Trade, Jobs and Worker Welfare

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Extended Abstract

This paper introduces a new framework to quantify the effect of international trade on worker's welfare through labor mobility. Our framework features various determinants of labor mobility and identifies how trade shocks impact those determinants endogenously. Focusing on wage and the number of jobs as two key determinants of labor mobility, we build a structural model of labor mobility where international trade affects not only wage but also the number of job opportunities. We then combine the local labor market approach to estimate the key structural parameters of our model. Our model delivers a sufficient statistic of change in worker's welfare, which can be easily estimated using a Bartik-type instrument.

Workers move between industries or regions for various reasons, with wage differential and idiosyncratic utility being the main reason that has been explored in the literature. In this paper, we explain labor mobility based on the different number of job opportunities provided by different industries and regions. International trade shocks impact not only wages but also the number of job opportunities in a sector or in a region.

Having more job opportunities in a particular sector and a region is important for workers broadly for two reasons. First, if a worker can choose her best job out of more opportunities, it is more likely that the best one gives her higher welfare. Second, even when she is hit by a negative labor demand shock in the future, it is more likely that she will be able to find another job without having to move to a different region or a different industry and paying a higher switching cost. Therefore, a region and an industry with a positive trade shock

will attract more workers not just because of a higher wage it provides, but also because of the larger number of job opportunities created there. This mechanism of dynamic labor adjustment in response to trade shock affects workers' welfare.

We first document a number of reduced-form evidence which shows that the aforementioned mechanism exists, using the matched employer-employee dataset from Brazil (RAIS) between 2003 and 2015. First, we construct an instrument for exports at region-industry level, exploiting exogenous variation in import demand and tariffs by other countries. The industry-region cells include 558 regions and 50 industries. We show that exports are positively correlated with wage, employment, and job turnover rates.

Motivated by the empirical facts that we document, we build a dynamic general equilibrium model of labor mobility. Each labor market is defined by a pair of industry and region. Different labor markets offer different wages and different numbers of job opportunities to workers. Each worker chooses a job which gives her the highest utility, where the number of jobs in each labor market is endogenously determined. This is a distinctive feature of our model compared to the existing works which assume that workers choose a labor market and that the number of jobs is exogenously fixed and same across labor markets. In our model, worker's choice of job determines which labor market she belongs to, and thus each labor market's wage level and the number of job opportunities provided by each labor market are both factored into her optimal job choice.

In a labor market with relatively more job opportunities, workers can choose the optimal job out of more potential jobs, to each of which workers attach idiosyncratic preference. We assume that this idiosyncratic preference for jobs follows a type I extreme value distribution. This is the first channel through which a labor market with more job opportunities provides workers a greater utility, because the maximum utility will be higher with more options. The second channel is related to mobility frictions. Worker mobility is subject to frictions. We assume that a change of job requiring a change of labor market incurs higher switching cost compared to a job switch within a labor market. Therefore, a growing labor market with more job opportunities reduce the risk of having to pay a switching cost in the future. The prospect of job switch generates an option value in worker's welfare. Our model further decomposes this option value into the option value associated alternative job opportunities within the current labor market and the option value from having alternative jobs in all other labor markets.

Our model delivers a sufficient statistic of changes in worker welfare which is a function

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of only the estimated probability of moving between labor markets and the labor supply elasticity. The welfare result does not depend on moving cost structure, observed changes in future wages, or moving probabilities across jobs within a labor market. All effects from a trade shock are embedded in the gross flows between labor markets. This is a powerful result which makes a welfare evaluation due to trade shocks much simpler.

For the welfare analysis, we first structurally estimate the model using the RAIS data from Brazil. We use 558 regions and 3 industries (natural resources, manufacturing and services) to define a labor market as a pair of these two dimensions. In the first stage of the estimation, we estimate the common value attached to each labor market and the moving cost between labor markets for each worker group using a gravity-like equation. The implied probability of moving between labor markets is then calculated with the estimated value of each labor market and the estimated moving cost. We find the the regional moving cost coefficient in the gravity equation is equal to -1, which is consistent with the papers in the migration literature. We find that the industry moving cost is equivalent to one time loss of approximately 65% of annual wage, which is also consistent with previous literature (see Dix-Carneiro 2014).

In the second stage, we estimate the labor supply elasticity of our model. We first derive an estimable equation describing the relationship between a change in transformed value of labor market and a change in wage, with the labor supply elasticity governing the responsiveness of the former with respect to the latter. We instrument the change in wage with exposure measures to trade shocks. We use a change in import demand by OECD partners and a change in effective tariffs imposed by OECD countries as our instrument. The interpretation of this estimation procedure closely follows that of Autor et al. (2013.)

Armed with the estimate of the labor supply elasticity, we estimate the effect of trade shocks in Brazil on workers' welfare, employment and wages using a Bartik-type instrument. We find that the welfare of a median formal sector worker increases by 16%, wages increase by 5%, and employment increases by 5% due to increase in export from 2003 to 2012.

This paper contributes to the literature on the labor mobility and international trade. Artuc et al. (2010, ACM hereafter), Dix-Carneiro (2014), Caliendo et al. (forthcoming, CDP hereafter), and Traiberman (2018) study the dynamic transmission of international trade shocks on labor market via labor mobility by modeling worker's idiosyncratic preference for a labor market with an extreme value distribution. We follow the convention of the literature when modeling worker's preference, but we introduce a new channel which affects worker

welfare: the number of jobs within each labor market. In reality, what workers choose is their job, and which labor market they belong to is a consequence of their choice of job. We then endogenize the number of jobs so trade shocks can affect labor mobility and thus welfare not just through changes in wage but also through changes in the number of jobs. Our contribution of introducing the endogenous number of jobs into welfare analysis also bridges this literature of labor mobility to the literature on local labor market effects of trade, e.g., Autor et al. (2013). This literature establishes a strong reduced-form relationship between trade exposure of a local labor market and the change in employment. However, the local labor market approach cannot provide a clear welfare implication due to the nature of its specification. Our model answers this welfare question by bringing this employment channel into the structural model of labor mobility and provide a powerful sufficient statistic result for welfare analysis.

In the international trade literature, Arkolakis et al. (2012, ACR hereafter) provide a sufficient statistic of welfare gains from trade, which is consistent with various classes of trade models. Since workers are assumed to be homogeneous in the trade models covered by that sufficient statistic result, each worker has the same welfare gains from trade. In our model, worker welfare depends on their actual mobility thus are allowed to be different between workers. However, we still maintain the same spirit of ACR by showing a new sufficient statistic of worker's welfare gains from trade. The sufficient statistic of worker welfare from our model can also compare welfare implication between existing models, showing relative importance of each transmission channel of trade shocks. If we assume that workers choose a labor market instead of a job and if the number of jobs is exogenously fixed, then we can re-assess the welfare effect of CDP using the sufficient statistic derived from our model. If we further assume that labor market is defined only based on industries, not based on regions, then our model is equivalent to ACM. Finally, if we assume that workers are perfectly mobile across industries with no idiosyncratic shocks, then our welfare analysis is equivalent to ACR.