United States International Trade Commission
Journal of International Commerce and Economics

Theory and Empirical Evidence Linking International Trade to Unemployment Rates

Web Version:
May 2015

Authors[1]:
Maksim Belenkiy and David Riker

Abstract

In this article, 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 unemployment: whether trade increases or reduces unemployment rates 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.

Suggested citation: Belenkiy, Maksim and David Riker. "Theory and Empirical Evidence Linking International Trade to Unemployment Rates." *Journal of International Commerce and Economics.* Published electronically May 2015. *http://www.usitc.gov/journals/jice_home.htm.*

[1] George Mason University School of Public Policy (Belenkiy) and U.S. International Trade Commission, Office of Economics (Riker). This article represents solely the views of the authors and not the views of the United States International Trade Commission or any of its individual Commissioners. This paper should be cited as the work of the authors only, and not as an official Commission document. Please direct all correspondence to David Riker, Office of Economics, U.S. International Trade Commission, 500 E Street, SW, Washington, DC 20436, or by email to *David.Riker@usitc.gov.*

INTRODUCTION

There is a significant disconnect between the policy debate on the impact of trade policies on American 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 is exactly offset by job creation, with no effect on unemployment rates. 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 policy initiatives.

So why is the assumption of full employment the norm? One reason is the prevailing view that the unemployment rate 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] 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. A second reason for the assumption of full employment is 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 used to represent labor markets as well as product 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 by assumption. However, this is not a realistic description of most labor markets. Workers are not matched to employers through an organized exchange; job matching can require costly and time-consuming search. While the prevalence of these types of market imperfections is widely recognized, they are difficult to represent in a formal economic model. A third 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.[3]

In recent years, there have been significant efforts to incorporate unemployment into models of trade – to change the norm but 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 tie into but extend well-established models of trade with differentiated products, factor proportions, or productivity differences.

---

[2] Krugman (1993) makes this point.

[3] Most theoretical models of international trade, including the Hecksher-Ohlin model, the Ricardian model, and almost all models with product differentiation and firm heterogeneity assume full employment. Similarly, most computable general equilibrium models, including the standard GTAP model, assume full employment.

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.[4] In equilibrium search models, frictional unemployment arises, even in the long run, due to imperfect information in labor markets. Frictional unemployment is an economic phenomenon that is distinct from cyclical unemployment (due to business cycle fluctuations) and structural unemployment (due to developments that can impede market clearing). 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.

There is a related branch of the new literature that models unemployment as the result of market imperfections unrelated to search. The non-search models of trade and unemployment include the efficiency wage models in Egger and Kreickemeier (2009) and Davis and Harrigan (2011) and the model of minimum wages in Davis (1998).[5] In the efficiency wage models, firms offer higher-than-equilibrium wages to prevent workers from reducing their effort on the job.

In this review, we focus on the search models, simply because they are more common in the trade literature and because we want to avoid introducing too many conflicting models of labor markets within this brief review.[6] Our review focuses on economic journal articles that model the effect of trade and trade policy on aggregate unemployment rates through their effect on job search.[7] Table 1 reports their main conclusions about the effect of international trade on aggregate unemployment rates.

Table 1: Summary of Selected Economic Literature

Authors and Year	Approach	Effect of Trade on Unemployment Rates
Davidson, Martin, and Matusz (1999)	Theoretical	The unemployment rate in a relatively capital abundant country with a more efficient labor market (like the U.S.) will increase when it liberalizes its trade with relatively labor abundant countries.

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

[5] 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 wage setting. In the benchmark version of their model, both wage inequality and aggregate unemployment rise with trade liberalization.

[6] 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) analyzes labor market churning within an industry and changes in the number of jobs that pay above average wages.

[7] 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 rates. Several of the studies examine the effects of trade on wage inequality as well as unemployment rates.

