

THE FREE TRADE MAGIC ACT

**In dubious study, first you see the benefits
of globalization, then you don't**

by Peter Dorman

In a recent paper, three economists — Drusilla Brown, Alan Deardoff, and Robert Stern — attempt to calculate the benefits of trade liberalization. They estimate that complete elimination of all trade barriers in the world would add \$1.9 trillion (about 5%) to the world's gross economic product by 2005 (Brown, Deardoff, and Stern 2001). Brown-Deardoff-Stern's numbers look convincing, leaving the casual reader with the sense that free trade benefits are pretty much in the bank — ready to be claimed if only we would adopt the correct trade policies. But a closer look reveals that the underlying assumptions are unreliable. In fact, if one compares the standard criticisms of free trade to the assumptions made by Brown-Deardoff-Stern when measuring its benefits, an odd symmetry appears: the problems identified by critics are identical to the factors discounted in the Brown-Deardoff-Stern model. In other words, Brown-Deardoff-Stern never rebut a single criticism of global liberalization; instead, they simply assume that each criticism is false or irrelevant to begin with. Thus, as a contribution to the debate on trade policy, the Brown-Deardoff-Stern estimate is useless. In spite of this, supporters of the Bush Administration's fast-track proposal (which would require Congress to vote trade agreements up or down without altering them) cite the Brown-Deardoff-Stern estimate to justify the rapid trade liberalization that fast track would promote.

Brown-Deardoff-Stern's buoyant predictions for free trade are like the rabbit pulled out of a hat: the trick works only because the rabbit was put into the hat to begin with. What follows is a visit backstage to see how the trick is put together step by step.

The Brown-Deardoff-Stern performance depends on five sleights of hand:

- The model is flagrantly disconnected from the real world. It assumes no one is ever unemployed, trade balances never change, and credit is always available to everyone. In the Brown-Deardoff-Stern world, multinational corporations, unions, even nations (except as perpetrators of trade barriers) play no role in international commerce.
- The model ignores the costs of trade liberalization. Unsustainable trade imbalances, short-term capital inflows, growing income inequality, and increasing downward pressures on wages do not exist. Gone, too, are environmental damage and the desire of citizens for a say in their government.
- According to Brown-Deardoff-Stern, complete liberalization of trade in the service sector will contribute \$1.2 trillion of the total gain of \$1.9 trillion, or almost two-thirds. Their computation, however, overestimates the benefits of trade liberalization in services. Their nonsensical results portray the U.S. service sector as less competitive than Europe's, Japan's, or Mexico's.
- Other implausible results raise concerns about the reliability of the entire model. For example, an East Asian exporter of textiles and apparel (such as Malaysia or China) would be better off if the United States and the European Union maintained barriers against that country's exports. It would be difficult to find a single trade negotiator in any country — developed or developing — who would agree with this.
- It is well known in the economics profession that the Brown-Deardoff-Stern modeling strategy is ill-equipped to handle substantive economic forecasts. Similar models were spectacularly unsuccessful in forecasting the impact of NAFTA. For example, contrary to predictions of 5-10% wage growth in Mexico after NAFTA's implementation, wages fell by 16% between 1994 and 1999.

Unwarranted assumptions

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-Deardoff-Stern assume away all criticisms of globalization. The following analysis will demonstrate this by comparing, one by one, the issues raised by free-trade critics to the corresponding assumptions of Brown-Deardoff-Stern.

Macroeconomics and global instability

WHAT THE CRITICS SAY: Repeated episodes of financial and economic turmoil characterized the 1990s. Although the global system survived crises in East Asia, Mexico, Russia, Brazil, Argentina, and Turkey, the upheavals caused immense human suffering. Single-minded liberalization of international capital flows, foreign exchange markets, and trade in goods and services heightens the risks of crises while depriving national governments of important policy tools to counteract the underlying causes (Blecker 1999a).

