

Chapter 1

OUR MOTIVATION

In 1992 H. Ross Perot ran as an independent candidate for the presidency of the United States. Two of his major campaign issues were the size of the national debt and a promise to block the passage of the North America Free Trade Agreement (NAFTA) in response to fears that this would lead to large job losses for American workers. Perhaps the most well-known phrase from this campaign was tied to his prediction that the passage of NAFTA would result in a “giant sucking sound” as jobs headed south for Mexico where wages were significantly below those paid in the United States. Playing off of such fears, Perot garnered roughly 19% of the popular vote, making him the second most successful third-party presidential candidate over the past hundred years.¹

Perot is not the only politician to argue that there is a strong link between international trade and jobs. In fact, we would argue that this is the norm. Almost every public debate about trade policy seems to focus on how job creation and job destruction will be affected. The two sides always seem to agree on what the central issue is—trade and jobs—they just disagree about the likely impact of openness on employment. Those who favor freer trade argue that one of its primary benefits is that openness expands our export markets and therefore creates new jobs. In contrast, those that favor trade restrictions worry that liberalization allows countries to shift production to lower wage countries, thereby destroying domestic jobs.

Most academic economists specializing in international economics view both of these arguments as fundamentally flawed. The standard view seems to be that overall employment is largely independent of trade policy and that the primary impact of trade on workers comes through

¹ Teddy Roosevelt was the most successful third-party candidate over the past 100 years, collecting over 27% of the popular vote and 88 electoral votes in 1912. Since then, Perot was the most successful third-party presidential candidate in terms of the popular vote, but he failed to carry a single state and therefore won zero votes in the Electoral College. In terms of the Electoral College, the most successful candidate since 1912 was George Wallace, who won five states and forty six electoral votes in 1968. Wallace was popular only in the South, however, and won only 13.5% of the popular vote.

the changes in their wages. Given this firm belief that trade does not affect aggregate employment, the profession has tended to rely almost exclusively on full-employment models to investigate the link between trade and worker welfare.

Since the early 1980s, we have argued that this reliance on full-employment modeling, by its very nature, misses the point and that it is time to extend conventional trade models to take into account the market imperfections that lead to equilibrium unemployment. We have made this argument in many articles, but each one taken separately addressed only a small subset of issues. In this book, we bring much of our work together. We believe that the value of this exercise is in highlighting a coherent research agenda that has yielded many new insights and strengthens the case that there awaits much fruitful and important research. In particular, we hope to convince our readers that the modeling techniques required to add unemployment to standard trade models are now available and that significant new insights can be gained from such an extension. Moreover, we emphasize that the development of such models allows for the consideration of important issues that simply cannot be addressed in a full-employment framework.²

Our goal in this introductory chapter is to make the case that models built around full employment, while clearly useful in understanding many of the most subtle issues involving international trade, are ill equipped to seriously tackle a variety of critically important trade-related issues, for which a deep understanding demands more textured modeling of the labor market. Whereas many reasons led us to believe this to be the case, we concentrate here on the three that we consider to be most compelling. These three reasons are tied to recent developments in labor economics and macroeconomics as well as the apparent disconnect between the public and academic views of the impact of trade on labor market outcomes. Once we have made our case, we then go on to briefly summarize the contents of the book and provide a rationale for its organization.

Reason 1: A lack of adequate research on trade with unemployment leaves a vacuum to be filled by protectionist pressure.

It is easy to make the case that many noneconomists, including those in position to craft policy, seem absolutely convinced that international

² A great deal of applied policy analysis is conducted by use of computable general equilibrium (CGE) models such as the Michigan Model of World Production and Trade. However, these models are all constructed under an assumption of full employment. See, for example, Brown, Deardorff, and Stern (2001). As one reviewer for this book notes, equilibrium unemployment has not yet made its way into CGE modeling, and this is an area that could bring great payoffs. See footnote 4 for further views on this issue.

trade is all about the jobs that it creates and/or destroys. We began this chapter by pointing to H. Ross Perot's well-known prediction about the "giant sucking sound" that would occur as American jobs moved to Mexico following the passage of NAFTA. Perot was not in favor of trade liberalization with Mexico and made his prediction in an effort to block NAFTA's passage. Of course, we could have just as easily focused on the statement made by George H. W. Bush when on a 1992 trade-promoting visit to Japan he declared that his trip was all about generating "jobs, jobs, jobs." A few other choice quotes from the NAFTA debate help to underscore the prevalence of this view. Note that in each case, the main focus is on the link between trade and jobs:

Unfair trade agreements, passed by both Republicans and Democrats, have sent millions of jobs to other countries. We need to stop this hemorrhaging and find ways for American workers to compete in the new market. Russ Feingold (U.S. Senator–Wisconsin, February 2005)

The Bush Administration and the Congress have to stop ignoring this crisis in international trade. The longer we ignore it, the more American jobs will move overseas. It's just that simple. Byron Dorgan (U.S. Senator–North Dakota, March 2005)

There is \$1.4 billion a day in trade that goes back and forth across the border. That means millions of jobs and livelihoods for families here in Canada and for families in the United States. Paul Cellucci (U.S. Ambassador to Canada, March 2005)

Some have even suggested that NAFTA resulted in an outcome that harmed workers on *both* sides of the border, with Mexican workers losing jobs and suffering wages losses along with their American counterparts:

Since NAFTA was put in place, Mexico has lost 1.9 million jobs and most Mexicans' real wages have fallen. Stephen Lynch (U.S. Congressman–Massachusetts, May 2005)

