

Research Summary

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My current research focus is trade policy and labor markets. I am interested in studying the dynamic adjustment process of workers to trade shocks, which is not studied in the international trade literature as intensively as the other aspects of economic globalization. The adjustment process in response to changes in trade policies involves flows between sectors and sometimes occupations, implicit adjustment costs paid by workers, changes in unemployment rates and search inefficiencies, changes in skill premium, redistribution of wealth among generations, and anticipatory adjustment to free trade. In addition to trade and labor projects, I have also explored a macro-labor topic (related to research and development) and a monetary economics topic (related to implicit borrowing costs), which have broadened my skills and understanding across other fields in economics.

Almost all my work is empirical, employing structural estimation of underlying theoretical parameters and undertaking counterfactual policy simulations. Since my main research interest is studying trade policy (especially those which have not yet been implemented), structural analysis is well-suited to dealing with the problems arising from the *Lucas Critique*. Moreover, I make sure that the economic intuition is not buried under computational technicalities. I try to make models as simple as possible, as long as the simplification does not affect the qualitative aspects of the policy question I am interested in. This will make the models more applicable to developing-country data, which is often limited, and to use by researchers who do not have access to (or experience in dealing with) high end computing clusters.

Current Projects:

Intergenerational Effects of Trade Liberalization (Under Review)

The Pew Global Attitudes survey shows that older workers are more split in supporting free trade compared to young. We can see a similar pattern if we look at General Social Survey of the US, and the EU Customs Union accession polls. This project is the first to give a general explanation why old and young people are affected differently from trade liberalization.

If we assume that workers are perfectly mobile across sectors, we would find that all workers are affected from trade liberalization in the same way because of factor price equalization, so all workers would be unanimous in supporting free trade. However if they are immobile, then they would be split based on their sectors: import competing sector workers would be against free trade, while export sector workers would support it.

In the labor economics literature, there is extensive evidence showing that older workers are less mobile compared to young. For example, older workers are more likely to hold sector specific human capital, own a house, and face joint location problems with a working spouse, all of which

limits their sectoral mobility. Taking labor economics literature seriously, we can guess that young workers will be more unanimous in supporting free trade compared to old, because they are more mobile across sectors. We would expect older workers to be more split because they can not change sectors easily.

In this project, I estimate sectoral mobility parameters of workers jointly with their human capital accumulation process using US data from the NLSY and CPS. Then, I simulate trade liberalization in the metal-manufacturing sector, which has been especially vulnerable to trade shocks in the past, the steel industry in particular. After the metal sector tariffs are removed, the manufacturing sector which benefits from the price reduction of metal-inputs expands while metal sector shrinks. Young workers, who are mobile, will leave the metal sector rapidly, while older workers will adjust much more slowly. Although wages of both young and old workers decrease, young workers in the metal sector will be affected less since they are able to change sectors faster. On the other hand, in the manufacturing sector, younger workers will win less compared to older workers because they are more likely to work in the metal sector in the future.

Thus, we see a *mirror effect*: Old workers win more or lose more compared to young, while young are more unanimous. The better off a manufacturing worker is, a similar metal worker will be the worse off, like a symmetric but opposite image in a mirror. Workers who are very close to retirement, however, will not be economically affected much since the time horizon to work ahead of them is very short.

Thanks to the multiple-overlapping generations framework I use, I can simplify the model without losing the focus on heterogeneity. As far as I know it is the first use of this approach in the literature.

Trade Shocks and Unemployment: Anticipation, Impact, Transition and New Steady State (joint with B. Eyigungor and J. McLaren)

In this project, we are interested in studying changes in unemployment rates during the transition from autarky to free trade. Although the “trade and unemployment” topic is becoming very popular in the literature, we bring new attention to the dynamics of unemployment and transition.

During the transition, workers change sectors more than usual so we would expect high unemployment rates during the adjustment process, regardless of what will happen in the long run. We develop a discrete sectoral choice model with a high frequency Pissarides-Mortensen type search framework to study this phenomenon. We estimate some of the underlying theoretical parameters, such as adjustment costs, using the US Current Population Survey.

Our counterfactual simulations show that unemployment rates, both in import competing sector and in the economy, will jump rapidly in the short run and then converge to the free trade steady state in two to five years. The temporary jump might be as high as a 100% increase in the overall unemployment rate after the trade shock. We explore delayed and gradual liberalizations as an alternative to shock therapy, and find that gradual liberalization might reduce the jump in

unemployment rates significantly.