Even without a crisis, trade liberalization can have a devastating impact on employment in specific sectors of an economy. Countries that lose entire industries to imports have no guarantee that their exports will increase to compensate. Families and communities that have lost their livelihood fall into the gap. Even if trade is balanced overall — if changes in imports are offset by changes in exports — workers unable to shift locations or occupations rapidly will have to pay high adjustment costs.

BROWN-DEARDOFF-STERN'S ASSUMPTIONS: They take no macroeconomic effects into account. They do not dispute the costs of unemployment or financial crisis; they simply ignore them. Indeed, in order to sidestep macroeconomics, Brown-Deardoff-Stern make some astonishing assumptions. First they assume no country's balance of trade ever changes; deficits remain deficits, and surpluses remain surpluses. They assume every dollar of new imports is balanced by a dollar of new exports. Of course, workers and governments would have little to worry about in such a world — provided they could shift readily between expanding and contracting sectors of the economy. Brown-Deardoff-Stern defend their position by arguing that flexible exchange rates would immediately adjust to offset changes in imports with changes in exports (Brown, Deardoff, and Stern 2001, 4). Yet the available evidence suggests that foreign exchange markets are not able to equilibrate a country's trade imbalances (Blecker 1992; Leonard and Stockman 2001).

They also assume no economic impact from any country's financial system because they also assume no debts. Countries never experience foreign exchange crises; borrowers never default.

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.

And they assume that capital, as well as labor, shifts costlessly and instantaneously between sectors. There are no adjustment problems associated with international trade. Consequently, it is impossible for systematic trade liberalization to create any net cost to workers or to economies.

Brown-Deardoff-Stern offer two justifications for these assumptions. First, they claim as a matter of principle that trade liberalization should have little effect on trade balances and therefore on other macroeconomic outcomes (Brown, Deardoff, and Stern 2001, 4). This is essentially a restatement of the initial assumptions for which they provide no other justification. Second, they suggest that the effects of trade liberalization on the composition of output — shifts between sectors and between countries — can be seen more clearly if macroeconomic considerations are factored out (Brown, Deardoff, and Stern 2001, 3). Yet the significance of these shifts surely depends on the macro context. For example, a surge of imports will have different effects on workers and the economy, depending on whether there are job prospects in export industries or whether workers face a prolonged period of unemployment.

Inequality and wage erosion

WHAT THE CRITICS SAY: The era of liberal globalization has brought about increased inequality within most countries and between them. Workers in the United States and many of its most important trading partners have suffered relative and, in some cases, absolute declines in real income. Labor market institutions designed to shelter workers from the vicissitudes of unfettered markets are under stress everywhere.

While other factors might have played a role in these trends, increased international competition is likely a significant cause (Mishel et al. 2001).

BROWN-DEARDOFF-STERN'S ASSUMPTIONS: They assume that supply and demand alone set wage levels. There are no labor market institutions — no unions, no labor standards, no social benefits — and therefore these institutions do not create differences between countries. Each worker receives exactly what he or she contributes to production; there are no differences caused by exploitation or discrimination. Clearly in such a world, there can be no race to the bottom in the global labor market because there is no top or bottom. Of course, a mountain of evidence demonstrating that labor markets don't work this way contradicts Brown-Deardoff-Stern's approach (Solow 1990; Freeman 1994; Mishel et al. 2001).

Environmental sustainability

WHAT THE CRITICS SAY: The need to restructure industrial economies to achieve a sustainable environment becomes more evident every day. But the deregulation of global markets undermines any progress. Critics fear that the pressure to sustain international competitiveness makes it more difficult for countries to enact policies that force businesses to pay for their environmental damage. Even where environmental laws are ambitious, the ability to implement them is diminished when businesses can relocate to more accommodating jurisdictions (Baker et al. 1998).

BROWN-DEARDOFF-STERN'S ASSUMPTIONS: They assume away all environmental problems. There are no market failures in either production or consumption, and thus no externalities or public goods. In their model, global warming does not cause droughts or floods, and consumers derive value only from the goods they consume; the cost of producing those goods depends only on preexisting technology and the prices of labor and capital.

