level frictions, such as imperfect information, costly adjustment, or search costs, dramatically affect how aggregate shocks are propagated across the economy relative to a frictionless environment. My research agenda aims at understanding and quantifying the mechanisms through which micro-level frictions operate, their interplay with heterogeneity, and their macroeconomic implications. My ultimate goal is to inform the design of policies aimed at stabilizing the business cycle and promoting growth.

My work can be broadly categorized into three main areas: (i) Macroeconomic Implications of Micro-Level Uncertainty; (ii) Firm Heterogeneity, Investment Frictions, and Aggregate Fluctuations; and (iii) Skill Obsolescence, Government Policy, and Inequality. Common across these areas is my research approach, built around developing structural frameworks that are tractable yet realistic, which allows me to characterize analytically the effect of frictions on aggregate outcomes, capture the heterogeneity in the microdata, and perform meaningful counterfactual experiments.

I. Macroeconomic Implications of Micro-Level Uncertainty

Economic agents make choices based on the information they have at hand; and most of the time, this information is not perfect. With imperfect information, agents may be uncertain about the environment or the impact of their choices, and generally, use past behavior and noisy observations to learn about reality and improve decision making. My first line of research has three objectives: understanding how agents behave in environments with information frictions, disciplining information sets with microdata, and examining the macroeconomic implications. My work in this area explores: (i) how uncertainty about firms' productivity shapes pricing decisions and the effectiveness of monetary policy; (ii) how terms-of-trade uncertainty affects exporting decisions and international trade; and (ii) how uncertainty about workers' ability determines their occupational choice and business cycle fluctuations.

In my job market paper, “[1] *Firm Uncertainty Cycles and the Propagation of Nominal Shocks*” (*American Economic Journal: Macroeconomics*, 2019), we study how firms' imperfect information about their own productivity affects price-setting and the transmission of monetary policy. Consistent with empirical observations, firm productivity is subject to fat-tail risk—it receives occasional large shocks. Learning about fat-tailed shocks generates uncertainty cycles, fluctuating between periods of high and low uncertainty. When firms face menu costs, that is, a fixed cost for changing prices, then uncertainty cycles translate into a heterogeneous frequency of price change across firms.

Our key finding is that uncertainty cycles amplify the real effects of monetary shocks, which explains why monetary shocks have persistent real output effects even with a high micro-frequency of price adjustment. Our learning model also rationalizes puzzling regularities in the pricing microdata, such as a decreasing hazard rate of price adjustment, and suggests that monetary policy is less effective in highly uncertain times, a fact that has been widely corroborated in empirical studies.

Besides shaping price-setting, uncertainty is a key determinant of production decisions. In particular, when firms engage in international trade, uncertainty about the returns to exporting influences export choices and alters the risk-sharing mechanisms embedded in the terms of trade. In “[2] *Can Global Uncertainty Promote International Trade?*” (*Journal of International Economics*, 2020) we challenge the common wisdom dictating that uncertainty impedes international trade. We show that terms of trade uncertainty—arising from imperfect information about foreign endowments or preference shocks—can fuel more trade in a simple general equilibrium trade model.

Higher uncertainty increases both the mean and the variance in returns to exporting, implying that trade can increase or decrease with uncertainty depending on preferences. In the commonly used case of constant elasticity of substitution between domestic and foreign goods, these comparative statics are a simple function of the trade elasticity. In particular, when domestic and foreign goods are highly complementary, the rise in the expected terms of trade more than offsets the increase in risk, and firms choose to export more when information is less precise. In other words, uncertainty facilitates trade. Trade creates value, in part, by offering a mechanism to share risk, and risk sharing is most effective when both parties are uninformed.

The previous papers study the consequences of uncertainty surrounding firms. In “[3] *Mismatch Cycles*” (*Journal of Political Economy*, *Forthcoming*), we expand the analysis and consider imperfect information about workers’ abilities. We build a tractable directed search model, in which workers differ in skills along multiple dimensions and sort into jobs with heterogeneous skill requirements along those dimensions. Skill mismatch—the misalignment between workers’ abilities and the requirements of their occupations—arises endogenously due to information and labor market frictions. We estimate the framework for the US economy using a combination of worker-level data and occupation-level descriptors of job requirements, and propose a novel skill-based strategy to identify career switches.