And this view of trade is not an American phenomenon; it is true in virtually every part of the world:

The global economy is a fact. The expansion of world trade—with exports up over 50 percent since 1990—has created millions of new jobs and offered many the chance to move from poverty towards prosperity. . . . [A]bove all . . . more open markets and more trade means growth and new jobs. Tony Blair (Statement to the WTO, 1998)

[Free trade is] the key to jobs for our people, prosperity and actually to development in the poorest parts of the world. Tony Blair (Statement to Canadian Parliament, 2001)

Finally, we note the seemingly far-fetched suggestion that the link among trade, jobs, and economic growth is so strong that liberalizing trade is an ideal way to fight terrorism:

Trade creates jobs and lifts people out of poverty. And when that happens, societies stabilize and grow. And there is nothing like a stable society to fight terrorism and strengthen democracy, freedom and rule of law. Dennis Hastert (Speaker of the House, July 2005)

Of course, we could easily fill all the pages of this book with more quotes that would support this contention, but we do not think we have to—we would be surprised if anyone disagrees with us.

Given the chorus of public opinion and statements by politicians of all stripes regarding the links between employment and trade, it might be natural for the academic community to provide guidance to those who wish to become informed and sort out the arguments. After all, better policies are likely to result if they are based on scientific principles rather than a politician's gut instincts. In fact, we heartily agree with the sentiments of the former U.S. Senate Majority Leader Bill Frist, who argued that “sound science must be a basis to governing our trade relations around the globe.” So, if we turn to academia, what do we find? We believe that the following two quotes, which we have used repeatedly to motivate interest in our previous work, capture the mainstream view among economists specializing in international economics:

It should be possible to emphasize to students that the level of employment is a macroeconomic issue . . . depending in the long run on the natural rate of unemployment, with microeconomic policies like tariffs having little net effect. Paul Krugman (*American Economic Review*, 1993)

Economists understand that the effect of protectionist policies is not on the overall employment of domestic resources, but rather on the allocation of resources across productive activities. Michael Mussa (*American Economic Review*, 1993)

The point that Krugman and Mussa are making is a simple one that is generally accepted by macroeconomists: the level of aggregate economic activity is dictated solely by macroeconomic variables such as the money supply. While we understand and respect this view, we also feel that it is a mistake to dismiss the public's concerns about trade and jobs so casually. We have several reasons for this. To begin with, very little direct empirical evidence supports the view that aggregate unemployment is independent of trade policy. Although it is true that a large number of studies have examined the impact of trade on jobs, virtually all of these focus on a specific industry or a set of industries (e.g., manu-

facturing in the United States), and almost none look at aggregate employment (see chapter 2 of Davidson and Matusz 2004 for a detailed review of the evidence).

Moreover, we would argue that there are good reasons to suspect that trade policy *must* affect the natural rate of unemployment in most economies. This follows from the observation that labor market frictions clearly exist and seem to vary across geographic regions within countries and sectors across economies.³ Differential frictions suggest different “natural rates” of unemployment that are both region specific and sector specific. By construction, the economywide natural rate of unemployment is a convex combination of these component parts. By reallocating resources across regions and sectors, more liberal trade necessarily changes the weighting scheme and must therefore affect the economywide natural rate of unemployment. For example, the economywide natural rate of unemployment would increase if more liberal trade induced a shift of resources from sectors with relatively low natural rates of unemployment to those with relatively high natural rates.

This point has been made in a number of articles including Davidson, Martin, and Matusz (1987, 1999), Matusz (1985, 1994), and, more recently, Helpman and Itskhoki (2007) and Helpman, Itskhoki, and Redding (2008). In addition, Janiak (2006) recently embedded equilibrium unemployment in a Melitz (2003) model of monopolistic competition and firm heterogeneity and demonstrated that higher trade exposure results in lower aggregate employment. This result is supported by Janiak’s subsequent empirical work showing that a one-point increase in the import penetration ratio results in a 14.7-point increase in the job destruction rate without any significant increase in the rate of job creation. Additional empirical work on the link between trade and unemployment can be found in Dutt, Mitra, and Ranjan (2008).

While the overall impact of trade on unemployment is an empirical question, our expectation is that it is likely to be quite small. And this issue has never been the focus of our research (which is why this book is *not* titled *Trade and Unemployment*). This leads to a natural question: If our conjecture is correct and trade has only a small effect on aggregate unemployment, what is the cost of simply using full-employment models to investigate trade issues? Our answer consists of two parts; one is tied to the manner in which our views are perceived by the public and the other deals directly with a substantive research issue.

³The fact that neither the average duration of unemployment nor the average duration of a vacancy is close to zero firmly establishes the existence of frictions in the labor market. And the enormous literature that has followed the pioneering work of Davis, Haltiwanger, and Schuh (1996) on job creation and job destruction in U.S. manufacturing clearly indicates that these rates vary dramatically across industries and across countries.

It is one thing for scientists to dismiss as irrelevant those who believe the Earth is flat. Virtually everyone can tell the difference between fact and fiction with respect to the shape of our planet. In contrast, issues as fundamental to economists as comparative advantage are not as firmly established among the wider public. By assuming away the connection between trade and unemployment, which many people believe to be both real and important, we make it all too easy for those who push for protectionist measures in the popular press to simply dismiss anything that economists have to say about trade. As an example, consider the following passage from an April 2006 article in the *Monthly Review* by Martin Hart-Landsberg titled “Neoliberalism: Myths and Reality”:

Like all theories, the theory of comparative advantage (and its conclusion) is based on a number of assumptions. Among the most important are:

- There is perfect competition between firms.
- There is full employment of all factors of production.
- Labor and capital are perfectly mobile within a country and do not move across national borders.
- A country’s gains from trade are captured by those living in the country and spent locally.
- A country’s external trade is always in balance.
- Market prices accurately reflect the real (or social) costs of the products produced.