Corporations, trade agreements, and democratic sovereignty

WHAT THE CRITICS SAY: As people in many fields now recognize, international markets increasingly constrain government policies, particularly the tax, labor, and regulatory policies that affect businesses. With investment ever more free to leapfrog national borders, countries compete to attract multinational corporations with a favorable business climate. The growing political influence of multinational corporations, which control an ever larger share of the world's productive capacity, intensifies this trend. At the same time, democratic sovereignty is threatened by treaties that restrict the discretion of elected governments over questions of property rights and obligations and the delivery of public services (Rodrik 1997; Crotty et al. 1998).

BROWN-DEARDOFF-STERN'S ASSUMPTIONS: The competitive market power of large, integrated multinational corporations makes no appearance in the Brown-Deardoff-Stern model. The authors also assume these behemoths accumulate no wealth. For Brown-Deardoff-Stern the sole effect of reducing trade barriers is to increase the size of markets and the degree of competition. They assume there is no tendency for

successful enterprises to absorb or displace others. Therefore, a more economically integrated world, according to their model, will have less, not more, concentration of wealth and productive capacity.

In addition, Brown-Deardoff-Stern make the assumption that bigger is always better. For example, when lower trade barriers link two national economies more closely, the cost of production always falls in the Brown-Deardoff-Stern world because economies of scale can rise without limits.¹

Nationality virtually disappears since nations exist only as locations and as perpetrators of trade barriers. They have no other economic role (Dorman 2001). Market regulation, the interplay of public and private enterprise, the differing national approaches to labor relations and corporate governance — none of these appears in the model. Since trade is always balanced and credit is always available, the division of the world into different national currencies has no relevance. *National borders become irrational because Brown-Deardoff-Stern have stripped government of all rational functions.*

Such an approach ignores the desire of individuals for a voice in how their economic and political life will be governed, and yet these preferences are just as real as the preferences that Brown-Deardoff-Stern and other economists measure for consumer goods (Frey and Stutzer 2001). Brown-Deardoff-Stern also ignore the interaction between trade agreements and government expenditures, especially expenditures for social programs. In the real world, governments race to reduce taxes in order to remain competitive and then must cut expenditures, most often for social programs. For example, government spending on social expenditures in Canada fell from 45% of gross domestic product in 1992 to less than 35% in 1999. At the same time, the government lowered corporate taxes and expanded subsidies to attract new investments (Scott et al. 2001).

These assumptions reveal the circular logic of Brown-Deardoff-Stern: the rabbit they pull out of the hat is the same rabbit they put in the hat before the show began. They rebut none of the criticisms of global liberalization; they are simply assumed to be false. The criticisms might be false, of course, but we won't discover this by assuming it.

Questionable treatment of the service sector

It is commonly thought that international trade does not affect most services and that customs and culture, personal connections, and other difficult-to-legislate factors create the principal barriers to direct foreign investment in services. So it is surprising that the Brown-Deardoff-Stern model attributes almost two-thirds of its projected growth in the world economy (nearly \$1.2 trillion of \$1.9 trillion) to trade liberalization in services alone. Why does the service sector dwarf manufacturing and agriculture in their model?

Economic analysis of the service sector has long been hampered by poor data; there is an inherent difficulty in measuring things that often have no physical units and fluctuate in quality. Poor data also characterize the effort to measure barriers to trade in services. There is a substantial literature in economics on measuring trade barriers in tangible goods. But no one agrees on how to calculate tariff equivalents for services.

Brown-Deardoff-Stern adopt a procedure that can best be described as creative. They use data on

TABLE 1
Gross operating margins, selected countries

	Average gross operating margins, service sector	FDI restrictiveness indices, combined service sector
Australia	16.6	181
Canada	32.9	196
Chile	44.0	N/A
China	49.5	330
EU	31.6	N/A
Hong Kong	18.1	74
Indonesia	41.3	339
Japan	28.7	118
Korea	25.8	464
Malaysia	21.6	241
Mexico	37.2	309
New Zealand	26.8	109
Philippines	42.3	462
Singapore	22.0	216
Taiwan	41.3	N/A
Thailand	52.6	562
United States	42.3	59
Other Cairns (mostly S. America)	39.0	N/A

Note: Gross operating margin = (total revenue – operating cost) / operating cost.

