Research Statement

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The bulk of my past and current research focuses on how market frictions, especially credit market frictions, can help us understand economic fluctuations. My research shows that credit market imperfections can lead to strong propagation mechanisms for real shocks, and that credit market imperfections can themselves be a source of business cycles. In addition, I have also tried to understand other aspects of business cycles, such as inflation dynamics and inventory fluctuations. A common theme of my research is to develop economic theory (models) to understand macroeconomic data.

The rest of my statement is divided into three sections. Section 1 reviews my work on credit market frictions. Section 2 summarizes my work on nominal rigidities and inventory behaviors. Section 3 outlines my plan for research in the near future.

1. Financial Frictions and Business Cycles

According to the real business cycle (RBC) theory, economic fluctuations are caused primarily by exogenous shocks. The pioneering studies of Kydland and Prescott (1982) and Long and Plosser (1983) show that one can build a successful business cycle model involving perfect markets without monetary factors and rationales for policy intervention. Building on the dynamic stochastic general equilibrium framework of the RBC theory, the New Keynesian approach incorporates nominal rigidities and monetary policies. However, in both frameworks the Modigliani and Miller Theorem (1958) applies: Financial structure is both irrelevant and indeterminate; hence, conditions in the financial markets do not affect real economy.

On the other hand, there is a long alternative paradigm in macroeconomics that emphasizes the central role of financial frictions in the propagation of business cycles, dating back at least to Fisher and Keynes. The seminar works by Bernmark, Gertler and Gilchrist (1998) and Koyataki and Moore (1997) illustrate the promise of this approach, suggesting that financial frictions in principle can translate small shocks to large and persistent economic fluctuations. However, some fundamental

challenges remain for this financial approach of the business cycle, as pointed out by Kocherlakota (2000):

[T]he degree of amplification provided by credit constraints seems to depend crucially on the parameters of the economy. This sets up a clear challenge for future work: to demonstrate, in a carefully calibrated model environment, that the amplification and propagation possible by credit constraints are quantitatively significant.

I tackled this challenge from several angles using modern economic theory. One of my major contributions in this regard is to study financial frictions in models with heterogeneous firms. Despite the potential technical difficulty in aggregating firm heterogeneity, I have developed tractable models to make the economic mechanism as transparent as possible. It turns out that the interplay of firm heterogeneity and financial frictions can generate many useful new economic insights. To be more specific, in a series of papers I showed that (i) financial constraints are quantitatively important in propagating business cycles; (ii) financial constraints can generate asset-price bubbles, which can themselves generate economic fluctuations; and (iii) financial constraints may generate indeterminacy in carefully calibrated models.

A. Financial Frictions in Quantitative Macroeconomic Models

My major contribution to this line of research includes Liu, Wang, and Zha (Econometrica, Second Revision), Wang and Wen (RED, 2012), Wang and Wen (2009, working paper), Miao and Wang (2010, working paper), Wang, Xu and Xu (2012, working paper) and Wang, Wen and Xu (2012, working paper). In these papers, I show that financial frictions are important transmission mechanisms for understanding housing prices, investment dynamics, aggregate and firm-level volatility, saving rates and capital flows.

The recent turmoil in the U.S. housing market and the subsequent deep recession have generated a growing interest in the effects of the collapse in housing prices on the current recession. Although economic discussions frequently proceed as though housing prices were important in influencing the macro economy, studies have been scant on the linkage of housing price dynamics and macroeconomic fluctuations in the context of an explicit quantitative theoretical model. In " **Land-Price Dynamics And Macroeconomic Fluctuations** ", (***Econometrica***, Second Revision), Zheng Liu, Tao Zha and I extended Kioytaki and Moore by incorporating two key features into a DSGE model: we identified a financial shock

that drives most of the fluctuations in land prices and introduced land as an important collateral asset in firms' credit constraints. We then confronted our model with the data and demonstrated that the propagation mechanism implied by the model is not simply theoretically necessary but empirically relevant to explaining how land-price dynamics influence macroeconomic fluctuations. This paper was cited by Robert Hall in the 2010 Number 1 issue of the NBER Reporter. It was also considered by the Economist as *This week's interesting economics research* on November 2, 2011.