Even a quick consideration of these assumptions reveals that they are extensive and unrealistic. Moreover, if they are not satisfied, there is no basis for accepting the theory’s conclusion that free-market policies will promote international well being. For example, the assumption of full employment of all factors of production, including labor, is obviously false. Equally problematic is the theory’s implied restructuring process, which assumes that (but never explains how) workers who lose their jobs as a result of free-trade generated imports will quickly find new employment in the expanding export sector of the economy. In reality, workers (and other factors of production) may not be equally productive in alternative uses. Even if we ignore this problem, if their reallocation is not sufficiently fast, the newly liberalized economy will likely suffer an increase in unemployment, leading to a reduction in aggregate demand and perhaps recession. Thus, even if all factors of production eventually become fully employed, it is quite possible that the cost of adjustment would outweigh the alleged efficiency gains from the trade-induced restructuring.

The author’s message in this passage is clear: because academics use full-employment models, our results have no credibility. Although we do not agree with this conclusion, we must admit that we are sympathetic to some of the points that are made along the way. For example, while

the profession acknowledges the existence of trade-related adjustment costs, little effort has been directed at quantifying them at an aggregate level. In addition, whereas the profession acknowledges that trade harms some agents, we have not spent a great deal of energy trying to figure out the best way to redistribute the gains from trade in order to compensate those who lose (so that a true Pareto improvement can be achieved). There has been some work on these topics, but not nearly as much as one would expect given the prominence these issues command in public discourse. It is not hard to figure out why: these issues cannot be examined in full-employment models, which are the bread and butter of our field.

We want to make it clear that we are not questioning the value of abstraction. Models will always be filled with unrealistic assumptions and the profession will always be vulnerable to criticism like the one provided above. But when it comes to trade issues, assuming away unemployment is, in our minds, especially problematic given the recent evidence that the *personal* cost of worker dislocation may be quite high. For example, Jacobson, LaLonde, and Sullivan (1993a, b) find that the average dislocated worker suffers a loss in lifetime earnings of \$80,000, with much of the loss attributed to a lower reemployment wage. And, more recently, Kletzer (2001) reported that the average dislocated worker in her study took a 13% pay cut on his or her new job. These are the kinds of personal costs that often accompany changes in trade policy that appear to be of paramount importance to many in the public domain. And even if the aggregate gains from trade swamp such personal losses, the profession appears heartless and disconnected from the concerns of common citizens when it ignores them.⁴ This has led several prominent economists such as Alan Blinder and Dani Rodrik to call on economists to think more deeply

⁴ Or, at the very least, it makes it easy for critics to paint academic economists as out of touch with the concerns of common citizens. A good example of this comes from Peter Dorman's 2001 Economic Policy Institute Briefing Paper (111) titled "The Free Trade Magic Act" in which he completely dismisses estimates of the gains from liberalization provided by highly respected economists Drusilla Brown, Alan Deardorff, and Robert Stern (2001). Dorman argues that their estimates cannot be trusted since the analysis "depends on five sleights of hand." In particular, he states that "The model is flagrantly disconnected from the real world. It assumes that no one is ever unemployed, trade balances never change, and credit is always available to everyone." He also points out that the model ignores the costs of trade liberalization: "All economic analysis must simplify, but what matters in any debate is the usefulness of the assumptions. Critics and supporters of free trade are trying to determine whether the benefits of liberalization exceed the costs. As mentioned earlier, Brown-Deardorff-Stern assume away all criticisms of globalization." Dorman attempts to underscore this point by pointing out (again) that "They further assume full employment of labor in all countries at all times. Workers who lose jobs in one industry instantaneously find others somewhere else."

about our attitude toward trade policy.⁵ One of the major points that we hope to make in this book is that there is no need to continue to rely on full-employment models—the tools are now available to build and analyze general equilibrium models that allow for equilibrium unemployment. Doing so and using these models to analyze standard trade issues will make it far more difficult for our critics to ignore our claims.

More fundamentally, and this is the substantive research issue alluded to above, we will argue that models that take into account the market imperfections that generate equilibrium unemployment are likely to behave in *significantly* different ways than models that assume perfectly competitive frictionless labor markets. In fact, much of our research has been devoted to sorting out how the presence of unemployment changes a number of underlying relationships in general equilibrium open economy settings (which is why we decided on the title *Trade with Unemployment*). For example, in chapters 1 and 2 of this book we show that the link between trade and factor rewards, governed by the Stolper-Samuelson theorem in the full-employment Heckscher-Ohlin-Samuelson (HOS) model, is substantively different when there are frictions in the labor market.

Reason 2: Macroeconomics teaches us that imperfections in the labor market are important.

Do models that account for unemployment behave in approximately the same way as full-employment models? If so, then our reliance on full-employment models is probably judicious and pragmatic—the models probably would yield similar conclusions and full-employment models would be far more tractable. However, if these models differ in fundamental ways, then relying on full-employment models may lead to faulty conclusions and may obscure key insights. If this is the case, then it is important to understand how the models differ.

