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constructing episode-based, outcomes-adjusted price indexes is a complex and cumbersome task, it is critically important for informed policy discussions. Although it may not be sensible or practical for the BLS to produce such an index on a monthly basis, it is important that policy analysts use episode-based, outcomes-adjusted price indexes when evaluating sources of expenditure variation in the National Health Accounts.

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³ E. R. Berndt, S. H. Busch, and R. G. Frank, "Treatment Price Indexes for Acute Phase Major Depression," NBER Working Paper No. 6799, November 1998, forthcoming in *Medical Care Output and Productivity*, D. M. Cutler and E. R. Berndt, eds. Chicago: University of Chicago

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International Trade and National Factor Markets

Donald R. Davis*

Trade, Wages, and Unemployment

Of primary concern in international trade policy is the impact of trade on national factor markets. Such concerns have sharpened as the extent of international integration has risen both among OECD countries and between these countries and poorer non-OECD nations. How does trade affect unemployment, we wonder, or wages? Does it matter that countries have very different labor market institutions?

For the analyst, these questions raise both theoretical and empirical issues. What theoretical framework is appropriate for thinking about these issues? Is there a model of international exchange and national factor markets with enough empirical support to give us confidence in the comparative static assessments that we make? These questions have motivated my work in recent years.

One strand of this work explicitly focuses on the analytics of trade, wages, and unemployment when countries have different labor market institutions. This work is motivated by the contrast between the experience of the Anglo-American economies and that of many Continental European economies. In the Anglo-American economies after 1980 there was a large decline in the

relative wages of unskilled workers, yet relatively low unemployment. In contrast in many of the European economies at that time, relative wages of the unskilled did not decline, but unemployment reached very high levels. The contrast in experience has been noted by many other researchers, and differences in the flexibility of factor market institutions often were cited as an important contributing factor.

One key question that had not been addressed, though, is how the costs borne by each of these country-types were affected by the fact that these countries trade in a unified global goods market. I address that question in a series of papers. The first paper considers a benchmark case between a stylized America and Europe, where the countries are

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identical except for one institutional difference: America has fully flexible wages while Europe targets an unskilled wage higher than what would prevail without intervention.¹ If the countries are in isolation, the resulting difference in outcomes is straightforward. Flexible labor markets allow America to have full employment, but at the cost of lower wages for the unskilled. Europe attains its higher target wage for the unskilled, but at the cost of high unemployment.

The outcome changes radically, though, when America and Europe trade freely. The key is the link between wages and goods' prices. If Europe is to achieve a high wage for unskilled labor, it must also target a high price for the good that uses that labor relatively intensively, since wages and prices move in lockstep. But it now must maintain this price not only in Europe, but also internationally, since the price is common. Trade with America incipiently lowers this goods price, and the target unskilled wage will be achieved only if ever greater quantities of unskilled labor are cast into unemployment. Since the benchmark assumes that America and Europe are structurally identical except for labor market institutions, we can be precise about the extent to which European unemployment rises. In this case, European unemployment must double to achieve the same high unskilled wage that it had in isolation. For this stylized Europe, this represents a pure deadweight loss. The results in America are strikingly different. Because of the common prices of international goods, it achieves the same high wage outcome as in Europe. However, because of its flexible labor markets, it bears none of the unemployment cost of achieving that wage. The paper I have just described began by asking the question: Does European unemployment prop up America

wages? Within this framework, the answer is unambiguously "yes."

The same paper then goes on to establish the robustness of these results under a variety of economic shocks and modifications to the benchmark model. It also develops, as an example, a simple calibration exercise to identify the extent to which European unemployment rose as the joint result of migration from developing to developed countries and the difference in the flexibility of labor market institutions within a freely trading world. These examples show that without South-North migration from 1970 to 1990, Europe could have achieved the same wages with one-eighth to one-quarter less unemployment. While the magnitudes arising from such a calibration exercise should be treated with proper caution, they do suggest that the impact of the differences in labor market institutions within an open trading system may have been substantial.