We also study whether search inefficiencies would slow down the adjustment process, which is in progress at the moment. When a worker searches for a job, if the Hosios condition does not hold, the worker's search causes congestion and slows down the job finding rates of other workers who also look for jobs in the same sector. After a trade shock, workers will search in the exporting sector more aggressively, which will result in an increase in negative search externalities and may create a rationale for a trade policy and gradual liberalization. We are exploring whether this possibility is a feature of the data.

We have tried to make the empirical model as simple as possible. At the same time we were very careful to incorporate the standard features of macroeconomic labor search literature to a dynamic sectoral mobility model in a way that is consistent with the trade policy questions we are asking. For example, in standard search models exogenous separations are caused by binary shocks. But, after a trade liberalization, separation rates might change across sectors, so workers might be less willing to leave exporting sectors, which can not be the case with binary separation shocks. In our model, we consider a more complicated shock structure that makes separations endogenous to sectoral productivity differences and trade policy. We have directed search in our framework because we would expect workers to search for jobs more intensively in the exporting sector and less intensively in the import competing sector. We solve the model at weekly frequencies so that we can see the adjustment process in great detail. The model we develop here requires only modest computing power and basic labor market data; we hope that this model can also be used to study trade policy in developing countries.

Trade Policy and Skill Premium: A Structural Analysis with Sectoral and Occupational Mobility
(joint with J. McLaren)

Trade economists usually assume that workers are perfectly mobile across sectors and immobile across occupations, a la Heckscher-Ohlin. However, the mobility rates among sectors and occupations in the Current Population Survey, are not very different from each other: 3.5 and 2.8 percent respectively.

In this project, we show how this unrealistic mobility assumption would affect results of economic analysis. We compare results of a model with estimated occupational and sectoral mobility rates and a variant with HO assumptions.

Our main focus is to show the bias in Stolper-Samuelson effects of trade liberalization, which states that blue collar workers will be worse off and white collar workers will be better off in a skill abundant country regardless of their sector. Since workers can not change sectors easily according to the estimated model, the popular factor-price equalization property does not hold. As the exporting sector grows, its increasing surplus is not perfectly transmitted to the import competing sector, and it is partially transmitted between occupations in the exporting sector (since workers can sometimes change occupations). Hence not all white collar workers are equally better off and not all blue collar workers are worse off. For example, we find that white collar workers in the import

competing sector might suffer from decreasing wages.

Thus, we show that workers' gains and losses from trade liberalization depend more on their sectors and less on their occupations. We find that the change in skill premium after trade liberalization would be 3.9 percent under Heckscher-Ohlin assumptions (which is close to the findings of previous research). However, when occupational and sectoral mobility frictions are considered, the change in skill premium is less than 0.5 percent. This finding suggests that the contribution of trade liberalization to skill premium, through Stolper-Samuelson channels, is negligible and it can be easily dominated by other factors such as skill-biased technological change.

R&D Shocks and Aggregate Fluctuations (joint with P. Pourpourides)

This project is different from my general focus on trade and labor, and explores a macro-labor problem. However, like my other projects, it involves structural estimation of the theoretical parameters. In this project, we identify technology shocks in the industrial R&D sector and evaluate their contribution as well as the role of the sector in propagating aggregate fluctuations.

The industrial R&D sector is only 1.5 % of the GDP. But, when we run structural VAR to show their contribution to aggregate fluctuations, we find that almost 18% of aggregate fluctuations can be explained by industrial R&D sector shocks. We impose the structure of a theoretical two sector general equilibrium model on the VAR to identify the neutral, investment and R&D shocks separately. By minimizing the distance between the impulse response functions calculated using VAR and implied by the model, we estimate underlying theoretical parameters of the model.

This the first empirical attempt to show the contribution of R&D sector on aggregate fluctuations in the literature.

Published Papers:

Trade Shocks and Labor Adjustment: A Structural Empirical Approach (American Economic Review 2010, joint with S. Chaudhuri and J. McLaren)

The welfare effects of trade shocks depend crucially on the sectoral mobility of workers, and the existing trade literature does not directly address this, assuming perfect mobility or complete immobility. If workers were perfectly mobile, then we would not see redistribution of wealth across sectors because of factor price equalization. In this paper we show that there will not be factor price equalization in the presence of sectoral moving costs, and gross flows will exceed net flows, consistent with key empirical facts.