One interesting finding in the paper is that the estimated capital/investment adjustment costs are very small but the model can explain sluggish aggregate investment if firms are assumed to be credit-constrained. It is also widely known that firm-level investment is lumpy and volatile, which seems to contradict the prediction of capital/investment adjustment costs. The difference in investment dynamics at the firm and aggregate levels motivated me to think deeper about capital/investment adjustment costs widely used in the macroeconomic models.

In " **Hayashi Meets Kiyotaki and Moore: A Theory of Capital Adjustment Costs**", ***(Review of Economic Dynamics)***, Yi Wen and I showed that financial frictions in the form of collateralized borrowing at the firm level (Kiyotaki and Moore, 1997) can give rise to convex adjustment costs at the aggregate level, yet at the same time generate lumpiness in plant-level investment. Our model explains the sluggishness in aggregate investment and lumpiness in firm-level investment at the same time.

In "**Financial Development and Economic Volatility: A Unified Explanation**", (**working paper**), Yi Wen and I further illustrated that financial frictions are powerful transmission mechanisms for both aggregate and firm-level fluctuations. We were motivated by empirical studies that have shown that firm-level volatility (for publicly traded firms) has been increasing but the aggregate volatility has been decreasing in the United States for the postwar period. In our model, firms are subject to idiosyncratic investment opportunity shocks and borrowing constraints. With reduced borrowing constraints, investment at the firm level may become more responsive to idiosyncratic shocks to investment opportunities, which raises firm-level volatility. On the other hand, better access to external financing suggests that aggregate productivity shocks, which affect firms' profits, will have less direct impact on capital investment because firms are less dependent on internal cash flows for financing. Consistent with empirical evidence, our model also predicts that countries with better financial development has smaller aggregate volatility.

In " **Financial Development and Aggregate Saving Rates: A Hump-Shaped Relationship** ", (**working paper**), Lifang Xu (one of my PhD students), Zhiwei Xu (one of my PhD students), and I examined the relationship between financial development and the national savings rate. We first examined the relationship between financial development and saving rates empirically. And we then construct an incomplete-market model featuring both heterogeneous households and heterogeneous firms to explain this hump-shaped relationship. The key insight of the model is that financial development tends to reduce the precautionary-saving incentives of households but increase firms' ability to borrow and invest. As a result, the aggregate savings rate may rise initially with financial development because of greater investment by firms, but then it declines with further financial development because of substantially reduced precautionary savings by households. Our model also suggests taxing capital may not be a good idea for financially underdeveloped countries.

In a related paper, "**Two-Way Capital Flows and Global Imbalances ",** Zhiwei Xu, Yi Wen and I studied the impact of financial frictions on capital flows. We wanted to explain why financial capital and fixed capital tend to flow in the opposite directions between poor and rich countries. For this purpose, we constructed a tractable, incomplete-market neoclassical model to explain the pattern of two-way capital flows between emerging economies (such as China) and the developed world (such as the U.S.). We showed how underdeveloped credit markets in China can lead to abnormally high rates of returns to fixed capital but excessively low rates of returns to financial capital, hence driving out household savings (financial capital) on the one hand while simultaneously attracting foreign direct investment (fixed capital) on the other hand.

All the papers described so far focus on risk-free debts. Default never occurs in equilibrium in these models. So by design, these models cannot help us to understand credit spread and how credit risk affects business cycles. In "**Credit Risk and Business Cycles"**, (working paper), Jianjun Miao and I attempted to develop a model that explicitly incorporates credit markets for long-term corporate bonds to study the impact of credit risk on economic fluctuations. As far as we know, we are among the first in the literature to incorporate credit risk into a full-blown DSGE model. We showed that credit risk amplifies aggregate technology shocks. The debt-capital ratio is a new state variable and its endogenous movements provide a strong propagation mechanism. Our model with credit risk delivers a number of interesting results that are in line with the empirical evidence. First, the model can match the persistence and volatility of output growth as well as the mean equity premium and the mean risk-free rate as in the data. Second, the

model implied credit spreads are countercyclical and can forecast future economic activities because they affect firm investment through Tobin's Q. Finally, credit spreads forecast future stock returns through changes in the market price of risk. We then showed that financial shocks to the credit markets are transmitted to the real economy through Tobin's Q. One advantage of our model is its tractability, making it be a very useful tool for future empirical work.