Data are three-year averages for 1994-96.

Source: Hoekman (2000), Tables 4 and 5.

average gross operating margins — the difference between total revenue (price times quantity) and total operating costs (total minus fixed costs) — for various service industries in a cross-section of countries. The difference may reflect fixed costs, or it may result from less competitive pressure to keep prices down, *some* of which may be due to trade barriers. Brown-Deardoff-Stern assume that the gap between revenues and operating costs is attributable entirely to domestic factors in the one country with the lowest margin, and that larger spreads elsewhere are solely the result of trade obstacles generated by national policy. (There could be obstacles stemming from technological factors or the expectations of consumers, but these are ruled out.) Thus, the entire international difference in this rough measure of profitability, one that abstracts from capital costs, is taken as the measurement of a tariff equivalent on services, so that free trade translates into a corresponding reduction in the cost of providing services.

Brown-Deardoff-Stern cite Hoekman (2000) as the source for this methodology. Hoekman indeed suggests gross operating margins as one of several possible indicators. **Table 1** shows the underlying data. Note the tremendous variability of these margins. Nine of 18 countries have margins that are more than double the size of the smallest margin, which is Australia's. If we accept the Brown-Deardoff-Stern interpretation, the difference between the United States and Australia suggests that the complete elimination of entry barriers in the service sector would lower the prices paid by U.S. consumers by more than

25% of U.S. operating costs. But the pattern as well as the size of these differences raises a troubling question: is it reasonable to think that trade barriers in the U.S. services market are so much higher than those in the EU or Japan?

Hoekman also reports a more direct approach in which researchers identified specific trade barriers and assigned weights to them based on interviews with affected businesses. The second column in Table 1 summarizes the scores by country. The United States, which was implausibly rated as a leading protectionist with the first method, is the least protective country in the service sector under the second method. In methodology and results, the rankings in column 2 appear far more plausible than those in column 1.

Converting the figures in each column to a simple ranking from one to 14 allows a comparison between the columns. The correlation between the two lists is 0.41. This is positive (two completely unrelated lists would have a correlation of zero) but far less than a perfect correlation, which is one. This suggests that gross operating margins are a less-than-helpful indicator. The picture becomes clearer if we divide the 14 countries and their rankings into two smaller lists, one of East Asian developing countries (China, Hong Kong, Indonesia, Korea, Malaysia, the Philippines, Singapore, and Thailand) and one for the rest. When column 1 is compared to column 2 for the East Asian list, the correlation rises to 0.71. When column 1 is compared to column 2 for the remaining countries, the correlation falls to -0.17. This reveals that the gross operating margin predicts with reasonable accuracy the openness of countries that are relatively similar to one another and located within the same geographical region. But applied to the diverse economies of the world, the gross operating margin is a weak or even negative indicator. Moreover, it is biased toward finding fallaciously large trade barriers because it assumes that no other factor could account for international disparities. Thus the Brown-Deardoff-Stern assessment of potential benefits from liberalizing trade in services is essentially arbitrary and likely to overstate the potential gains. Considering that trade liberalization in services accounts for nearly two-thirds of the total gain predicted by Brown-Deardoff-Stern, their model looks even more problematic. A more realistic approach would therefore show much smaller potential gains from trade liberalization overall.

Implausible results

Interviewers often use the technique of asking a few questions whose answers they already know in order to assess the credibility of the answers they are really interested in. In much the same way, we can assess an economic model by looking at the estimates it produces about subjects that we're already familiar with. Even if we know little about the effects of across-the-board trade liberalization, we have a pretty good idea of its general effects in certain sectors such as textiles and agriculture. The Brown-Deardoff-Stern model provides estimates for these two sectors in several countries.

