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Theory and Evidence Linking International Trade to Unemployment Rates

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Abstract

In this working paper, we review recent theoretical and empirical studies that link international trade flows and trade policies to aggregate (economy-wide) unemployment rates. The theoretical models demonstrate that there is a complex and often ambiguous relationship between trade and aggregate unemployment rates: whether trade increases or reduces unemployment depends in a complicated way on the industry composition of a country's output and on differences in labor market frictions across industries and countries. The empirical studies, on the other hand, offer a story that is simpler and fairly consistent: they generally find that an expansion in international trade reduces a country's aggregate unemployment rate in the long run.

Keywords: International Trade, Unemployment, Labor, Job Search, Econometric Analysis.

JEL Classifications: F14, F16, J6.

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1. Introduction

There is a significant disconnect between the policy debate on the impact of trade policies on jobs and the traditional assumptions in economic models of international trade. The policy debate usually focuses on whether changes in trade policy will create more jobs than they will displace, while the economic models used to evaluate these policy changes usually assume that the economy is always at full employment and that total employment in the economy remains fixed. In these economic models, any job destruction will be exactly offset by job creation, with no effect on unemployment rates. This disconnect is described in Davidson, Martin, and Matusz (1999):

> The vast majority of public debate concerning trade policy centers on the impact of trade on employment. Those opposed to free trade argue that lower production costs and fewer regulations in other countries allow foreign firms to out-compete domestic producers. This, they argue, results in less domestic output and fewer domestic jobs. On the other hand, proponents of free trade argue that free trade expands our export markets, resulting in a greater demand for our products, greater domestic production, and more jobs.
>
> The vast majority of economists view both of these arguments as misguided and fundamentally incorrect. In fact, the debate about trade policy among economists almost always ignores the impact of trade on [a country's aggregate or total] employment.

As Harrigan (2011) points out, economic models of the effects of trade on labor market outcomes have relied almost entirely on the assumption of full employment. Yet unemployment is a fact of life, and net job creation is often a stated goal of trade policies.

So why is the assumption of full employment the norm? First, it is important to understand that every economic model involves many simplifications that abstract from reality. Economic models often assume that markets are perfect. In this paradigm, prices adjust to ensure that supply equals demand. This paradigm is commonly used to model labor markets: the models assume that wages adjust until the number of workers available is equal to the number of jobs that employers want to fill, and so there is no unemployment. However, this is not a realistic description of most labor markets. Workers are not matched to employers through an organized exchange; job matching requires costly and time-consuming search. While the prevalence of market imperfections is widely recognized, they are complicated to formally model. A second reason for the assumption of full employment is tradition. While economic modeling is a field with constant methodological innovations, it still builds largely on past practice. A third argument that is often made is that unemployment is determined by aggregate demand factors like monetary policy in the short run

and by the natural rate of unemployment in the long run, rather than industry-specific trade policies, and for that reason it is not important to include unemployment in models of trade that focus on the long run.[2]

Over the past fifteen years, however, there have been significant efforts to incorporate unemployment into models of trade, in a way that is mindful of these concerns. The newly developed models include aggregate unemployment that persists even in long-run equilibrium. The models are derived from microeconomic decision-making, and they serve as extensions of well-established models of trade with differentiated products, factor proportions, or productivity differences.

An important branch of the new literature models unemployment as the result of time-consuming job search, following the Nobel Prize-winning equilibrium search models of Peter Diamond, Dale Mortensen, and Christopher Pissarides.[3] In equilibrium search models, frictional unemployment arises due to imperfect information in labor markets and persists in the long run. Frictional unemployment is distinct from cyclical unemployment (due to business cycle fluctuations) and structural unemployment (due to policies like minimum wages that can impede market clearing). Non-search models of unemployment have also been incorporated into trade models, though they are less common. They include the efficiency wage models in Egger and Kreickemeier (2009) and Davis and Harrigan (2011) and the model of minimum wages in Davis (1998).[4] In the search models, wages are determined through a bargaining process, and the worker's outside option reflects the wages that are likely available in other jobs within the sector. In the efficiency wage models, in contrast, firms offer higher-than-equilibrium wages in order to prevent workers from reducing effort. Firms set lower wages when the aggregate unemployment rate is higher. Each

[2] Krugman (1993) makes this point. However, the fact that unemployment is determined by the natural rate in the long run does not imply that it is unaffected by international trade, as the models of trade with equilibrium search in our review demonstrate.

[3] Diamond (1982), Mortensen (1982), Pissarides (1990), and Mortensen and Pissarides (1994) develop these models.