B. Financial Frictions and Asset Bubbles in Infinite Horizon Models

I will now try to summarize my work on asset bubbles. To me, the recent financial crisis caused by the burst of the U.S. housing bubble is not new. History has witnessed the rise and collapse of many nationwide asset bubbles. Each time, an entire economy cheered a bubble's birth and then mourned its death. So understanding asset bubbles and their roles in propagation of business cycles becomes a fascinating research topic to me very naturally. Although the idea that asset bubbles can generate excessive volatility is appealing, it is not easy to articulate it in a fully-blown DSGE model. One important reason is that characterizing the conditions for a bubble to form in an infinite horizon model is difficult. As a result, most rational bubbles are studied in very stylized overlapping generation models, which were designed for qualitative purposes. In contrast, I have written a series of papers on asset bubbles in infinite horizon models and have attempted to study their business cycle implications.

In " **Speculative Bubbles and Financial Crisis** ", (***American Economic Journal: Macroeconomics***), Yi Wen and I incorporated asset bubble in standard macroeconomic models in a relatively straightforward yet rigorous way. In our model, the heterogeneous firms hold bubbles to self-insure against idiosyncratic investment opportunity risks. We characterized conditions under which storable goods, regardless of their intrinsic values, can carry bubbles and agents are willing to invest in such bubbles despite their positive probability of bursting. We showed that systemic risk due to perceived changes in the bubbles probability to burst can generate boom-bust cycles with hump-shaped output dynamics, and produce asset price movements that are many times more volatile than the economy's fundamentals, as in the data. To my best knowledge, this is the first paper that quantitatively studies the business cycle moments of asset price bubbles.

While bubbles on intrinsic worthless assets or storable goods are theoretically interesting, bubbles on stock prices are far more relevant for business cycle fluctuations. In "**Bubbles and Credit Constraints**", (***Econometrica*** , Miao and Wang 2011, Invited for Revision), Jianjun Miao and I provided a theory of credit-

driven stock market bubbles. In our model firms meet stochastic investment opportunities and face credit constraints. Capital is not only an input for production, but also serves as collateral. We showed that bubbles on this reproducible asset may arise, relaxing collateral constraints and improve investment efficiency. The collapse of bubbles leads to a recession and a stock market crash. Our theory is consistent with the observation that stock market booms are often accompanied by credit booms. This suggests that one possible cause of stock market bubbles is excessive liquidity in the financial system, inducing lax or inappropriate lending standards by the banks.

In the follow-up paper "**Bubbles and Total Factor Productivity**", (***American Economic Review Papers and Proceedings***), Jianjun Miao and I applied the above theory to an environment in which firms face idiosyncratic productivity shocks and credit constraints. We showed that both bubbleless and bubbly equilibria can exist. In the bubbly equilibrium, more productive firms have larger stock price bubbles. These bubbles allow firms to relax credit constraints and improve investment efficiency and capital allocation. Consequently, capital is allocated more to more productive firms, leading to a rise in total factor productivity (TFP). On the other hand, the collapse of bubbles tightens the credit constraints and worsens investment efficiency. Thus, the collapse of bubbles leads to a recession and a fall of TFP. Our theory helps explain the sharp fall in TFP during the East Asian, Mexican, and Argentina financial crisis in the 1990s.