The model replicates salient business cycle properties of mismatch. In recessions, underqualified workers are fired; this *cleansing effect* reduces mismatch among ongoing work relations, raising the average labor productivity of continuously employed workers. Yet, mismatch among new hires goes up in recessions; this *sullyng effect* reduces the labor productivity of new hires. Combined, total mismatch is mildly procyclical whereas occupational switching is countercyclical. Our model provides novel narratives for the “scarring” (or long-term) effects of unemployment on earnings, which is particularly large among occupational switchers, consistent with empirical observations.

Throughout this agenda, we make various methodological contributions. For instance, we show how to discipline agents’ learning speeds using hazard rates, and extend the Kalman filter—an algorithm that produces estimates of unknown variables using noisy measurements—to incorporate fat-tail risk. To make these technical contributions more accessible, we wrote “[4] *Bayesian Learning*” (*Handbook of Economic Expectations*, *Forthcoming*), which presents the key techniques used to study Bayesian belief formation and reviews its major applications in macroeconomics. We discuss passive learning in signal extraction problems and coordination games with strategic motives; we also discuss active information acquisition and the most commonly used learning technologies, including inattentiveness and rational inattention. Finally, we survey the growing literature on the data economy, in which economic activity generates data and the information in the data feeds back to affect economic activity.

II. Firm Heterogeneity, Investment Frictions, and Aggregate Fluctuations

Investing in physical capital is far from frictionless. Building capital stock and setting it up for productive purposes entails adjustment costs that reflect a variety of frictions involved in the investment process, such as searching for suppliers, disrupting production, restructuring plants, and retraining workers. These adjustment costs make firm-level investment *lumpy*, that is, it remains unchanged for several periods and then it is adjusted by a large amount. My second agenda asks: How does an economy respond to aggregate shocks when firms make lumpy investments? Do the nature of investment frictions matter in the aggregate? How should we use microdata to discipline investment models?

The first paper within this agenda, *“Aggregate Dynamics for Lumpy Economies” (Econometrica, 2021)*, develops a “sufficient statistics” approach to quantitatively assess the role of adjustment costs and firm heterogeneity in the propagation of aggregate productivity shocks on aggregate investment. We demonstrate that capital’s transitional dynamics are structurally linked to two cross-sectional moments: the dispersion of capital to productivity ratios—an indicator of capital misallocation—and the covariance of capital to productivity ratios with the time elapsed since their last adjustment—an indicator of asymmetric costs of upsizing and downsizing the capital stock. These statistics capture the economic forces that shape aggregate dynamics, serve as model discrimination devices, and provide researchers with a unique set of moments to be targeted. We use Chilean investment microdata to compute these two statistics; their values indicate very persistent effects of aggregate productivity shocks and favor models with a strong downsizing rigidity and random opportunities for free adjustments.

Besides adjustment costs, the literature has documented a significant wedge between the buying and selling prices in the market for physical capital. This wedge renders investment partially irreversible and generates a strong downsizing rigidity, as suggested by our measurement of sufficient statistics. In *“The Macroeconomics of Partial Irreversibility” (UPF Working Paper, 2022)*, we investigate the macroeconomic effects of such a wedge. On the theory front, we characterize the effects of irreversibility on aggregate productivity, firm valuation, and business cycle dynamics; moreover, we show that these three outcomes are interrelated, which establishes a bridge across fields studying capital with different objectives, namely, development, finance, and macro. On the empirical front, we measure the effects of irreversibility with investment microdata and show that ignoring price wedges results in overestimating the value of capital and underestimating the persistence of aggregate fluctuations. Lastly, on the policy front, we discover that corporate income tax cuts, by lowering the deductibility of capital losses, effectively increase the price wedge and structurally change long-run capital behavior.

Future Work. I plan to further pursue this agenda during the next 5 years in my ERC project, *“Macroeconomic Effects of Corporate Tax Reforms”*, which has the objective of understanding the macroeconomic effects of corporate tax reforms through their effects on private investment. I expect to contribute to developing new structural frameworks to assess the long-run consequences of corporate tax reforms in environments with rich firm heterogeneity, empirically relevant investment frictions, and general equilibrium effects; providing systematic evidence on the impact of tax reforms using a combination of theory and cross-country firm-level investment data; and evaluating different corporate tax reforms with a long-run macro perspective that considers the interaction with monetary policy.