To address this issue, we start by going back to 1968 when Milton Friedman gave his Presidential Address to the American Economic Association and defined the “natural rate of unemployment” in the following way:

The “natural rate of unemployment,” in other words, is the level that would be ground out by the Walrasian system of general equilibrium equations, provided there is embedded in them the actual structural characteristics of the

⁵ See, for example, section III.A of Blinder’s 1988 Richard T. Ely Lecture in the *American Economic Review* in which he challenged trade economists to take the issue of unemployment seriously. More recently, see the articles in the *Wall Street Journal* “Job Prospects: Pain from Free Trade Spurs Second Thoughts—Mr. Blinder’s Shift Spotlights Warnings of Deeper Downside” and “Politics \$ Economics—CAPITAL: As Globalization’s Benefits Grow, So Do Its Skeptics” (March 28 and 29, 2007, respectively).

labor and commodity markets, including market imperfections, stochastic variability in demands and supplies, the cost of gathering information about job vacancies and labor availabilities, the costs of mobility, and so on.

Although this is just a conjecture on our part, we believe that by invoking the term “Walrasian system” Friedman meant to imply that a general equilibrium model that included these labor market imperfections would share the key features of a standard Walrasian model—in particular, the equilibrium rate of unemployment would be constrained Pareto efficient. Initial work by Lucas and Prescott (1974) seemed to confirm this view.

At the same time that Friedman was pushing his notion of the natural rate of unemployment and the rational expectations revolution was beginning in macroeconomics, significant changes were under way in microeconomics as well. In particular, following George Stigler’s classic papers on the economics of information (Stigler 1961, 1962), an enormous literature on markets with incomplete information began to emerge. For our purposes, the most significant work was related to equilibrium price dispersion. Two key questions needed to be addressed. First, suppose that unemployed workers must search for a job without knowing which firms are offering which wages; what is the optimal search strategy? Second, given that workers search optimally, what would the equilibrium distribution of wages look like? In particular, could a nondegenerate distribution of wages be supported in equilibrium? Determining the equilibrium wage distribution would be a key step in analyzing the efficiency properties of the market outcome and, in particular, the efficiency of the equilibrium rate of unemployment.

Assuming that the worker knows the distribution of wages, the first question was answered by McCall (1965, 1970), who showed that it was optimal for workers to use an optimal stopping rule: searching until finding a wage offer at or above a prespecified level. This prespecified level, the “reservation wage,” was the wage that equated the expected benefit from continued search (in the form of a higher wage) with the marginal cost of additional search. The initial answer to the second question was provided by Diamond (1971) and it was disturbing. Diamond showed that if all workers know the distribution of wages, search using a reservation wage rule, and face positive search costs (no matter how small), then the only equilibrium is characterized by all firms offering the monopsony wage. In other words, optimal search by workers eliminates the need to search! This became known as the “Diamond paradox.”

The Diamond paradox presents two troubling aspects. The first is the implication that it is impossible to build a model of search-generated unemployment in which workers know the distribution of wages and firms

find it optimal to offer different wages.⁶ And if all firms offer the same wage, all workers simply accept the first job offered them, implying that no one is unemployed in equilibrium. In the late 1970s and early 1980s, this aspect of the Diamond paradox was resolved in a number of satisfying ways. Reinganum (1979) pointed out that if firms differ in non-labor costs, then they will not agree on the monopsony wage, and this is enough to generate equilibrium wage dispersion. Burdett and Judd (1983) demonstrated that if firms take time before making offers after the initial contact with the worker (so that a worker might receive a second offer before having to decide on the first one), then this might also result in a nontrivial equilibrium distribution of wages.

The second troubling aspect of the Diamond paradox is that it implies that search costs, no matter how small, can create large inefficiencies—after all, the result that all firms offer the monopsony wage holds regardless of the number of firms and no matter how small the search costs are (as long as they are all positive). Thus models that are “close” to perfect competition may have equilibria that are strikingly noncompetitive.⁷ Moreover, these inefficiencies continue to appear in models such as those formulated by Reinganum (1979) and Burdett and Judd (1983), which were designed to explain equilibrium wage dispersion. One lesson learned from this literature is that it would be an error to simply argue that since search costs are likely to be small, models that include search-generated unemployment are likely to produce equilibria that are similar to those in full-employment models. These early search models predicted quite the opposite!

⁶ Assuming that the workers knew the distribution of wages was necessary for tractability. As Rothschild showed (1974), if the workers do not know the distribution of wages, the optimal search strategy becomes almost impossible to characterize except in a small subset of cases.

⁷ The logic that supports this result is simple and compelling. The proof can be divided into two steps. First, show that in equilibrium all firms must offer the same wage. The second step is to show that the common wage must be the one that a monopsonist would offer. The first part can be proven by contradiction. Suppose that all firms do *not* offer the same wage. Let $\varepsilon > 0$ denote the lowest search cost borne by any worker and let w' denote the highest wage paid by any firm. Then it is clear that any firm offering w' cannot be maximizing profits since it can lower its wage offer by $\varepsilon/2$ without reducing the size of its labor force. To see this, note that no worker would reject the lower offer since he or she would have to pay at least ε to search again and can, at best, increase his or her wage offer by $\varepsilon/2$ by doing so. The lower wage offer reduces the firm's costs without altering output and thus increases profits. The conclusion is that no firm will be willing to offer the highest wage—thus all firms offer the same wage. A similar argument can be used to complete the proof. With all firms offering the same wage, any single firm can (again) lower its wage by $\varepsilon/2$ without causing any worker to reject its offer. If the common wage is above the monopsony wage, profit increases as the wage falls, and all firms choose to reduce their wage. The process continues until all firms pay the monopsony wage.