Another interesting feature of stock price bubbles is that bubbles often appear in some particular sectors or industries of the economy. In " **Sectoral Bubbles and Endogenous Growth** ", Jianjun Miao and I used a two-sector endogenous growth model to explore the effect of sectorial bubbles on economic growth. Bubbles have a credit easing effect in that they relax collateral constraints and improve investment efficiency. The credit easing effect of bubbles encourages investment and saving and hence enhances economic growth. In our two-sector model economy, bubbles have an additional capital reallocation effect: Bubbles in only one of the sectors help attract more investment to that sector but also distort capital allocation between the two sectors. We showed this misallocation of capital can reduce growth if bubbles happen to occur in a sector with no positive externality. One conclusion is that rational bubbles can be welfare-reducing and thus should be a concern for policy makers.

Jianjun Miao and I also applied the model of Miao and Wang 2011 to unemployment and banking. In "**Stock Market Bubbles and Unemployment** ", Jianjun Miao, Lifang Xu and I introduced endogenous credit constraints in a search

model of unemployment. These constraints generate stock market bubbles supported by self-fulfilling beliefs similar to those model of Miao and Wang (2011). The collapse of the bubble tightens the credit constraints, causing firms to reduce investment and hiring. Hence it becomes difficult for unemployed workers to find jobs generating high and persistent unemployment.

The collapse of large financial institutions was a distinguishing feature of the recent Great Recession. The collapse is widely considered to be at least partially triggered by self-fulfilling expectation. Motivated by this, Jianjun Miao and I developed a macroeconomic model with a banking sector in which banks face endogenous borrowing constraints in "**Banking Bubbles and Financial Crisis** ". Banking bubbles emerge as the borrowing constraint of banks are relaxed. Changes in household confidence can cause the collapse of bubbles, resulting in a bank-run type of financial crisis. Our infinite horizon model compliments the stylized bank run models pioneered by Diamond and Dybvig (1983) in a dynamic setting, and could be a useful tool for quantitative studies.

All the papers described above show that bubbles are potentially interesting sources of business cycle fluctuations. But one important question remains: are bubbles empirically relevant for business cycles? This is not an easy question to answer since bubbles are not observable. In "**A Bayesian DSGE Model of Stock Market Bubbles and Business Cycles**", Jianjun Miao, Zhiwei Xu (one of my Ph.D students) and I provided an estimated dynamic stochastic general equilibrium model of stock market bubbles and business cycles using Bayesian methods to answer this important question. We solved the unobservability problem of bubbles by treating them as latent variables in a DSGE model. The state space representation of the DSGE model then allows us to conduct Bayesian inference of these latent variables with knowledge of the observable data. We answered the question as to whether bubbles are important by comparing the marginal likelihoods of a DSGE model with bubbles and an alternative DSGE without bubbles. We identified a sentiment shock which drives the movements of bubbles and is transmitted to the real economy through endogenous credit constraints. This shock explains more than 96 percent of the stock market volatility and about 25 to 45 percent of the variations in investment and output. It is the main driving force behind the comovement between stock prices and macroeconomic quantities. Historical decomposition of shocks shows that the sentiment shock is the dominant force in driving the internet bubbles and the Great Recession. Our paper shows bubbles are not only theoretically important but also empirically relevant for business cycles.

C. Financial Frictions and Indeterminacy

In a world where firms and businesses face borrowing constraints, any downturn or negative shock that depresses the value of their collateral will curtain their ability to finance investments and increase their operating costs. This, in turn, will amplify the downturn. Conversely, any positive shock that appreciates the value of a firm's collateral will decrease the costs of external finance, increase profitability, and amplify the effect of the initial shock. This is the well-known financial accelerator mechanism. This mechanism, however, suggests the possibility of self-fulfilling multiple equilibria: Optimistic expectations of higher output may well lead to increased lending to financially constrained firms. The relaxation of borrowing constraint, in turn, leads to an expansion in output, which justifies the initial optimistic belief. Different from rational bubbles, this type of self-fulfilling multiple equilibria is similar to the spirit of Benhabib and Farmer (1994) as a result of local indeterminacy around a unique steady state.

I have explored two complementary mechanisms for such self-fulfilling multiple equilibria in models with financial frictions.