Authors and Year	Approach	Effect of Trade on Unemployment Rates
Moore and Ranjan (2005)	Theoretical	Opening a country to international trade increases the unemployment rate in some sectors and lowers it in others. The effect on the aggregate unemployment rate is generally ambiguous: it depends on the relative size of the sectors.
Dutt, Mitra, and Ranjan (2009)	Theoretical and Econometric	In their econometric analysis, they find that a country's aggregate unemployment rate is negatively related to the trade openness of the country and positively related to the magnitude of its trade barriers.
Helpman and Itskhoki (2010)	Theoretical	Aggregate unemployment rates can rise in response to falling trade costs. If there are no search frictions in homogenous product sectors, then lowering barriers to trade can increase the aggregate unemployment rate by expanding the share of the country's production in the differentiated product sectors, where there is frictional unemployment.
Helpman, Itskhoki, and Redding (2010)	Theoretical	Trade liberalization reallocates resources toward more productive firms that evaluate the quality of workers more intensely before hiring them. Trade liberalization increases the pool of workers that can be matched, but fewer of the matches lead to successful hires.
Mitra and Ranjan (2010)	Theoretical	Offshoring, or trade in intermediate products, reduces aggregate unemployment rates as long as there is a high degree of labor mobility between sectors.
Felbermayr, Prat, and Schmerer (2011)	Econometric	They find that a ten percentage point increase in trade openness reduces a country's aggregate unemployment by approximately three quarters of one percentage point.
Felbermayr, Larch, and Lechthaler (2013)	Econometric	They 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 percent.

We have organized the articles into two groups: 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. They do not provide a general prediction for whether international trade increases or decreases aggregate unemployment in a country. 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 THEORETICAL MODELS OFFER AMBIGUOUS PREDICTIONS

Davidson, Martin, and Matusz (1999) incorporate equilibrium job search into a model of international trade with sectors and countries that vary in their job turnover rates.8 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 in the sectors of the economy. When an employment match is created, it lasts until an exogenous shock causes the worker to separate from his or her match. 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 also be a source of comparative advantage in international 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 have a compositional effect on 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 job 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 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 relatively labor-abundant country. In this case, trade increases the aggregate unemployment rate in the capital abundant country.[9]

---

[8] Davidson and Matusz (2010) collect many related articles by the two authors.

[9] Davidson, Martin, and Matusz also demonstrate that 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.

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. 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. 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 in 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.[11] 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 rates can rise in response to falling trade costs, though this is not always true.[12] The model produces clear 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. If there are no search frictions and therefore no unemployment in the homogenous goods sector, then lowering barriers to trade can increase a country's aggregate unemployment rate by expanding the share of production in the country's differentiated goods sector. This theoretical result holds for symmetric countries

[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] 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.

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

in which each country's differentiated goods sector has a higher unemployment rate than its homogeneous goods 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 that firms can determine through costly applicant screening. 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 unemployment rate. Trade liberalization reallocates resources toward more productive firms that evaluate the quality of workers more intensely before hiring them. The model's predictions for the effect of trade on unemployment rates are ambiguous, because trade liberalization increases the pool of workers that can be matched, but fewer of the matches lead to successful hires.

Finally, the theoretical analysis in Mitra and Ranjan (2010) examines the effect of offshoring, or trade in intermediate products, 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 different sectors of the economy.

THE EMPIRICAL STUDIES TELL A SIMPLER STORY

A number of empirical 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 countries' 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.[13] They also estimate a dynamic model of unemployment rates during the period 1985-2004. They find that the trade liberalizations led to immediate increases in unemployment rates that only resolved over 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 aggregate unemployment rates and trade, and they do this by adding measures of trade openness into a regression framework previously established in the

[13] The countries' openness is measured as the ratios of their total trade (exports plus imports) to their total output. The measures of trade barriers include average external tariff data from the World Bank.

macroeconometric literature on differences in national unemployment rates.[14] 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.[15] 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, estimation methodology, or 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 predicting that higher labor market frictions in a country will increase both the country's own unemployment rate and 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 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. It also predicts that 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 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 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 percent. They also estimate the magnitude of these spillover effects in 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.

CONCLUSIONS

We reviewed the recent theoretical and empirical literature linking 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 a brief and accessible way. Several of the studies that we have reviewed are large and elaborate, and we have

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

[15] The authors use measures of union coverage, the extent of employment protection legislation, and average tax rates on wages from the OES as measures of labor market institutions.

[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.

focused our review narrowly on the parts of the studies that deal directly with how international trade affects unemployment rates. The theoretical models we 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 equilibrium 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. This empirical literature rarely links unemployment rates directly to measures of trade policy, but rather the magnitude of trade flows. A more direct link to trade policies would be a useful extension of the literature that might better inform trade policy debates.