Textiles

The authors analyze the phasing out of the Multi-Fiber Agreement (MFA), which was created to limit the export of textiles and apparel to industrialized countries. Originally instituted at the behest of the developed countries, the MFA's gradual elimination is regarded as a great benefit to the developing world. A

reduction in trade barriers should open markets for exporters based in low-wage countries; their expanded operations should create more employment and increase the local tax base, as well as provide profitable investment opportunities. If, however, the tariffs and quotas remain in place, employment and investment will remain in the textile-producing regions in the developed countries.

We would expect any model purporting to estimate the effects of trade liberalization in textiles to show gains accruing to the low-wage countries and the costs borne by regions losing out to the new competition. Amazingly, according to the Brown-Deardoff-Stern model, the main textile importers are the chief beneficiaries of liberalized trade, and many of the prime exporters actually experience significant economic losses (see **Table 2**). For Brown-Deardoff-Stern, an East Asian exporter of textiles and apparel such as Malaysia or China would be better off if the United States and the EU maintained barriers against their exports. In the real world, it would be difficult to find a single trade negotiator in any country, developed or developing, who would agree.

Agriculture

Once again we would expect to find the countries whose economies are geared to agricultural exports benefiting the most from freer trade, and we would expect countries whose domestic growers depend on trade barriers to have the most to lose. According to the Brown-Deardoff-Stern model, however, complete elimination of agricultural tariffs would harm the major exporters, such as the United States and Australia, while benefiting the net importers such as Europe and East Asia (see **Table 3**). This contradicts the objectives pursued by these countries in trade negotiations for the past half-century. Indeed, if Brown-Deardoff-Stern were correct, U.S. and EU trade negotiators should switch sides: we should hire their people, and they should hire ours.

What accounts for such anomalous results? In both examples as presented by Brown-Deardoff-Stern, an assumption of balanced trade plays havoc with the real world analysis. In the real world, when a country's exporters find new markets and expand production, their increased prosperity has a ripple effect throughout the economy. Similarly, when an industry suffers because it is overrun by imports, it tends to pull others down with it. A balance between the two processes — more exports balanced by more imports — might be advantageous, as conventional trade theory indicates, but balance is not inevitable. There is nothing in the process of exporting per se that generates imports, or vice versa.

In the real world, if trade barriers are removed in agriculture but remain unchanged elsewhere, countries that export agricultural goods will tend to have greater trade surpluses than they would otherwise, and this will be to their advantage. This explains why their trade negotiators aggressively pursue liberalization for agriculture.

In the Brown-Deardoff-Stern world, however, opening an economy to more imports automatically creates larger markets for the importing country's own exports. This happens because they assume that changes in imports can never alter a country's trade balance. Thus, the benefits of trade liberalization depend not on changes in the trade balance, but on the terms of trade (that is, the effect on prices of the change in trade patterns). In the Brown-Deardoff-Stern world, when trade barriers for a particular com-

TABLE 2
Welfare effects of the elimination of the
Multi-Fiber Agreement in 2005, in percent GDP, textiles

Country	Percent GDP
Japan	-0.009
United States	0.083
Canada	0.149
Australia	0.002
New Zealand	0.004
EU and EFTA	0.030
Hong Kong	-0.099
China	-0.020
Korea	-0.006
Singapore	-0.106
Taiwan	-0.093
Indonesia	-0.071
Malaysia	-0.163
Philippines	-0.020
Thailand	-0.058
Rest of Asia	0.307
Chile	0.038
Mexico	-0.059
Other Carib., Latin America	-0.041
Middle East/North Africa	0.034

Source: Brown et al. (2001), Table 2.

modity fall, so do its prices, because consumers have more access to the global supply. This price change benefits importers because they are the buyers. So for Brown-Deardoff-Stern the ideal situation for a country is when trade liberalization occurs only for what it imports.