First, in " **Credit Constraints and Self-fulfilling Business Cycles** "(***American Economic Journal: Macroeconomics***, Invited for Revision), Zheng Liu and I showed that financial constraints can generate indeterminacy through an endogenous TFP channel as a result of resource reallocation across firms. In our model, firms differ in productivity and in the absence of credit constraints, only the most productive firms survive while the unproductive firms with high costs perish. Some unproductive firms, however, continue to produce as the more productive firms are financially constrained by the value of their assets. An expected increase in aggregate output increases the value of the assets of all firms, and relaxes their borrowing constraints. This relaxation in the borrowing constraints allows more productive firms to expand production. This in turn pushes up the factor prices and increases the cost of production for the unproductive firms. As some of the unproductive firms stop producing the resource reallocation towards more productive firms generates endogenous increasing return to scale. We showed that for sufficiently tight credit constraints, the model generates a sufficiently large increasing return to scale and can lead to self-fulfilling business cycles.

Second, in "**Financial Constraints, Endogenous Markups, and Self-fulfilling Equilibria** " (***Journal of Monetary Economics***, Invited for Revision), Jess Benhabib and I focused on an endogenous markup mechanism for indeterminacy.

For this purpose, we introduced borrowing constraints into an otherwise standard Dixit-Stiglitz monopoly competition model, where firms face borrowing constraints when financing their working capital. Optimistic expectations of higher output may well lead to increased lending to financially constrained firms. The marginal costs of firms rise and their markups decline as they compete for additional labor and capital. At the new equilibrium both output and factor returns will be higher. Despite the income effects on labor supply, the increase in wages associated with lower markups will allow employment and output to increase, so the optimistic expectations of higher output will be fulfilled. We showed that self-fulfilling equilibria and indeterminacy can easily arise in this simple financial accelerator model with reasonable parameter calibrations. We illustrated, via simulations, that our financial accelerator model can generate rich business cycle dynamics, including hump-shaped output in response to demand shocks as well as serial autocorrelation in output growth rates.

The model of Benhabib and Wang (2012) is also complement to my previous work on indeterminacy in models with endogenous markup, which is a result of imperfect information or change in the composition of aggregate demand. More specifically, in "**Incomplete Information and Self-fulfilling Prophecies**", (Under Revision for***Journal of Money, Credit, and Banking***), Yi Wen and I demonstrated incomplete information can be a rich source of sunspots equilibria in a standard dynamic general equilibrium model of monopolistic competition àla Dixit-Stiglitz. In a follow-up paper entitled, " **Volatility, Growth, and Welfare** ", (***Journal of Economic Dynamics and Control***), we show that sunspots-driven fluctuations are able to explain the well-known stylized fact that the average growth rate of GDP is related negatively to volatility. In " **Imperfect Competition and Indeterminacy of Aggregate Output** ", (***Journal of Economic Theory***), we demonstrate indeterminacy can arise from the composition of aggregate demand in a standard DSGE model with imperfect competition.

Finally, the self-fulfilling-expectation-driven business cycles are also related to my work on news-driven business cycles. In " **Understanding Expectation-Driven Fluctuations-A Labor-Market Approach** ", (***Journal of Money, Credit, and Banking***), I borrowed the insight from the self-fulfilling-expectation-driven business cycles literature to provide a unified analysis of neoclassical models that can generate expectation-driven business cycles under anticipated future technology shocks (or news shocks). The diagrammatic analysis of labor market provides a simple and intuitive guide to understanding the existing literature and to searching for new models that can explain the data under news shocks.

2. Other Works on Business Cycles

I have reviewed my work on the implications of financial frictions on business cycles and asset bubbles. I turn now to my other work on business cycles. I summarize my work on monetary business cycles in part A and on inventory investment in part B.