In our model, workers choose sectors in every period dynamically considering present discounted value of all future wages and some iid moving cost shocks. Since workers move from one sector to another in all directions, the total number of workers who change sectors (i.e. gross flows) is larger than the change in number of workers in a sector (i.e. net flows). At steady state net flows will be equal to zero so that the number of workers remain unchanged. After a trade shock hits, the import competing sector will shrink and a larger percentage of workers will need to move out to make net

flows equal to zero, which can only be achieved by lower wages in the import competing sector compared to other sectors. This framework can capture both failure of factor price equalization and the difference between gross flows and net flows which are the key features of labor data.

We estimate sectoral movings costs of workers within this dynamic stochastic sectoral choice model using US data. We find that sectoral moving costs are large, implying both slow adjustment of the economy, and sharp movements in wages, in response to a trade shock. We also consider two alternative versions of the model with simple observed and unobserved worker heterogeneity and show how implications of the model would change. Most of the criticism against this model was related to difficulties in incorporating worker heterogeneity to this framework. A more rigorous study of labor mobility with worker heterogeneity can be found in my other project “Intergenerational Effects of Trade Liberalization”, which is complementary to this project as it uses a different and more efficient estimation strategy but requires more detailed data.

The most intriguing aspect of this project is that, although it uses a discrete choice model based on value functions, we do not need to calculate value functions explicitly. We only use gross flow and wage data; the Euler-type condition we employ for estimation requires very modest computing power, which is not the case for most of the other structural models. Our method can be used even if only a very short data series is available, which makes it very useful to study developing countries' trade policies.

A Structural Empirical Approach to Trade Shocks and Labor Adjustment: An Application to Turkey (World Bank Book Chapter 2010, joint with J. McLaren)

This is an extension to our paper on “Trade Shocks and Labor Adjustment”. In this project we estimate structural mobility parameters of Turkish workers using only 3 years of household labor force survey. We find that industry-switching costs implied by the Turkish data are very large compared to the US. We simulate a counterfactual trade liberalization to show the adjustment process of workers during the transition. This project shows that the method we developed in our previous paper can conveniently be applied to a developing country using limited data.

Delay and Dynamics in Labor Market Adjustment: Simulation Results (Journal of International Economics 2008, joint with S. Chaudhuri and J. McLaren)

In this project, we developed the simulation method that we used in our later papers on labor mobility. We studied the effects of delayed trade liberalization on welfare of workers. Announcing and delaying the liberalization can build a constituency for free trade, but it can also destroy one.

Here is how it is possible: First, present discounted value (or welfare) of workers depend not only on their current sector wages but also on wages in the other sector because there is a positive probability that a worker will change sectors in the future. If the labor demand in the exporting sector is very inelastic (as would be the case with Leontieff technology), then as workers move from the import competing sector to the export sector, the export sector wages will drop sharply, causing large welfare losses. If the liberalization is delayed long enough, the probability of sector

change will be high enough to make all workers unanimous. Thus, with low labor demand elasticity in the export sector and delayed liberalization, it is possible to see all workers opposing to free trade.

Discount Window Borrowing after 2003: The Explicit Reduction in Implicit Costs (Journal of Banking and Finance 2010, joint with S. Demiralp)

This project seems very different from my main research focus, but it involves calculation of implicit costs and in that aspect is similar to my labor mobility projects. In 2003, the Fed introduced primary credit as its discount window lending program. This program replaced the adjustment credit program, which had generated a stigma associated with borrowing. The Fed was trying to reduce this stigma (or implicit borrowing cost) to make the lending facility more efficient.

I was very surprised when I learned that there was no attempt to estimate the magnitude of this stigma using structural models, which was in principle very similar to estimating the implicit moving cost of workers. We modelled the borrowing decision mechanism of banks from the Fed and estimated the model using Indirect Inference. We pinned down the stigma of borrowing using the fluctuations in fed funds rate and borrowing data. A simple decrease in the cost of borrowing from the Fed would reduce the the price of the substitute choice which is borrowing from the Fed funds market, so the Fed funds rate would decrease. This simple intuitive fact makes identification possible.

We showed that the stigma of borrowing from the Fed unambiguously decreased after the change in the lending program in 2003. Although it was not evident in the early days of the crisis, recent borrowing data shows that our results were indeed accurate.

Provision of Liquidity through the Primary Credit Facility during the Financial Crisis: A Structural Analysis (New York Fed EPR 2010, joint with S. Demiralp)

We use the estimated parameters of the model from our previous paper to design counterfactual policy simulations. We show how response of the Fed funds market would be different during the recent financial crisis if the Fed had not changed its primary lending program in 2003.