As search models evolved and macroeconomists began to embed trading frictions in general equilibrium models, their inefficiencies were highlighted and dissected and their implications explored. Peter Diamond (1981, 1982a, 1982b) and Dale Mortensen (1982) emphasized that models with trading frictions are riddled with externalities, making market failure the expected outcome. For example, consider an economy with multiple sectors in which unemployed workers and firms with vacancies must expend time and effort to find each other. Then, any decision by a worker to seek a job in a particular sector makes it harder for other workers in that sector to find a job (a negative externality) while making it easier for firms in that sector to fill their vacancies (a positive externality). Although the external impact on any given worker or firm may be small, a large number of workers and firms are affected. As a result, equilibrium is likely to be suboptimal, and, since each decision generates both positive and negative externalities, the equilibrium rate of unemployment may be too high or too low.

Diamond (1982b) raised another concern by pointing out that models with unemployment are likely to be characterized by multiple equilibria, primarily due to feedback effects and the important role played by expectations about economic activity. To see this, note that the amount of search effort that workers will be willing to expend will be influenced by the number of job opportunities that they expect to be available. If workers expect firms to create a large number of job opportunities, they will be willing to search hard for those openings. And if workers are searching hard, then firms, knowing that new vacancies will be easy to fill, will be willing to create a large number of job opportunities. Thus optimistic, self-fulfilling expectations on the part of workers can lead to an equilibrium with a high level of employment. However, an equilibrium with a low rate of employment may exist as well. This equilibrium is supported by pessimistic, self-fulfilling expectations in which workers expect it to be hard to find a job and therefore choose a low level of search effort. And with workers unwilling to search hard for jobs, firms expect it to be hard to fill new vacancies and thus they do not create many new job opportunities.⁸

While much of our early work focused on the implications of inefficient outcomes and a possible multiplicity of equilibria, we occasionally ran into some rather strong resistance to our basic message. Some individuals

⁸ Multiple equilibria and inefficient equilibrium outcomes are not unique to models with search-generated unemployment. As we discussed at length in Davidson, Martin, and Matusz (1991) and Davidson and Matusz (2004), most models that explain unemployment as the result of labor market imperfections exhibit these two characteristics. For example, this is true of the efficiency wage model (Shapiro and Stiglitz 1984) and the fair-wage model (Akerlof and Yellen 1990).

pointed out that search-generated externalities are hard to measure, so that it is difficult to know just how important they are from a practical standpoint. Similar issues arise with respect to the role of the feedback mechanisms and self-fulfilling expectations that lead to multiple equilibria. We became convinced that if we wanted to persuade economists of the practical aspects of modeling trade with unemployment, we were going to have to hang our hat on results derived in models in which equilibrium is unique and constrained Pareto efficient.

In the mid- to late 1990s we began working with such models and we had little trouble finding concrete examples in which the presence of unemployment significantly altered the underlying structure of the model. For example, in full-employment models the rates at which jobs are created and destroyed play no role in the analysis. This is because with frictionless labor markets worker are always guaranteed that they will find new jobs immediately upon termination. Now, consider a model in which jobs take time and effort to find. In some sectors jobs might be easier to find than in others and some occupations may offer more job security than others. It is not hard to see that turnover rates will now play an important role in workers' occupation choices, as a worker might be willing to trade off a lower wage for greater job security. Lower wages, in turn, translate into lower production costs and hence lower autarkic prices. The implication is that turnover rates may play a role in shaping comparative advantage.

Similar logic suggests that turnover rates should affect the link between trade and wages. If jobs are costly to obtain, a worker will be reluctant to quit even if other sectors offer somewhat higher compensation. This implies that trade frictions make employed factors quasi-fixed and this generates qualitative properties that are characteristic of Ricardo-Viner economies even if the remaining structure of the model is consistent with the Hecksher-Ohlin-Samuelson framework. Thus we conclude that even if equilibrium is unique and constrained efficient, there are strong reasons to suspect that the factors that generate unemployment may affect the links between key variables in general equilibrium settings. As a result, models that take the market imperfections that lead to unemployment into account are likely to behave very differently from their full-employment counterparts. And, as macroeconomists have pointed out, this is likely to be the case even when such imperfections are small.

Reason 3: Labor economics teaches us that the structure of the labor market matters and that the personal costs from worker dislocation are large.

When factor markets are incomplete, labor market institutions become particularly important for determining the manner in which trade

shocks are propagated throughout the economy. And a large literature in labor economics documents the tremendous heterogeneity in labor market institutions across countries. For example, labor markets in the United States are relatively flexible. Minimum wage laws apply to only a small fraction of the workforce (see, for example, Brown 1999), and union influence has been weak and on the decline for quite some time now (see, for example, Nickell 1997). In addition, job creation and job destruction rates are high relative to other countries, suggesting a dynamic economy in which jobs turn over frequently even when sectors are not expanding or contracting at the aggregate level (Davis, Haltiwanger, and Schuh 1996).

In contrast, in many European labor markets unions still dominate the wage-setting process, and firms face a considerable amount of government regulation that adds to the cost associated with altering the size of its labor force (see Freeman 1994; Nickell 1997). Moreover, job creation and job destruction rates are often considerably lower than those in the United States, even when the economies appear to be quite similar in other respects.⁹ This creates an environment in which wages are relatively flexible in the United States but highly rigid in Europe. This point is not lost on economists. Labor economists and macroeconomists have noted the differences in labor market institutions across countries and have explored their implications for a variety of issues (e.g., macroeconomic performance and the manner in which training costs are covered).