A. Nominal Rigidities, Output and Inflation Dynamics

The issue of monetary policy has intrigued me since my graduate study. I have finished three projects in this direction and will continue to work in this area. As far as I understand, explaining the long lasting monetary non-neutrality and delayed inflation remains as one of the biggest challenges (see Chari et al (2000) and more recently Golosov and Lucas (2007) on issue of monetary non-neutrality; and Mankiw and Reis (2003) on inflation dynamics). I have made contributions in partially solving the persistence problem and identifying some problem with nominal rigidities. My paper coauthored with Yi Wen, entitled "**Another look at sticky prices and output persistence**", (***Journal of Economic Dynamics and Control***), shows price rigidity in fact can (by itself) give rise to a strong propagation mechanism in standard models, provided that investment is also subject to a cash-in-advance constraint. In **" Endogenous money or sticky prices?—comment on monetary non-neutrality and inflation dynamics** ", (***Journal of Economic Dynamics and Control***), Yi Wen and I showed that sticky prices are not necessary for understanding the inflation persistence in the US economy that has puzzled many economists. We show instead that endogenous monetary policy is far more important than sticky prices in explaining the postwar US business cycles, especially the dynamic interactions between inflation and output. Finally, in " **Inflation Dynamics: A Cross-Country Investigation** ", (***Journal of Monetary Economics***), Yi Wen and I documented that "persistent and lagged" inflation (with respect to output) is a world-wide phenomenon in that these short-run inflation dynamics are highly synchronized across countries. We found that neither the new Keynesian sticky-price model nor the sticky-information model can explain the synchronization in inflation. As far as we know, our paper is among the first to study sticky information in general equilibrium.

I have also written articles criticizing the using the VAR evidence to select theoretical models. In the paper **" Endogenous money or sticky prices?—comment on monetary non-neutrality and inflation dynamics** ", (***Journal of Economic Dynamics and Control***), Yi Wen and I showed that the now popular empirical method of identifying the effects of monetary shocks - the VAR - could

be misleading. We constructed a model which money is a veil and use it to generate artificial time series data. We then showed that standard econometric VAR analysis based on these artificial data would conclude that monetary shocks have significant non-neutral effects on output. We plan to do more robustness analysis. If our conclusions are supported by the various robustness analyses, they could have an important impact on the empirical monetary policy literature. In "**Understanding the effects of technology shocks**", (***Review of Economic Dynamics, 2011***), Yi Wen and I argued that the negative impulse responses of hours and investment to technology stocks are not grounds to favor sticky prices over flexible prices, in contrast with the conclusion reached by the literature led by Gali (AER 1999) and Basu et al. (AER 2006). We built a real business cycle with firm entry and exit to show that a positive technology shock leads investment and employment to decline sharply on impact but then to rise significantly in the longer run. Consistent with the data, our model also predicts that a positive aggregate technology shock leads to (i) a modest rise on impact and a permanent rise in the long run for the real wage and (ii) a sharp decrease for the real interest rate in the short run. We then concluded that a contractionary effect of technology shocks on aggregate inputs and factor prices does not reject flexible prices.

B. Inventory Dynamics

Inventory investment typically averages less than one percentage of GDP in the developed economy. It has long been observed, however, its fluctuation accounts for a large part of the fall in GDP during recessions. The table below shows such

Peak to Trough	Peak-trough change in Real GDP	Contribution of Inventory Investment
1973 (IV)-1975(I)	-3.18%	46%
1980(I)-1980(III)	-2.23%	47%
1981(III)-1982(IV)	-2.64%	70%
1990(III)-1991(I)	-1.36%	39%
2007(IV)-2009(II)	-5.14	29%

arithmetical accounting during several recent recessions: Such arithmetical accounting of course does not suggest a causal relationship. But it does suggest explaining the movement in inventory should be an important research topic for business cycle study. However, an important technical hurdle exists. The commonly used (S,s) inventory model is computationally challenging. As pointed out by Blinder (1981), "*If firms have a technology that makes the (S,s) rule optimal*,

aggregation across firms is inherently difficult. Indeed it is precisely this difficulty which has prevented the (S,s) model from being used in empirical work to date".

One goal of my recent research on inventory is to build tractable models which can be used as an useful vehicle for empirical works. So far, I have made some initial progress. In " **When Do Inventories Destabilize the Economy?-An Analytical Approach to (S,s) Policies** ", (***Journal of Economic Dynamics and Control***, Invited for Revision), Yi Wen, Zhiwei Xu and I illustrated that inventory can be introduced to a standard DSGE model in a straightforward yet rigorous way. We showed that inventory decision at the firm level can be analytically characterized. And standard log-linearization methods can be used to solve the aggregate model and generate impulse response functions. We are now exploiting this tractability to estimate the model using Bayesians method to extract useful information from inventory movement on the source of business cycles.