[4] Egger and Kreickemeier (2009) present a theoretical model of the effects of globalization on an economy where wages are determined through a fair-wage efficiency wages setting. In the benchmark version of their model, both wage inequality an aggregate unemployment rise with trade liberalization.

approach generates unemployment in the equilibrium. In this review, we focus on the search models, simply because they are more common in the trade literature.[5]

Our review focuses on economic journal articles that model the effect of trade and trade policy on aggregate unemployment rates.[6] We have organized the articles into two sections: theoretical studies with minimal data analysis and empirical studies with extensive data analysis. Within each section, we discuss the studies in the order of publication. Overall, the theoretical studies find that there is a complex and often ambiguous relationship between trade and aggregate unemployment rates. The studies do not provide a general prediction for whether international trade increases or decreases aggregate unemployment in a country.

This ambiguity can be illustrated with a very simple model. Suppose that an economy has two industries, an exporting industry and an import-competing industry. Jobs in the export industry require extended job search, and this creates frictional unemployment in the economy. When trade costs are lowered, there is an increase in demand for labor in the export industry. The aggregate unemployment rate may increase or decrease depending on whether the export sector has a higher or lower unemployment rate than the import-competing sector. In general, the prediction is ambiguous.

The models in the theoretical literature are much more elaborate than this illustration, but they still do not resolve this ambiguity.[7] In contrast, the empirical studies offer a story that is simpler and fairly consistent: they generally find that an expansion in international trade reduces a country's aggregate unemployment rate.

The literature that we review is a relatively small branch of a much larger economics literature on the link between international trade and employment outcomes.[8] Before launching into our review

[5] On the other hand, there are some issues that the efficiency wage approach is better equipped to handle. For example, the model in Davis and Harrigan (2011) analyze labor market churning within an industry and changes in the number of jobs that pay above average wages.

[6] We do not try to summarize all parts of the studies that we review; instead, we focus on what they have to say about unemployment. Several of the studies examine the effects of trade on wage inequality as well as unemployment.

[7] They define the conditions under which trade will have a negative effect on a country's aggregate unemployment rate, but they do not offer a general prediction.

[8] There is also a very large economics literature on the effects of trade on wages. Haskel, Lawrence, Leamer, and Slaughter (2012) provide an excellent review of this branch of the literature.

of the literature on trade and unemployment, we briefly highlight related branches that are outside of the scope of our review. First, there is a branch of the empirical literature that estimates the effects of trade and trade liberalization on the level of employment within specific sectors of the economy. For example, Trefler (2004) quantifies the impact of the Canadian-U.S. Free Trade Agreement on manufacturing employment and labor productivity in Canada, based on a detailed econometric analysis of industry-level and plant-level data. He finds that the tariff reductions led to a 5 percent decline in Canadian manufacturing employment as a whole, and a 12 percent decline in employment in the most impacted industries. However, he does not try to estimate the net change in employment in the economy as a whole or the impact on the aggregate unemployment rate.

Second, there is a branch of the literature that estimates the temporary effects of trade liberalization on employment, as workers transition between sectors. For example, Artuç, Chaudhuri, and McLaren (2010) use a structural model of dynamic labor adjustment and data from the U.S. Current Population Survey to estimate the movement of workers between sectors of the U.S. economy in response to trade. Their simulations indicate that there is slow movement of workers and sharp wage movements. However, there is no unemployment in their model, either in the short-run or the long-run, because the labor reallocation across sectors does not take time.

2. Theoretical Models

Davidson, Martin and Matusz (1999) incorporate equilibrium job search into a model of international trade with sectors and countries that vary in their turnover (or break-up) rates. In their model, workers who are displaced from their jobs search for new employment matches, and while they search they are unemployed. Unemployed workers must choose a sector in which to seek a job. They choose the sector that offers the highest expected lifetime income, and in the process they equilibrate expected returns to labor in the two sectors. When an employment match is created, it lasts until a random exogenous shock causes the worker and capital to separate. There is aggregate unemployment in the steady-state equilibrium, even though individuals' unemployment spells are typically short-lived.

Their general equilibrium model of trade shows that search frictions in the labor market can affect job creation and job destruction and can be a source of comparative advantage in trade. When turnover rates and unemployment rates vary across sectors within a country, then a reallocation of

resources between sectors – for example, due to a shift in prices after trade liberalization – will affect the aggregate unemployment rate of each country.