This first paper set out the basic model and considered comparative statics such as increased openness to trade, exogenous factor accumulation, entry to world markets of an unskilled South, and migration from South to North. However, a good deal of the literature examining these labor market developments instead emphasized the role of technical change. Indeed, this was a significant point of discussion between such researchers as Edward E. Leamer² and Paul R. Krugman.³ Therefore, I incorporated a consideration of technical change into my broader framework,⁴ providing an intuitive account of the impact of a wide variety of technological shocks, both local and global, on relative wages and unemployment in the stylized America and Europe. I found that in a number of cases, the impact of technology differed palpably, though sensibly, from what would occur in the flexible wage cases that had dominated dis-

cussion. I therefore provided a mapping to explain what patterns and geographical extent of the technology shocks could account for various stylized facts that have appeared in the literature.

The final paper in this series extends the basic model to consider the case of endogenous human capital accumulation.⁵ Since some of the labor market patterns of interest concern changes over decades, it is important to consider how labor responds to the evolving incentives. Also, ignoring the endogenous response of human capital accumulation may make it difficult to identify the source of the key shocks.

Endowments, Technology, and Trade Patterns

The work sketched above assumes an economic model suitable to the problem and draws out the consequences of these assumptions. An alternative approach that I describe now asks whether our models have sufficient empirical support in their key predictions to inspire confidence in them when applied to policy questions.

Differences across regions or countries in the relative availability of factors will lead to differences in factor prices or goods prices in autarky. This in turn will motivate trade. This simple but deep insight formed the basis for Bertil Ohlin's 1977 Nobel Prize. Jaroslav Vanek in 1968 provided a relatively robust formulation of the theory focusing on the exchange of services of factors.⁶ The Heckscher-Ohlin-Vanek (HOV) theory has been a central focus of empirical research in international trade ever since.

Yet, the most serious prior empirical efforts to verify HOV (and variants) have yielded only "paradox" and "mystery." The list of failed efforts to confirm the theory is both

impressive and daunting. The Leontief "paradox" described in 1953 — that the United States is an importer of capital services and an exporter of labor — is well known.⁷ In a widely cited 1987 paper, Harry P. Bowen, Leamer, and Leo Sveikauskas noted that if you want to know which factor services a country will export on net, you will get no more information from measured factor abundance than from a coin flip.⁸ More recently, work by Daniel Treffer identified a series of anomalies in the data including the "mystery of the missing trade:" that measured factor service trade is an order of magnitude smaller than predicted based on factor endowments.⁹ The HOV theory thus appeared to be a resounding empirical failure.

What was wrong? In a joint paper with David E. Weinstein, Scott C. Bradford, and Kazushige Shimpo, we start with a belief that the conventional assumption of factor price equalization (FPE) for the world as a whole is a major stumbling block for empirical implementation.¹⁰ Our strategy was to sidestep this problem by focusing on the net factor trade of a subset of the world for which the assumption of FPE is more plausible: regions of Japan. The rub is that the HOV theory is one of world — not just national — equilibrium. Hence, we had to consider what HOV predicts when only a subset of the world shares FPE, integrating the international data in an appropriate manner.

Our empirical results both helped us make sense of prior failures and indicated directions required to get HOV to work. We provided the first test of the production side of the HOV model on international data, demonstrating that an important reason for the failure of prior efforts was the assumption of identical techniques of production. We went on to show that even if one restricted attention to the data for Japanese regions, but continued to assume world FPE,

we would obtain all of the anomalies identified in earlier studies, including the "mystery of the missing trade." We then showed that if you abandon FPE for the world as a whole, the results improve dramatically. Regions of Japan export the services of abundant factors and they do so in approximately the right magnitude. This represented the first true empirical success for the HOV theory of factor service trade.