III. Skill Obsolescence, Government Policy, and Inequality

The rise of new technologies, industries, and occupations experienced in recent decades has created a more uncertain environment for workers. In particular, returns to human capital investment accrued through education, on-the-job training, and work experience are larger but also riskier, as workers are more likely to lose their investments due to the obsolescence intrinsic to a fast-changing economy. My third line of research studies the macroeconomic and distributional implications of *turbulence risk*—the hazards of uninsurable and persistent human capital loss that coincide with job destructions and quits.

In “*Returns to Labor Mobility: Layoff Costs and Quit Turbulence*” (*R&R at The Economic Journal, 2021*), we formalize the mechanisms through which the interplay of human capital dynamics, labor market frictions, and welfare-state institutions shape private and social returns to labor mobility and, in turn, how returns to labor mobility determine macroeconomic outcomes. We identify opposing effects of turbulence risk on returns to mobility in generous welfare states. On the one hand, workers whose skills have become obsolete are reluctant to leave unemployment due to high unemployment benefits linked to past earnings; on the other hand, employed workers are reluctant to quit and search for better jobs to avoid losing their skills. Our analysis shows that, under calibrations consistent with the observation that high layoff costs do not completely shut down labor reallocation in welfare states, the first force dominates and a robust positive turbulence-unemployment arises. More generally, by focusing on returns to labor mobility, we shed new light on calibrations of influential macro-labor studies and argue for the use of cross-phenomenon restrictions to discipline the parameterization of productivity processes.

Naturally, workers have available several mechanisms that can be exploited to cope with turbulence risk and smooth their consumption. In ongoing work, “*Self-Insurance and Welfare in Turbulent Labor Markets*” (*UPF Working Paper, 2022*), we examine two major insurance mechanisms. The first mechanism consists of *precautionary savings*, which arise when workers accumulate assets for self-insurance in an incomplete markets setting. The second mechanism consists of *precautionary search*, which refers to workers’ ability to direct their job search toward jobs that trade off lower wages with a higher job finding probabilities or vice versa.

On the empirical front, we contribute by documenting new facts on the short-term and long-term effects of skill obsolescence and wealth accumulation on unemployment duration and reemployment earnings. On the quantitative front, we use our calibrated model to assess the welfare consequences of turbulence risk. We uncover a previously ignored channel of the welfare effects of skill obsolescence, both in the aggregate and in the cross-section: The welfare effects arising from earnings losses upon reemployment are substantially smaller than the welfare effects arising from wealth depletion during periods of unemployment. Finally, on the policy front, we study the effects on aggregate output and inequality of various welfare-state policies such as unemployment benefits, income maintenance programs, and training subsidies.

Summary of Research Projects

Peer-reviewed publications

1. *Firm Uncertainty Cycles and the Propagation of Nominal Shocks* with A. Blanco. **American Economic Journal: Macroeconomics**, 11 (1), 276-337, January 2019.
2. *Can Global Uncertainty Promote International Trade?* with L. Veldkamp and M. Waugh. **Journal of International Economics**, Vol. 126, September 2020.
3. *Mismatch Cycles* with A. Figueiredo and R. Ulbricht. **Journal of Political Economy**, Forthcoming.
4. *Bayesian Learning* with L. Veldkamp. **Handbook of Economic Expectations**, Forthcoming.
5. *Aggregate Dynamics in Lumpy Economies* with A. Blanco. **Econometrica**, Vol. 89 (3), 1235–1264, May 2021.

Working papers

6. *The Macroeconomic of Partial Irreversibility* with A. Blanco. **UPF Working Paper**, 2022.
7. *Returns to Labor Mobility: Quit Turbulence and Layoff Costs*, with L. Ljungqvist and T. Sargent. **UPF Working Paper**, 2nd R&R at **The Economic Journal**, 2022.
8. *Self-Insurance and Welfare in Turbulent Labor Markets*, with A. Figueiredo, C. Mantovani, A. Sepahsalari. **UPF Working Paper**, 2022.