Research Statement

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My general background emphasizes macroeconomics and econometrics, and I am currently focusing on monetary policy and labor markets. I am especially interested in the relationship between financial friction and labor market dynamics and inequality. I also have an interest in Bayesian estimation, especially for nonlinear, non-Gaussian models such as the Sequential Monte Carlo method.

One main objective of my dissertation is to see if optimal monetary policy obtained from a homogeneous labor market model is still appropriate, even though we observe significant differentials in consumption and labor market variables among demographic subgroups. To that end, I devote one chapter of my dissertation to building a structural model taking into account heterogeneity in the labor market which gives a reasonable explanation for the differential. In my second chapter, I estimate the model using Bayesian estimation techniques and investigate which shock is most responsible for the differentials and inequalities. Finally, I study optimal monetary policy with the presence of inequality and compare welfare loss from baseline model with that under various scenarios in which a Central Bank is not aware of true economic constraints. I will now summarize two completed chapters in my dissertation and one working paper. I will also outline my future research interests.

Segmented labor markets in a New Keynesian model

In this chapter, I build a structural model accounting for heterogeneity in labor market variables within a New Keynesian Framework. Data from the Merged Outgoing Rotation Group of the Current Population Survey indicates that, on average, workers with less than a college education have suffered from greater fluctuations not only in employment but also in unemployment than workers with bachelors’ degrees. In addition, the wage premium, which is defined as the log difference between average high-skilled wages and average low-skilled wages, is weakly procyclical in response to a contractionary monetary policy shock. To generate these stylized facts, I assume that low-skilled workers are more substitutable from the firm’s point of view, and their labor supply is more responsive to income variation than high-skilled workers. This assumption leads to a flatter low-skilled wage Phillips curve making low-skilled wages effectively stickier than those of the high-skilled. Accordingly, the volatilities of employment and unemployment of low-skilled workers are relatively larger than those of high-skilled workers. Moreover, the wage premium moves procyclically in response to a negative demand shock due to the different slopes of the two sectoral wage Phillips curves. A change in the wage premium brings about the strategic complementarity in wage setting and induces a stickier adjustment of the aggregate nominal wage (which is a convex combination of two sectoral wages). Thus, heterogeneity in
the labor market generates greater volatility in macroeconomic variables such as output, employment and unemployment than a homogeneous labor market model.

**Monetary policy impact on labor markets in an estimated DSGE model. (Working paper)**

In the second chapter, I extend the model developed in previous chapter by incorporating bond-transaction cost that introduce imperfect risk sharing between households and allows the model to avoid unit-root problem technically. I then estimate the model incorporating 6 additional shocks using a typical Bayesian estimation method: obtain a system of equations by log-linearization of the first order conditions, calculate the likelihood of the structural parameters with the Kalman filter, and then estimate the parameters with the Random Walk Metropolis-Hasting algorithm. I obtain the reference for the parameters that are important for the labor markets such as the inverse of Frisch elasticity and elasticity of substitution between workers within a sector. The estimate for inverse of Frisch elasticity of high-skilled workers (11.197) and low-skilled workers (2.895) are somewhat greater than the calibrated values implying much more volatile participation and unemployment rates. The estimates for elasticity substitution between workers in a given sector are 3.917 and 6.626 for the high skilled and the low skilled respectively. In addition, both labor supply and demand elasticity indicate a lower natural rate of unemployment than the historical average unemployment rate: 2.6% (5.7%) of high (low) skilled workers' unemployment rate. The estimate for elasticity of substitution across the sectors is 2.95, which is also consistent with the literature. The policy reaction parameter to the output growth (the gap between current output and previous one) is 1.017 which is larger than the expected and that is partly because unemployment rates are used as observable variables causing a less volatile output gap. The policy reaction coefficient to inflation is 1.01. Bayesian impulse responses confirm that heterogeneity in labor demand and supply elasticity has a significant impact on aggregate dynamics such as output, employment and unemployment.

**Inequality and optimal monetary policy (Job Market Paper).**

In the third chapter, I modify the model I discussed in chapter 1 by assuming the same preference for both high-skilled and low-skilled households, that is, each household has the same labor supply elasticity regardless of their skill levels. Instead, I incorporate a Limited Asset Market Participation framework in which low-skilled workers are not able to smooth their consumption through financial assets so that low-skilled labor supply reacts more sensitively than high-skilled workers to the income variation. This combined with segmented labor markets allows me to analyze the effect of monetary policy on consumption and income inequality, as well as the dynamics of labor market variables. In addition, given the disproportionate effect of the monetary policy, I study if a Central Bank needs to take into account inequality for optimal monetary policy design. Since income inequality brings about a new policy trade-off with output after idiosyncratic shock, a Central Bank cannot achieve the first best allocation by strict inflation targeting rule even under flexible wages in contrast to the single labor market model. Simulation results under various scenarios show that if a Central Bank ignores inequality focusing only on aggregate variables, optimal monetary policy
generates substantive welfare loss relative to the baseline model.

**Work in progress: Financial Friction, inequality and monetary policy**

According to Survey of Consumer Finance (2010) data, the percent of families with financial asset is increasing in education and percentile of income. A standard “financial accelerator” mechanism takes place in household level because consumption and labor supply decision of the household are significantly influenced by the financial constraint; less educated (or low income) families are more vulnerable to business cycle fluctuation because their net wealth is very small or even negative in general and hence suffer from relatively higher financial cost during a recession. This affects their willingness to work, and thus wages and unemployment, and eventually widens inequality. Therefore, such a cyclical financial cost makes aggregate economy more vulnerable to shocks. I am trying to incorporate this channel to see the relationship between inequality and the efficacy of monetary policy. In my job market paper, I assumed that population share of financially excluded workers is constant. I will endogenize the cyclical variation of the share which will mitigate monetary policy impact. Fiscal policy supporting low income families might help to restore monetary policy efficacy.

**Future Research : Sequential Monte Carlo Method for DSGE model estimation**

It is well known among macroeconomic researchers that linearized models are inadequate in many dimensions such as time-varying volatility or policy regime switching analysis. Many researchers have tried to use Sequential Monte Carlo (SMC) methods for estimation of Dynamic Stochastic General Equilibrium (DSGE) models. SMC methods were initially used for filtering latent state variables but they have recently been adopted for estimation of the structural parameters. Many researchers such as Fernandez-Villaverde and Rubio-Ramirez (2007) and Chen, Petralia and Lopes (2010) argue that particle filter method delivers a substantially better fit of the model to the data even for a case in which the MCMC method is available. In addition, Herbst and Schorfheide (2013) assert that the SMC algorithm is more stable than the Random Walk Metropolis-Hasting algorithm. I have estimated a simple state-space model using the SMC Method but I have not applied it to the estimation of DSGE model yet. I would like to estimate the model that I developed in my dissertation using the SMC method in the near future to draw an implication for policy makers.