The World Bank has developed an index used to measure the degree of labor market flexibility. Table 1.1, taken from Cunat and Melitz (2006), provides a summary of their findings with countries grouped based on GDP per capita. Higher scores indicate a more flexible labor market. The table indicates differences in labor market flexibility even across countries within the same income group. For example, the United States, Canada, and the United Kingdom all have labor markets that are considerably more flexible than countries such as Spain, Portugal, France, Greece, and Germany, all of which belong to the high-income group.

There is also considerable evidence of a great deal of *within*-country variability in job creation and job destruction rates across sectors. Davis, Haltiwanger, and Schuh (1996) provide the documentation for manufacturing sectors in the United States; the enormous literature that has grown up since their pioneering work provides similar documentation for a large number of other countries.

⁹ For example, Blanchard and Portugal (2001) show that job flow rates in the United States and Portugal are quite different even though the aggregate unemployment rates in the two economies are very similar.

TABLE 1.1

<i>Low-Income Countries</i>		<i>Middle-Income Countries</i>		<i>High-Income Countries</i>	
<i>Country</i>	<i>Flexibility</i>	<i>Country</i>	<i>Flexibility</i>	<i>Country</i>	<i>Flexibility</i>
Morocco	30	Mexico	28	Spain	31
Ukraine	36	Brazil	28	France	34
Guinea	41	Paraguay	41	Greece	34
Uzbekistan	42	Venezuela	44	Portugal	42
Indonesia	43	Turkey	45	Germany	45
Peru	45	Belarus	46	Slovenia	47
Algeria	45	Tunisia	46	Argentina	49
Moldova	46	South Africa	48	Italy	50
Egypt	47	Colombia	49	Finland	56
El Salvador	48	Latvia	51	Netherlands	57
Ecuador	49	Estonia	56	Sweden	57
Georgia	51	Thailand	58	Austria	60
India	52	Lithuania	59	Oman	65
Philippines	59	Hungary	60	South Korea	66
Bolivia	60	Iran	60	Israel	67
Dominican Republic	60	Costa Rica	65	Norway	70
Guatemala	60	Poland	66	Ireland	71
Sri Lanka	60	Uruguay	69	Czech Republic	72
Kyrgyzstan	62	Bulgaria	72	Japan	76
Azerbaijan	62	Kazakhstan	73	Belgium	80
Macedonia	62	Russia	73	United Kingdom	80
Syria	63	Fiji	79	Kuwait	80
Armenia	64	Chile	81	Switzerland	83
Jordan	66	Slovakia	90	Australia	83
Honduras	69	Malaysia	97	Denmark	83
China	70			Saudi Arabia	87
Albania	70			New Zealand	93
Lebanon	72			Canada	96
Zimbabwe	76			United States	97
Papua New Guinea	83			Singapore	100
Jamaica	90			Hong Kong	100

Table adapted from Cunat and Melitz (2006). Low-income countries have per capita GDP between \$2,000 and \$5,000, middle-income countries have per capita GDP between \$5,000 and \$10,000, and high-income countries have per capita income above \$10,000.

It is surprising that the evidence of large cross-country and cross-sector differences in basic labor market structure has not yet had a significant impact on research in international economics, a discipline where other sorts of differences (e.g., in endowments, factor intensities, and technology) are central to so many different analyses. There are, of course, exceptions

(e.g., Krugman 1995 or Davis 1998); but by and large the importance of labor market structure and labor market institutions has not, in our opinion, received the attention that it deserves.¹⁰

Clearly, labor market structure can affect (and be affected by) trade. For example, labor market institutions alter the manner in which factor prices adjust to trade-related shocks. They also have profound implications for the hiring and firing decisions of firms. For example, union contracts may restrict the firm's ability to lay off workers when export demand falls. Well-developed markets for temporary hiring may allow firms to expand employment quickly. Thus it is hard to believe that these institutions play no role in the link between trade and wages.

An additional area in which labor market structure is of importance is in the analysis of adjustment costs. Since trade liberalization triggers a reallocation of resources across sectors, it necessarily implies adjustment. The speed and efficiency with which such adjustment takes place is surely influenced by labor market institutions and government support provided through the welfare state. The standard approach in international economics is to acknowledge that there are costs to adjustment and then to note that they are likely to be small and, since labor market structures are rarely, if ever, discussed, one must presume independent of the institutional setting. In this context, "small" means that adjustment costs are likely to be swamped by the benefits from freer trade, so that it would always be possible (in principle) to compensate those who bear the costs without exhausting the gains from trade. However, this conclusion is really more a matter of faith than the outcome of a serious attempt at empirical measurement or theoretical modeling.