In the world of Brown-Deardoff-Stern, the importing country can pay for its additional imports with the money made from all the additional exports that automatically come along. Meanwhile, the elimination of barriers puts an exporting country in a bind. Its exports have increased, but their price has fallen. The Brown-Deardoff-Stern model insists on balanced trade, so the exporting country is forced to increase imports to maintain balance. The increase in demand for those imports will raise their prices. Alas, the country must then sell still more of the export good that is being freely traded. Yet this ends up making the country still poorer. It laments the passing of the good old days when foreigners made it richer by erecting barriers against its goods.

An ill-fated modeling strategy

It is well known that models like the one used by Brown-Deardoff-Stern are highly sensitive to changes in mathematical specification. This was brought home during the run-up to the North American Free Trade

TABLE 3
Welfare effects of the elimination of the
Multi-Fiber Agreement in 2005, in percent GDP, agriculture

Country	Percent GDP
Japan	0.201
United States	-0.136
Canada	0.028
Australia	-0.130
New Zealand	-0.123
EU and EFTA	0.061
Hong Kong	0.047
China	0.535
Korea	0.497
Singapore	0.376
Taiwan	2.162
Indonesia	0.168
Malaysia	0.832
Philippines	0.597
Thailand	0.095
Rest of Asia	1.207
Chile	-0.160
Mexico	0.095
Other Carib., Latin America	-0.088
Middle East/North Africa	0.277

Source: Brown et al. (2001), Table 2.

Agreement. Comparable studies that attempted to predict NAFTA's effects produced widely divergent results because of minor differences in assumptions (Faux and Lee 1991). At that time, a spate of computable general equilibrium (CGE) studies appeared, purporting to estimate NAFTA's impact. They shared many of the questionable assumptions found in the Brown-Deardoff-Stern model (Stanford 1992).

Drusilla K. Brown surveyed the projections made for income and wages in Mexico in four of these NAFTA studies (Brown 1992). The road ahead looked rosy — in 1992. As shown in **Table 4**, every study predicted a rise in Mexico's GDP, ranging from negligible to nearly 7%, attributable to NAFTA. The most widely circulated of these studies, Hinojosa-Ojeda and Robinson, predicted wage gains from about 5% to 10% for all sectors of Mexican society.

As everyone knows, the results of NAFTA took a different turn. Within a year after its introduction in 1994, Mexico's economy was in free fall, victim of a devastating foreign exchange crisis. Although Mexico's GDP has since recovered, Mexican wages haven't. Two broad-based surveys revealed an astonishing 40% decline in average real hourly wages between 1991 and 1998. As for the NAFTA years alone, the value of both the real minimum wage and real manufacturing wages fell about 16% during the period 1994-99 (Scott et al. 2001). *Thus, none of the predictions made by the pre-NAFTA CGE studies bore the slightest resemblance to the actual outcomes.*

TABLE 4
Projected impact of NAFTA on Mexican real wages and incomes,
four CGE studies (in percent of total)

Model	Wage	Income
KPMG Peat Marwick		
Basic model		0.32
Basic model with capital flows		4.64
Hinojosa-Ojeda and Robinson		
Basic model	rural	-0.2
	urban unskilled	-0.2
	skilled	1.0
	white collar	1.0
Basic model with capital flows	rural	9.2
	urban unskilled	9.2
	skilled	7.4
	white collar	8.8
Basic model with capital flows, migration	rural	4.7
	urban unskilled	4.7
	skilled	7.7
	white collar	9.1
Roland-Holst, Reinert and Shiells		
Removal of tariffs		0.11
Removal of tariffs and nontariff barriers		2.28
Trela and Whalley		
Textiles		1.2
Steel		1.6

Source: Brown (1992), Table 2.

Defenders of these modeling exercises might argue that the Mexican peso crisis was unforeseeable or unrelated to the creation of NAFTA. The claims are questionable since the combination of Mexico's foreign debt and the liberalization imposed by NAFTA virtually guaranteed that the peso would come under pressure (Blecker 1997). But there is a larger issue at stake: what is the point of an abstract analysis that excludes any possible source of crisis? Why expend so many intellectual resources for results that, like a sand sculpture, can be wiped out by the first wave of real world events?