Our attention then turned to the question of whether we could get HOV to work on an international sample. Here it was clear that it would no longer be possible to sidestep the issues surrounding the failure of FPE — these would have to be confronted directly. Weinstein and I began by noting that the major efforts to test HOV on international data have considered two principal amendments to the simple model.¹¹ The first contemplates cross-country technological differences. The second considers departures from the conventional model of absorption. These prior efforts have a major drawback, though. Although the proposed amendments concern technological differences and alterations to the model of absorption, the data the studies employ typically have a single observation on technology (the United States) and no observations at all on absorption. As a result, it is difficult to be sure whether even the minor statistical improvements in measures of fit achieved have a structural interpretation in terms of the economic fundamentals of interest.

As an alternative, we bring a wealth of new data to bear on the problem of testing HOV on international data. For a sample of ten OECD countries we are able to test hypotheses about the nature of technological differences and the structure of the production model directly on the data of interest. Similarly, we are able to examine the absorption model directly on the relevant data.

Having selected the best models of international technology differences and absorption patterns, we then impose the estimates on the data on production and trade. We show step by step how the introduction of our principal hypotheses yield corresponding improvements in measures of model fit. The result is a very striking confirmation of the HOV theory, suitably amended. Various checks for robustness yield a common conclusion. Countries export their abundant factors and they do so in approximately the right magnitude. The "mystery of the missing trade" is almost entirely resolved.

The most exciting feature of this paper is the simple and unified picture it draws of the global economy. The departures from the standard theory are simple, plausible, and confirmed directly in the relevant data. And they allow the amended model of factor service trade to match the international data surprisingly closely.

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Foreign Direct Investment and the Operations of Multinational Firms

Robert E. Lipsey*

Foreign direct investment (FDI) flows and the operations of multinational firms have attracted increased research attention in recent years. This is partly because FDI has grown in importance as a form of capital flow and partly because FDI seems a more reliable form of finance for developing countries than portfolio investment or short-term lending in light of the recent Asian experience. Perhaps the most important reason is the emergence of a popular view that multinational firms control much of the world's economy.

In fact, the share of direct investment in the world's capital outflows has grown substantially since the early 1970s to reach about 25 percent in the early 1990s.¹ That share dropped in 1996 and again in 1997, with a surge in portfolio capital and short-term lending. But as portfolio and short-term capital flows declined after the start of the Asian crisis, FDI flows rebounded to 30 percent of the total world capital flows.

Despite this growth in FDI flows, the resulting production is still a small part of the world's total output: about 7 or 8 percent in 1995, compared with about 4.5 percent in

1970.² The petroleum sector was the most internationalized in 1970, but the internationalized share fell sharply afterwards, especially in developing countries where important operations were nationalized. Manufacturing is now the most internationalized sector, at over 16 percent of output, but apart from these two sectors, internationalized production remains under 4 percent of the world total.

In the past, FDI flows to individual countries were less volatile than other international capital flows: they changed direction less frequently and the range of fluctuations around their mean was smaller. That characteristic of FDI flows was demonstrated in the Latin American crises of the early 1980s. It was confirmed in the Mexican crisis of 1994, when direct investment inflows quickly regained their previous level, while other forms of capital inflow remained far below their peaks. And the pattern was further confirmed in the Asian crises of 1997, when direct investment inflows into developing Asia as a whole hardly paused in their rapid growth, while portfolio and other forms of investment either dried up or turned negative on net balance.³

Over a longer horizon, the econo-

mies of East Asian countries have been transformed, and FDI has played an important role in most of the transformations. The industry structure of production and of exports has changed drastically. In 1977 almost two-thirds of East Asian manufactured exports were in foods, textiles and apparel, and miscellaneous manufactures, but in 1995 this percentage had dropped to one-third.⁴ Over the same period, the exports of East Asian machinery industries grew from 17 to 44 percent of the total.

Much of that shift in export composition was propelled by direct investment in these countries, mainly from Japan and the United States. Foreign firms supplied technology and links to other parts of their production and trade networks. These links, added to the local resources, fueled rapid export growth and changes in export composition. Frequently, affiliates were established mainly for export production, but over time their output shifted toward production for local markets. That change was accompanied by growth in production by nonaffiliated host-country firms in the same or related industries.

The developing countries are almost all net recipients of direct