The standard frameworks that have been used to analyze international trade issues are simply not adequate either to measure the size and scope of adjustment costs or to provide us with any insight about the most efficient manner to compensate those harmed by liberalization. Models that ignore the search and training processes undertaken by workers to acquire skills and seek out job prospects cannot be used to measure the costs that dislocated workers face when losing a job due to increased

¹⁰ We are delighted to note that this has begun to change recently. Over the past few years several new papers have appeared that deal with trade-related issues in the presence of imperfect labor markets and unemployment. Purely theoretical work includes Hoon (2000, 2001a, b), Kreckmeier and Nelson (2006), Moore and Ranjan (2005), Costinot (2007), Davis and Harrigan (2007), Egger and Kreckmeier (2007, 2008), Felbermayr, Prat, and Schmerer (2007), Helpman and Itskhoki (2007), Helpman, Itskhoki, and Redding (2008), Mitra and Ranjan (2007), and Song, Xu, and Sheng (2007). Papers that offer theoretical treatments coupled with empirical analysis include Bradford (2006), Cunat and Melitz (2006), Janiak (2006), and Dutt, Mitra, and Ranjan (2008). However, if one compares this with the attention devoted to the product market in the 1980s and growth and models of political economy in the 1990s, it is still remarkably small.

import competition. While there were some early attempts to pin down these costs (see, for example, Magee 1972 or Baldwin, Mutti, and Richardson 1980), unemployment was always treated in an ad hoc and inadequate manner. This was understandable since, at the time that these papers were written, general equilibrium models with micro-based explanations of unemployment were not yet available. This is no longer the case.

The need to account for adjustment costs has been underscored, as we noted at the outset, by the recent findings cited earlier that quantify the personal costs of worker dislocation: the Jacobson, LaLonde, and Sullivan (1993a, b) finding that the average loss in lifetime income for dislocated workers is roughly \$80,000, and the Kletzer (2001) finding that the average dislocated worker takes roughly a 13% wage reduction to find reemployment. The implication is that even if aggregate adjustment costs are small, the personal costs to individual workers may be high.

Such findings have given considerable ammunition to those in Washington who have been pushing for programs to provide support for dislocated workers (see, for example, Lawrence and Litan 1986; Bailey, Burtless, and Litan 1993; Bailey, Burtless, Litan, and Shapiro 1998; Kletzer and Litan 2001). Offering compensation to workers who lose their jobs due to liberalization can be justified in a number of ways.¹¹ To begin with, there is a straightforward equity argument: since we choose to liberalize trade, knowing that some workers will be harmed, we should compensate those who lose as long as we can afford to do so. This rationale dovetails nicely with the standard argument made in trade textbooks: since liberalization generates aggregate net benefits, we can always compensate the losers without exhausting the gains from trade. In theory at least, this makes it possible to turn trade liberalization into a true Pareto improvement. Of course, when this argument is made in textbooks or in class, we never point out that such compensation is rarely (if ever) offered by governments. Moreover, even if governments wished to provide compensation, little or no existing research provides direction regarding the design characteristics of an efficient compensation scheme. Should the government offer dislocated workers training subsidies, extended unemployment insurance, wage subsidies, or employment subsidies? Is there some other measure that could or should be used? Each program provides a

¹¹ In practice, it is likely that many more people become unemployed because of non-trade-related issues such as technological advancement, demographic shifts, and reductions in aggregate demand. We focus on trade-related unemployment because this is a politically sensitive issue. Moreover, U.S. laws already distinguish the reasons for job loss among different groups of workers as when workers must receive certification to be eligible for trade adjustment assistance.

unique set of incentives for workers to accept jobs or switch occupations, and therefore each has different implications for labor market adjustment. Proper analysis of the relative efficiencies of these different labor market programs requires a general equilibrium model in which agents face nontrivial spells of unemployment along with search and training costs. In other words, conventional full-employment trade models are not well suited to tackle important policy questions related to worker dislocation and the associated costs from freer trade.

We hope that by now we have made a convincing case that there are sound reasons to build and analyze general equilibrium models of international trade that allow for equilibrium unemployment. Of course, in order to do so, one must make a choice of how to introduce the market imperfections that generate unemployment. In most of our research, we have chosen to work with search models in which unemployment comes about due to a lack of information about job opportunities and worker availability. These information problems make it necessary for unemployed workers to search across firms for a vacancy and for firms to recruit unemployed workers. We have chosen to work in this framework because of our belief in its intuitive appeal. The very idea that time and effort are needed for unemployed workers and firms with vacancies to find each other just feels right to us. In addition, this is the one modern approach to unemployment that has been held up to serious empirical scrutiny. The matching function, which determines the rate of job creation and the equilibrium rate of unemployment, has been estimated and its features have been pinned down (for a survey of the evidence see Petrongolo and Pissarides 2001). This makes it possible to quantify models and use them for serious policy analysis.

There are a variety of other ways to introduce unemployment. One could rely on efficiency wages (Shapiro and Stiglitz 1984) or fair wage considerations (Akerlof and Yellin 1990), models of insider-outsider conflict (Lindbeck and Snower 1989), minimum wages, union influence, or a host of other labor market imperfections. We have argued elsewhere (Davidson and Matusz 2004) that, at least for some results, the approach used does not matter since similar results emerge from all of these frameworks. However, the extent to which this is true remains an open question—one we hope that others will take up in the future.¹²

¹² Of course we are aware that some work on trade and unemployment has already been carried out in these alternative settings. For work on trade and unemployment with efficiency wages see Copeland (1989), Brecher (1992), Matusz (1994, 1996, 1998), Hoon (2000, 2001a, b), and Davis and Harrigan (2007). For work on trade and unemployment with fair wages see Kreickemeier and Nelson (2006) or Egger and Kreickemeier (2007, 2008). For work on trade and unemployment with minimum wages see Brecher (1974) or Davis (1998).