The literature that we reviewed is a relatively small branch of a much larger economics literature on the link between international trade and labor market outcomes. Interested readers should also investigate the other branches that do not focus on unemployment (and therefore fall outside of the scope of our review). For example, there is a large and informative literature on the effects of trade on wages. Haskel, Lawrence, Leamer, and Slaughter (2012) provide an excellent review of this branch of the literature. There is a branch that estimates the effects of trade and trade liberalization on the level of employment within specific sectors of the economy, including Trefler (2004).[17] There is another branch that estimates the temporary effects of trade liberalization on employment, as workers transition between sectors, including Artuç, Chaudhuri, and McLaren (2010).[18]

[17] Trefler 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.

[18] Artuç, Chaudhuri, and McLaren 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.

REFERENCES

Artuç, Erhan, Shubham Chaudhuri, and John McLaren (2010): "Trade Shocks and Labor Adjustment: A Structural Empirical Approach." *American Economic Review* 100 (3): 1008-45.

Davidson, Carl, Lawrence W. Martin, and Steven J. Matusz (1999): "Trade and Search Generated Unemployment." *Journal of International Economics* 48: 271-99.

Davidson, Carl and Steven J. Matusz (2010): *International Trade with Equilibrium Unemployment*. Princeton and London: Princeton University Press.

Davis, Donald R. (1998): "Does European Unemployment Prop Up American Wages? National Labor Markets and Global Trade." *American Economic Review* 88: 478-94.

Davis, Donald R. and James Harrigan (2011): "Good Jobs, Bad Jobs, and Trade Liberalization." *Journal of International Economics* 84: 26-36.

Diamond, Peter (1982): "Wage Determination and Efficiency in Search Equilibrium." *Review of Economic Studies* 49: 217-228.

Dutt, Pushan, Devashish Mitra, and Priya Ranjan (2009): "International Trade and Unemployment: Theory and Cross-National Evidence." *Journal of International Economics* 78: 32-44.

Egger, Hartmut and Udo Kreickemeier (2009): "Firm Heterogeneity and the Labor Market Effects of Trade Liberalization." *International Economic Review* 50: 187-216.

Felbermayr, Gabriel, Mario Larch, and Wolfgang Lechthaler (2013): "Unemployment in an Interdependent World." *American Economic Journal: Economic Policy* 5: 262-301.

Felbermayr, Gabriel, Julien Prat, and Hans-Jörg Schmerer (2011): "Trade and Unemployment: What Do the Data Say?" *European Economic Review* 55: 741-58.

Harrigan, James (2011): "Book Review of International Trade with Equilibrium Unemployment by Carl Davidson and Steven J. Matusz." *Journal of International Economics* 84: 131-34.

Haskel, Jonathan, Robert Z. Lawrence, Edward E. Leamer, and Matthew J. Slaughter (2012): "Globalization and U.S. Wages: Modifying Classic Theory to Explain Recent Facts." *Journal of Economic Perspectives* 26: 119-140.

Helpman, Elhanan and Oleg Itskhoki (2010): "Labor Market Rigidities, Trade and Unemployment." *Review of Economic Studies* 77: 1100-37.

Helpman, Elhanan, Oleg Itskhoki, and Stephen Redding (2010): "Inequality and Unemployment in a Global Economy." *Econometrica* 78: 1239-83.

Krugman, Paul (1993): "What Do Undergrads Need to Know About Trade?" *American Economic Review* 83: 23-26.

Melitz, Marc J. (2003): "The Impact of Trade on Intra-Industry Reallocations and Aggregate Industry Productivity." *Econometrica* 71: 1695-1725.

Mitra, Devashish and Priya Ranjan (2010): "Offshoring and Unemployment: the Role of Search Frictions Labor Mobility." *Journal of International Economics* 81: 219-229.

Moore, Mark P. and Priya Ranjan (2005): "Globalisation vs Skill-Biased Technological Change: Implications for Unemployment and Wage Inequality." *Economic Journal* 115: 391-422.

Mortensen, Dale (1982): "The Matching Process as a Non-Cooperative Bargaining Game." In: McCull, J.J. (Ed.) *The Economics of Information and Uncertainty*. Chicago: University of Chicago Press.

Mortensen, Dale and Christopher Pissarides (1994): "Job Creation and Job Destruction in the Theory of Unemployment." *Review of Economic Studies* 61: 397-415.

Pissarides, Christopher (1990): *Equilibrium Unemployment Theory*. Oxford: Basil Blackwell.

Trefler, Daniel (2004): "The Long and Short of the Canada-U.S. Free Trade Agreement." *American Economic Review* 94: 870-95.