In their model, the country with more productive employer-employee matching has a comparative advantage in the sector with the higher turnover rate. A country exports goods from the sector with the lowest expected duration of unemployment, since its workers require lower wages to induce them to search for a job in that sector. The model predicts that a relatively capital-abundant large country with a more efficient labor market (like the United States) will have a relatively low unemployment rate and a comparative advantage in the high unemployment sector when it trades with a smaller, relatively labor-abundant country. In this case, trade increases aggregate unemployment in the larger country.[9]

Their model of trade and equilibrium job search has been extended to include workers with different skill levels. Moore and Ranjan (2005) investigate the dynamic and static effects of globalization and skill-biased technological change on unemployment rates.[10] In their model, there are two factors of production, skilled and unskilled workers, and two countries that differ in their relative factor endowments. The factor endowments determine the pattern of comparative advantage. In a relatively skill-abundant country, international trade increases the relative price of the skill-intensive products. This reduces the unemployment rate of skilled workers and increases the unemployment rate of unskilled workers. This is similar to the findings in Davidson, Martin and Matusz (1999), but with this distinction between skilled and unskilled workers.[11] Moore and Ranjan find that opening a country to international trade increases the unemployment rate (and lowers real wages) in one sector and lowers the unemployment rate (and raises real wages) in the other sector. The effect on the aggregate unemployment rate is generally ambiguous: it depends on the relative size of the two sectors.

Dutt, Mitra, and Ranjan (2009) incorporate traditional sources of comparative advantage into their model of trade and unemployment. They include international differences in productivity and

[9] Davidson, Martin, and Matusz also show how equilibrium search in labor markets modifies well-known trade theoretic results: they find that the Stolper-Samuelson Theorem holds for searching factors of production, but the effects on the returns to employed factors are more complicated.

[10] Their analysis is mainly theoretical, with some simulations. They include a brief discussion of macroeconomic data for the United States and Europe in their final section.

[11] Moore and Ranjan use this distinction to isolate the effects of skill-biased technological change from the effects of globalization.

factor abundance, as well as search frictions in labor markets. They derive several theoretical predictions about the relationship between trade liberalization and aggregate unemployment rates. They find that the effect of an increase in trade on a country's aggregate unemployment rate depends on the reason for the trade: when trade is due to international differences in productivity, as in a Ricardian model of trade, trade liberalization unambiguously reduces unemployment; when trade is due to international differences in factor abundance, as in a Hecksher-Ohlin model of trade, trade liberalization reduces unemployment in a relatively labor-abundant country but may increase unemployment in a relatively labor-scarce country like the United States.

Job search and equilibrium unemployment have also been incorporated into models of international trade with product differentiation and firm heterogeneity.[12] Helpman and Itskhoki (2010) present a two-sector, two-country model in which searching workers are unemployed, and the two countries vary in their matching efficiency and their costs of posting vacancies. One of the sectors in each country produces differentiated goods, while the other sector produces homogeneous goods. In some cases, aggregate unemployment can rise in response to falling trade costs, though this is not always true.[13] The model produces sharp predictions about the effects of trade on economic welfare – both countries gain from trade – but more ambiguous predictions about the effects of trade on aggregate unemployment rates. Assuming that there are no search frictions and therefore no unemployment in the homogenous goods sector, lowering barriers to trade can increase a country's aggregate unemployment rate by expanding the share of production in the country's differentiated products sector. This theoretical result holds for symmetric countries in which each country's differentiated products sector has a higher unemployment rate than its homogeneous products sector prior to the reduction in trade costs.

Helpman, Itskhoki, and Redding (2010) extend the model in Helpman and Itskhoki (2010) by adding job-specific differences in worker ability. Firms try to screen out workers with low ability. In their model, both within-industry wage inequality and unemployment are affected by trade. The most productive firms export and pay higher wages. Trade can affect the equilibrium

[12] Pioneered by Melitz (2003), this class of trade models emphasizes the role of firm heterogeneity in understanding the selection of firms into exporting and the effect of trade on economic welfare.

[13] The model's predictions about the effects on unemployment depend on the levels of trade impediments and labor market rigidities in the two countries.

unemployment rate. Trade liberalization reallocates resources toward more productive firms that screen more intensively. While the fraction of matched workers that are hired falls, the fraction of workers searching for employment that are matched can rise, so the model's predictions for the effect of trade on unemployment are ambiguous.

The theoretical analysis in Mitra and Ranjan (2010) examines the effect of offshoring, or trade in intermediate goods, on a country's unemployment rate when labor markets are characterized by an equilibrium search process. Offshoring increases the productivity of domestic workers that perform complementary production processes, and this increases their real wages. Their model indicates that offshoring reduces aggregate unemployment as long as there is perfect labor mobility between sectors. On the other hand, the effects on aggregate unemployment rates are ambiguous if there is limited labor mobility between the sectors of the economy.

3. Empirical Studies

Davidson and Matusz (2004) elaborate on the theoretical model in Davidson, Martin, and Matusz (1999), but they also provide an empirical analysis and a discussion of implications for labor market policies.[14] In their empirical analysis, they find that there are higher job destruction rates in import-competing industries, turnover rates help to explain pattern of trade, and political activity to influence trade policy is consistent with some of the predictions of their theoretical models. However, none of these empirical findings directly address their theoretical predictions about the effects of trade on unemployment rates.

