

RESEARCH STATEMENT

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I am an economist with research interests in macroeconomics, money and banking, and macro-finance. I summarize my ongoing work and future plan below.

Ongoing Work

In my ongoing work, I have examined the implications of market concentration on business cycles with financial frictions and explored how concentration distorts the optimal subsidization policy. I have investigated the fiscal paradoxes in liquidity trap with non-linear analysis. I have also analyzed the welfare effect of bailout policies.

With the increasing trend in market concentration in the United States, many have explored the implications of the concentration on economic dynamics. Yet, the research studying the relation between market concentration and business cycles is largely missing. My job market paper, "**Market Concentration and Business Cycles**", proposes a model featuring the strategic competition between a forward-looking large firm and a continuum of heterogeneous small firms that are financially constrained. The elasticity of demand and, therefore, the markup of the large firm is endogenously determined by the strategic competition along with business cycles. I find that the effect of the strategic competition is non-monotonic. It is conditional on how the shock alters the market power of large firms and how their markup responds to the shock. I show that although the endogenous markup mitigates shocks on large firms, it significantly amplifies shocks that are biased to small firms, such as credit crunches. Furthermore, the endogenous markup has opposite effects on the accumulated decline of output and the speed of convergence. For the homogeneous technology shocks, due to financial frictions, small firms are more cyclically sensitive. Consequently, large firms increase markup along with transition dynamics which amplifies the decline in output, yet accelerates the recovery by promoting the wealth accumulation of small firms. I use Compustat data to examine the main predictions of the model. The relations between the change of large firms' market share, the aggregate sales in a sector, and the small firms' equity and income growth in the future are consistent with the implications of the strategic competition.

What are the consequences of shocks driving the economy to a liquidity trap? In the paper "**Fiscal Paradoxes in a Liquidity Trap**", joint with Francisco Buera, we analyze the fiscal consequences to implement a Taylor rule at a liquidity trap. Recent literature stresses the paradoxical economics operating at the liquidity trap, e.g., fiscal multipliers are greater than one, price flexibility tends to exacerbate the effect of shocks. Notwithstanding the rich interactions between fiscal and monetary policy in a liquidity trap, the fiscal implications of implementing a Taylor rule have been mostly ignored. We analyze the fiscal consequences to implement a Taylor rule at a liquidity trap. We provide a non-linear analysis of the dynamics of a RANK model featuring sticky prices, a cash-credit monetary environment, and a standard Taylor rule. We show that for a sufficiently large, but finite shock, or when prices are sufficiently flexible, the equilibrium with stable long-run prices fails to exist. Related, in any of these two finite limit cases, the fiscal cost of implementing the Taylor rule becomes arbitrarily large as the economy approaches these

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limits. As a response to the shock that drives the economy to a liquidity trap, the Taylor rule calls for a monetary expansion in the period of the shock, and a monetary contraction in the following period. As the shock to the discount rate approaches the aforementioned limit, the future policy response induces an arbitrarily large deflation which requires an equally large monetary contractions in the second period. The equilibrium fails to exist when the government needs to impose arbitrarily large lump sum taxes on the representative agent. Alternatively, we propose a simple modification to the Taylor rule consisting of adding a limit to the fiscal costs of implementing the rule. With the alternative rule, a unique stable equilibrium exists for any size of shock and degree of price stickiness. Moreover, with the alternative rule, the model features a small fiscal multiplier, non-paradoxical comparative statics with respect to price flexibility, and a milder contraction.

In the aftermath of the Great Recession, many have debated over the optimal stabilization policy to rehabilitate the financial sector and to restore the borrowing capacity of the economy. However, few have investigated the way in which market concentration distorts the optimal subsidization policy with financial frictions. One of the sections in my job market paper, **"Market Concentration and Business Cycles"** fills the gap by providing a welfare analysis of the ex-post interest rate cut. I find that the uniform interest rate subsidization has heterogeneous effects on small and large firms. Because large firms are less constrained, their marginal cost is more elastic to factor prices. Consequently, the uniform subsidy by its nature benefits large firms and increases their market power, which amplifies the welfare cost of implementing the subsidy by suppressing the equilibrium wage. Alternatively, I investigate the implications of the subsidy biased to constrained entrepreneurs. Although the strategic behaviors of large firms dilute the effect of policy intervention, the economy makes a speedy recovery while bearing lower welfare costs.

Moving away from the policy implications of concentration, my project **"Bailout Policy with Heterogeneous Agent Model: Is Bailout Still Efficient?"** investigates the effect of a bailout policy by focusing on the relation between the ex-ante distortion on investment decisions and the ex-post restoration of the credit market. The bailout policy is characterized as a subsidy on labor supply during the period of credit crunches. The policy can be interpreted as an expected transfer from households to entrepreneurs when they are undercapitalized. The paper shows that the broad-based bailout policy increases the wealth of entrepreneurs throughout the whole dynamic. Hence, it raises the aggregate productivity both during and after a credit crunch. Yet, the welfare loss of households cannot be compensated by the increased wage in the time of prosperity. The welfare cost of the households is a convex function with subsidy rates. Consequently, the optimal rate of subsidy is decreasing with the persistence of the credit crunch.

Future Plan

I have a very active working agenda on various topics in the future: (1) the effect of market concentration on financial fragility; (2) the effect of business cycles on the evolution of market structures; (3) the optimal development policies in international trade.

The first potential project is about financial fragility. After the financial crisis of 2008, there are some studies revealing that in the financial sector, the feedback loop of fire sale amplifies the crisis. An initial shock is amplified if financial intermediaries are forced to fire-sell their capital. Since fire-sales depress the price of capital, the net worth of financial intermediaries suffers even further. I want to

link the financial fragility to market concentration. Note that the banking sector is highly concentrated. Internalizing the effect of shorting securities on prices, financial intermediaries are less motivated to sell capitals during crisis. Subsequently, the feedback loop is dampened ex-post. Yet, anticipating the mitigated shock, financial intermediaries might raise leverage ratios which increases the risk ex-ante. Therefore, I would like to investigate how financial fragility is affected if the financial intermediaries have market power.

The second project is an extension of my job market paper. In my job market paper, given a specific market structure, I study how market concentration affects business cycles. We have shown that firms are heterogeneously exposed to aggregate shocks. For example, during the COVID-19 crisis, we have seen the coexistence of the massive bankruptcies of small firms and the increased shares of large firms like Amazon or Walmart. Considering the fact that small firms are more cyclically sensitive to large firms, I would like to investigate the effects of business cycles on merger and acquisitions and, subsequently, the market structure. Further, I intend to analyze the welfare implications of the mergers and acquisitions along with business cycles.

The third project is about economic development. I notice that countries are heterogeneous in trade policies conditional on stages of national development. In particular, underdeveloped countries are inclined to protectionism. Many underdeveloped countries impose aggressive tariff imports while subsidizing exports. Therefore, the project aims to explore if there exists a role for the governments in underdeveloped countries to accelerate economic development by intervening in international trade markets, and to explore what is the optimal intervention policy in global trade conditional on the stage of development.