A ROADMAP OF THE BOOK

We have divided our book into five parts. Part 1 contains articles that demonstrate how standard versions of the Heckscher-Ohlin-Samuelson (HOS) and Ricardian trade models can be extended to allow for search-generated unemployment. The industry is considered the appropriate unit of measure in these models, with all firms within an industry being identical. We therefore refer to this part as “new insights from old trade theory.” We begin in chapter 2, where we embed labor market frictions into the standard 2×2 HOS model of trade and show how the structure of the model is altered by the presence of equilibrium unemployment. We make use of the well-known “hat calculus” of Jones (1965) to emphasize how the model can be manipulated to look quite similar to the conventional HOS model. This highlights the subtle changes that are introduced when labor market imperfections are taken into account.

The equilibrium characterized in chapter 2 is not efficient because of the presence of externalities due to the manner in which we model the search process. By adjusting the model slightly so that equilibrium is always constrained Pareto efficient, we demonstrate in chapter 3 that labor frictions alter general equilibrium relationships in fundamental ways even when equilibrium is unique and efficient.

As we noted above, one of the goals of our research agenda is to develop models that are rich enough in labor market detail to allow for an analysis of programs aimed at the lowering the costs of adjustment associated with globalization. Such models must allow for nontrivial spells of unemployment and they are also inherently dynamic. These features raise complications that trade economists have not had to deal with much in the past. The three papers in part 2 (which is titled “complications”) highlight some of these issues. In particular, the first two papers in this section are devoted to showing that the presence of equilibrium unemployment can generate problems that are usually absent from full-employment models. In chapter 4 we illustrate how labor market imperfections can result in multiple free trade equilibria, whereas in chapter 5 we demonstrate that the presence of unemployment makes welfare analysis in dynamic models considerably more complicated than it would be in the absence of labor market frictions. The reason for this is that changes in employment transfer income across generations, giving rise to social surpluses that have important implications for trade policy.¹³ In chapter 6 we emphasize that when carrying out policy analysis in dynamic models,

¹³ These surpluses are similar to the ones generated by the social planner in Samuelson’s original overlapping generations model (Samuelson 1958). See chapter 5 for details.

serious mistakes can arise if one ignores the adjustment path (by relying on a comparison of steady states).

Part 3 of the book consists of two empirical contributions designed to test two of the predictions of the models developed in chapter 3. In particular, chapter 7 presents evidence that the structure of the labor market can influence trade patterns in a manner consistent with the model's predictions, whereas chapter 8 explores the issue of whether labor market frictions alter the link between trade and wages as predicted.

The chapters contained in part 4 are devoted to policy analysis with a particular emphasis on issues that cannot be addressed in full-employment models. We begin in chapter 9 where we present a simple general equilibrium model with turnover in an effort to see how taking search and training costs into account might alter the calculation of the costs of adjustment. Chapters 10 and 11 deal with policy issues related to adjustments costs. In chapter 10 we show how the gradual implementation of new trade policies can be optimal when labor markets exhibit congestion externalities. Chapter 11 compares different labor policies designed to compensate workers who are harmed by trade liberalization and chapter 12 examines the issue of whether coupling trade policy with compensation makes free trade easier to achieve politically.

In the final part of the book, we show how trade frictions can be included in the "new trade models" that have been inspired by empirical studies of firm- and plant-level adjustment to trade. One of the most important features of the new trade models is heterogeneity across firms, usually in terms of productivity or technology choice. In chapters 13 and 14 we develop models with labor market frictions in which workers are also heterogeneous in terms of their skill sets. In chapter 13, we show how the types of employment relationships that workers are willing to enter into can be altered by changes in openness and that this can provide new explanations for many of the empirical regularities that inspired the new trade theory. In particular, we show that changes in openness affect the type of worker-firm matches that can and do take place in equilibrium. We also show that this can explain changes in firm-level decisions to export as well as how openness impacts measures of productivity at the firm and industry levels. In chapter 14, we use the same framework to investigate the implications of the outsourcing of high-skill jobs for the wage distribution.

The model in chapter 13 yields some strong predictions about the link among openness, productivity (both within-firm and industrywide measures), and wage inequality. In the past, researchers would have had little or no hope of testing these predictions due to lack of sufficiently disaggregated data. However, recently a number of matched worker-firm data sets have emerged that will allow for a detailed analysis of labor market

adjustment to changes in openness. These data sets make it possible to test our theories, and, perhaps more important, they also allow for a new set of stylized facts about the manner in which labor market outcomes are altered by changes in trade policy and trade costs. For example, we should be able to examine the hiring and firing practices of firms engaged in trade and compare them with those firms that sell all of their output domestically. It should also be possible to examine how industry-level wage distributions are altered when trade liberalization occurs. We should also be able to gain a deeper understanding of how openness affects workers since such rich data sets should provide us with new micro-level insights into the incidence of worker dislocation, the manner in which openness affects the job search process, the pattern of worker turnover across industries, and the manner in which the gains and losses from freer trade are distributed across firms and their workers within industries. That is, it should now be possible to look at labor market adjustment to globalization as closely as the profession has examined firm- and plant-level adjustment.¹⁴

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¹⁴ Again, there is recent strong evidence that such a literature is starting to emerge. Papers that focus on labor market reallocation in response to liberalization include Currie and Harrison (1997), Revenga (1997), Harrison and Hanson (1999), Topalova (2004), Pavcnik et al. (2004), Attanasio, Goldberg, and Pavcnik (2004), Warczziag and Seddon-Wallack (2004), Cuñat and Guadalupe (2006), and Guadalupe (2007). For papers that use matched worker-firm data to analyze such issues the recent contributions of Filho, Menezes, and Muendler (2007), Muendler (2007), and chapter 5 of Silva (2007).

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