On the other hand, a number of important studies have directly estimated the effect of trade on aggregate unemployment rates. Dutt, Mitra, and Ranjan (2009) empirically test the predictions of their own theoretical model, described above, using a set of econometric models and data for 90 countries in the 1990s. Their cross-sectional regressions include the country's unemployment rates as the dependent variable and several different trade policy measures and economic characteristics of the countries as explanatory variables. They find that the countries' unemployment rates are negatively related to the trade openness of the countries and positively related to the magnitude of trade barriers. They also estimate a dynamic econometric model of unemployment rates during the

[14] Davidson and Matusz (2004) also include a survey of related literature. Davidson and Matusz (2010) collect many related articles by the two authors.

period 1985-2004. They find that the countries' trade liberalizations led to immediate increases in unemployment rates that dissipated in the long run.

Felbermayr, Prat, and Schmerer (2011) report an econometric analysis of a panel of 20 OECD countries and a broader cross-section of 62 countries for the period 1990-2007. Their empirical analysis does not test a specific theoretical model. Instead, their aim is to document robust facts about the relationship between the rate of unemployment and trade, and they do this by adding measures of trade openness into a regression framework previously established in the macroeconometric literature on differences in national unemployment rates.[15] They average the country-year unemployment rates over five-year periods to remove business cycle fluctuations. Their models control for international differences in labor market institutions. They find that a ten percentage point increase in trade openness reduces aggregate unemployment by about three quarters of one percentage point. The reduction is due primarily to the reduction in the unemployment of highly skilled workers. The result is not sensitive to the choice of sample, the estimation methodology, or the particular measures of openness or unemployment.

The empirical literature is developed further in Felbermayr, Larch, and Lechthaler (2013). They present a two-country theoretical model that predicts that higher labor market frictions in a country will increase the country's own unemployment rate but also the unemployment rates in its trading partners. Their key insight is that higher unemployment in one country reduces its demand for imports through income effects, and in this way it spills over to the unemployment rates in the country's trading partners.[16] The model predicts that a reduction in trade costs between two countries leads to a decrease in the equilibrium unemployment rates in both countries. The strength of the international spillover of one country's labor market institutions onto its trading partner's unemployment rate depends on relative country size and also on the magnitude of international trade costs.

They test the predictions of their model with panel data on the unemployment rates of 20 OECD countries for the time period 1982-2003. They estimate the magnitude of these spillover effects in

[15] They estimate many versions of their econometric specification in order to address potential problems with measurement error and simultaneity bias.

[16] Their model is not exactly estimating the effects of trade on unemployment; it is quantifying the effects of labor market institutions in different countries on the unemployment rate in each country when there is international trade. Their measures of labor market institutions include an index of real wage flexibility, union density, and a labor participation tax rate.

an econometric model that controls for business cycle fluctuations and for the labor market institutions in the partner countries. They find that the effect of foreign institutions on domestic unemployment is about ten percent of the effect of domestic institutions, and that wage flexibility reduces the size of the unemployment spillovers. They also find that expanding international trade reduces unemployment rates. They estimate that, all else equal, a one standard deviation increase in trade openness lowers unemployment rates by 1.4 percentage points.

Finally, Autor, Dorn, and Hanson (2013) estimate the effects of the large increase in U.S. imports of manufactured goods from China between 1990 and 2007 on labor market outcomes in different parts of the United States. They derive their main econometric specification from a theoretical model of trade that does not include unemployment. However, they incorporate unemployment rates into their regressions as a sensitivity analysis. They rerun the model with the unemployment rate in each local labor market (called a commuting zone) as the dependent variable. They estimate that every $1000 in imports from China per local worker increased the number of unemployed in the affected local market by 4.9 percent.[17] They estimate that there was a larger impact on the unemployment of workers who do not have a college education, and this leads to a rise in enrollments in Social Security Disability Insurance programs.

4. Conclusions

We have reviewed the recent theoretical and empirical literature that links international trade to aggregate unemployment rates. While many of the underlying studies are mathematically complicated, we have tried to describe their assumptions, methodologies, and findings in an accessible way. Many of the studies that we have reviewed are large and elaborate, and we have tried to focus our review more narrowly on the parts of the studies that deal directly with how international trade affects unemployment rates. The theoretical models that we have reviewed find that there is a complex and often ambiguous relationship between trade and aggregate unemployment rates in the long run. Nevertheless, they demonstrate that it is feasible to incorporate unemployment into formal models of international trade, and that these models with unemployment can yield unique insights into the impact of trade on labor markets. The accompanying empirical literature provides evidence that trade tends to reduce aggregate unemployment rates. However, this empirical literature rarely links unemployment directly to

[17] These additional estimates are reported in Table 5 of Autor, Dorn, and Hanson (2013).

trade policy (it usually links it to trade flows), and a more direct link to trade policy would be a useful extension that might better inform policy-making.

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