In another paper entitled " **Inventory Accelerator in General Equilibrium** ", (working paper), Yi Wen and I developed a tractable general-equilibrium model of inventories with explicit micro-foundations by embedding the production-cost smoothing motive (e.g., Eichenbaum, 1989) into a DSGE model with imperfect competition. We showed that monopolistic firms facing idiosyncratic cost shocks have incentives to bunch production and smooth sales by carrying inventories. The model is broadly consistent with key stylized facts of aggregate inventory fluctuations, such as the procyclical inventory investment and the countercyclical inventory-to-sales ratio. In addition, the model yields novel a predictions for the role of inventories in macroeconomic stability: Inventories may greatly amplify and propagate the business cycle. This prediction contracts some recent results that inventory investment has little effect on output volatility in general equilibrium.

3. Future Research Plans

My work with Jianjun Miao has shown that rational bubbles can be straightforwardly incorporated into the mainstream macroeconomic paradigm. We have shown the standard Bayesian method can be used to test such a model. In the near future, I will continue this effort to bring bubbles from the periphery to the core of macroeconomics. Explaining the strong negative relationship between unemployment and stock price and persistent high unemployment after Great Recession will be one of my priorities.

I also plan to quantify the importance of financial frictions using Chinese firm-level data. The apparently lack of financial development in China makes Chinese

firm-level data an ideal platform for this purpose. I believe using modern macroeconomic theory to understand China will not only generate fruitful academic work, it will also provide scientific policy recommendation for many urgent macroeconomic issues in China such as financial reforms, global imbalances and asset bubbles.

Meanwhile, I have become increasingly interested in self-fulfilling sentiment driven business cycles. In " **Sentiments and Aggregate Demand Fluctuations** " (work in progress), Jess Benhabib and Yi Wen and I formalized the Keynesian insight that aggregate demand driven by sentiments can generate output fluctuations under rational expectations. When production decisions must be made under uncertain demand conditions, optimal decisions based on sentiments can generate multiple self-fulfilling rational expectations equilibria in simple production economies under constant returns and without persistent informational frictions. We then introduced Markov sunspots across equilibria, generating stretches of time when the economy exhibits steady output, alternating with occasional periods of high volatility and low average output. We plan to enrich the models in future for more careful quantitative analysis to understand the data. I believe this simple framework can be a useful tool to understand asset price fluctuations as well. Demonstrating such possibility in carefully calibrated DSGE models will be another focus for my future research.

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A. Publications

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B. Working Papers

1. Land-Price Dynamics And Macroeconomic Fluctuations, with Liu Zheng and Zha Tao, ***Econometrica***, Second Revision.
2. Bubbles and Credit Constraints, with Jianjun Miao, ***Econometrica***, Invited for Revision.
3. Indeterminate Credit Cycles, with Zheng Liu, ***American Economic Journal: Macroeconomics***, Invited for Revision.
4. Credit Constraints, Endogenous Markups and Self-fulfilling Equilibria, with Jess Benhabib, ***Journal of Monetary Economics***, Invited for Revision.
5. Incomplete Information and Self-fulfilling Prophecies, with Yi Wen, Under Revision for ***Journal of Money, Credit and Banking***, Invited for Revision.
6. When Do Inventories Destabilize the Economy?-An Analytical Approach to (S,s) Policies, with Yi Wen and Zhiwei Xu, ***Journal of Economic Dynamics and Control***, Invited for Revision.
7. Sentiments and Aggregate Demand Fluctuations, with Jess Benhabib and Yi Wen, July 2012.
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9. Two-Way Capital Flows and Global Imbalances, with Zhiwei Xu and Wen Yi, April 2012.
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16. Financial Development and Economic Volatility: a Unified Explanation, with Yi Wen, March 2009.