Indeed, it is not out of the question that history may repeat itself. Now it is the United States that is running an unsustainable current account deficit. Simple arithmetic demonstrates that a large correction is inevitable (Blecker 1999b). Related macroeconomic trends — for example, rising private debt and equity prices out of proportion to corporate profits — cannot go on much longer (Godley 2000). A crisis precipitated by these trends will dwarf the effects, whatever they might be, of current and future trade agreements.

Rabbit redux

Brown-Deardoff-Stern have indeed done nothing more than drop a rabbit into a hat and then pull it out. Old tricks cannot serve as a serious basis for policy analysis. Moreover, the stakes are too high for theatrics: the well-being of billions of workers and entire economies are at stake. All citizens deserve a critical analysis of the costs and benefits of globalization, an analysis that holds up to honest scrutiny. Brown-Deardoff-Stern fail the test.

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Appendix A: General methodology

Because the economic world is impossibly complex, any reasonable attempt at analysis requires daring simplification. Economic methodologies differ not in their predilection to simplify but in how they go about it. Brown-Deardoff-Stern use general equilibrium theory (GET). A GET model sets up an entire economy as an interconnected set of markets. Consumers choose among products to maximize their well being (“utility”); firms employ resources and produce goods to maximize profits. The mathematical task of the economist is to calculate the prices of all goods and resources at the point where supply equals demand in every market simultaneously. This is “general equilibrium.” The purpose of the exercise is to see what else happens at general equilibrium: which industries expand or contract, whose income rises or falls, and so on.

As simplified as GET is, it requires even more simplification to become computable. With billions of individuals and millions of firms in the world economy, and with complex interactions between them, the numerical demands of such a model would be beyond the resources of even the most advanced supercomputers — and the computer comes *after* the problem of gathering and recording all the data. For this reason, computable general equilibrium (CGE) modelers reduce the world’s people to just a few composite consumers; they reduce the vast array of goods and services to a few sectors. In the Brown-Deardoff-Stern model, for example, there are 21 countries or regions, each with a single composite consumer and 18 composite industries. There are only two resources, capital and labor, each in fixed amounts and each in the form of a homogeneous, undifferentiated lump.

But this is still too complex. On what basis do these composite entities make decisions? How will consumers respond to price changes, and how will firms (sectors) respond to changes in demand? Decision making in the real world is messy and not well understood. To deal with this, Brown-Deardoff-Stern construct a simplified set of decision rules. Corresponding to each product category is a fixed relationship between changes in prices and changes in consumer demand, with this relationship provided by the existing allocation of consumers’ income. Given any change in prices, the model tells us exactly how consumers will change their buying habits. Producers choose their scale of production based on existing costs and the prices consumers are willing to pay. Then producers decide how much capital and labor to use based on the costs of these inputs. It is important to bear in mind that these behavioral rules are not extrapolations from past experience; they are generated by very precise (if mathematically simple) formulas that calculate how much “utility” consumers get from what they buy and how much it costs firms to produce.

At this point Brown-Deardoff-Stern have dealt with consumers and producers, demand and supply. Yet they need additional assumptions to “close” their model, which means determining the overall levels of income and production. They also need to add assumptions to reflect the way these markets operate in the international trading system. Finally, they add assumptions about the way firms compete in different markets, which is the province of “industrial organization.” Having made this long series of simplifying assumptions, Brown-Deardoff-Stern can now feed their model data and compute results.

Information on consumption and production come from a database managed by the Center for Global Trade Analysis Project (GTAP-4) at Purdue University. Various United Nations and World Bank statistical publications provide additional information. Measurements of tariff barriers (and the tariff equivalents of other trade barriers) also

come from GTAP-4, with the exception of data on the service sector. After plugging this data into their model, Brown-Deardoff-Stern calculate their general equilibrium under a variety of scenarios: trade barriers in the absence of reductions produced by the Uruguay Round of trade negotiations, trade barriers reflecting the impact of the Uruguay round, a 33% reduction of all remaining barriers (which Brown-Deardoff-Stern propose as the result of a new World Trade Organization round), a complete elimination of all barriers, and the piecemeal adoption of a variety of bilateral and regional trade agreements. They find increasing global benefits as trade barriers are reduced in a balanced, multilateral fashion. According to their model, the greatest gain — \$1.9 trillion in 2005 — comes from unlimited free trade.

Appendix B: Technical critique

Lack of sensitivity analysis

The results generated from the Brown-Deardoff-Stern study represent just one possible scenario. We would expect different numbers — perhaps very different — if its assumptions were changed. Since there is no single “correct” way to model the global economy, researchers have the obligation to report the effect that changed assumptions have on their results. This sensitivity analysis can tell us whether a purported \$1.9 trillion gain vanishes as soon as a utility or cost function is given a slightly different form, or whether the projected gain survives more or less intact through a wide range of assumptions. Neither in their published paper, nor on their website, do Brown-Deardoff-Stern provide such an analysis.

Outdated modeling strategy

If CGE models are inherently ill-equipped to address any but the smallest effects of economic policies, what explains their appeal? Proponents of CGE models sometimes claim that, despite practical shortcomings, the methodology is uniquely justified by economic theory. Only CGE, they argue, approximates the “true” structure of real world economies as elucidated by general equilibrium theory. This position, however, is several decades out of date. CGE models such as the one developed by Brown-Deardoff-Stern are based on Walrasian equilibrium theory. This theory, which dominated the discipline until the 1970s, has been substantially modified in subsequent years and is no longer seen as even remotely descriptive of how real economies work. Far from being in the forefront of economic analysis, CGE methodology is the rear guard of a theory in retreat.

Two criticisms in particular have undermined GCE models; both have implications for applied work. First, it is now recognized that “representative” or “composite” agent models, such as the one used by Brown-Deardoff-Stern, have fundamentally different properties from models in which agents are heterogeneous. Since the path-breaking work of Sonnenschein, Debreu, and Mantel 30 years ago, we have learned that, as models become more realistic (for example, as they incorporate the varied preferences of individual consumers) their dynamics become more unstable. There is simply no tendency to converge on a given equilibrium (Kirman 1989). Every choice made out of equilibrium — every decision to buy or sell — ricochets through the system and changes the direction in which the economy is headed. This is the rule of complexity in economics: the system, in the course of its adjustment, continually redefines its equilibrium. Empirical modelers like Brown-Deardoff-Stern are compelled to limit complexity drastically. They are left with a model that has little similarity to the models that contemporary theorists now use to simulate the evolution of economies.

Second, the outdated modeling strategy of Brown-Deardoff-Stern relies completely on the assumption that economies have only one equilibrium to which they gravitate. This assumption permits them to compute the unique equilibrium corresponding to particular trade scenarios. But economic theorists now recognize that interactions between people and commodities outside the marketplace tend to produce a multiplicity of potential general equilibria. (Dorman 1997; Brock and Durlauf 2000). So, given initial information about the desires of consumers and producers, as well as the resources available to them and the institutional rules they follow, we should expect to find a large number of equilibria, each with its own price changes, expanding or shrinking sectors, and so on.

Clearly this insight should defeat the CGE strategy altogether. Both theory and common sense reject the notion that an analysis of markets alone can locate, even approximately, the future destination of an economy. For informed judgments about an economy’s development, we need to combine market analysis with the study of historical trends, psychological and political predilections, and all the other factors that sensible economists bear in mind. Of course, a great many such useful studies of global economic integration exist. The Brown-Deardoff-Stern model is not one of them.

Endnote

1. The Brown-Deardoff-Stern model incorporates imperfect competition, that is, the existence of firms with market power. They assume each manufacturing sector is a limited number of firms that try to increase prices by withholding output. Brown-Deardoff-Stern further assume that if any firm in the world succeeds in earning profits above its cost of raising capital, other firms will immediately enter the market to drive down prices. Thus, in general equilibrium, there will be a single global rate of profit equal to the rate of interest on borrowed money. After workers and creditors are paid off, no profits remain. So firms never accumulate wealth.

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