The Benefits of Free Trade to U.S. Consumers

QUANTITATIVE CONFIRMATION OF THEORETICAL EXPECTATION

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Much of the literature concerning trade liberalization focuses on estimating the effect of increased trade on aggregate economic indicators, such as the growth in GDP per capita. Although there is a general recognition that trade benefits consumers, there is little research that estimates the direct impact of increased trade on U.S. consumers. We take broad measures of the economic impact of trade liberalization from three authoritative studies and apply economic principles to estimate the impact of increased trade on the income of U.S. households. We find, for example, that U.S. households gained about $2,500 in 2002 from increased trade, or the equivalent of almost six percent of the median household income in that year. We believe these results should be given weight in the ongoing debate regarding the effect of globalization.

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"Globalization" and related issues such as "outsourcing" are hotly debated topics, as are their perceived costs and benefits. In some corners, it seems that certain basic economic insights relevant to the discussion have been ignored or forgotten. One aim of this article is to remind those interested in these issues that economists have long studied such topics and that certain guiding principles have emerged. In particular, economists have long understood the benefits of free trade to consumers – lower prices, greater choices in the products available, and enhanced quality. Competition from the increased availability of imported goods to domestic consumers also forces domestic firms to offer competitive prices, to improve production efficiency, and to innovate. Free trade also presents domestic firms the opportunity to export their products and services to other countries, stimulating domestic growth. But, while increased trade leads to higher incomes and faster growth for the economy as a whole, trade liberalization typically displaces some workers and resources in import-competing industries. While consumers are "winners" from free trade largely through lower prices and greater variety, adversely affected groups are forced into other sectors of the economy in the face of increased imports. On balance, however, existing research indicates that the net economic benefits of free trade are substantial.

In this article we summarize the general effects of trade, and specifically estimate how much free trade has effectively increased the income of the average U.S. household. Much of the existing literature focuses on the impact of trade on aggregate economic measures (e.g., growth of GDP per capita, net welfare effect on the economy as a whole). There is little research that estimates the direct impact of trade on U.S. consumers. Existing research does, however, provide information that can be used to identify this impact of increased trade. We take the results from three different well-recognized studies and calculate the implied effect of increased trade on U.S. consumers' income per household. Our results based on each of these studies are consistent and show substantial benefits to U.S. households. We believe our estimates provide relevant and easily understood measures of the impact of freer trade.

We estimate that the expanded availability of imported goods and services from increased trade has had a cumulative aggregate benefit to U.S. consumers of approximately $2.3 trillion over 1992-2002 (in 2002 dollars). Table 1 summarizes our estimates of the per-household gains from increased trade. On a macroeconomic level, these benefits are approximately 2.5 percent of the total inflation-adjusted ("real") GDP over the same period, or between $20,000 and $22,000 per U.S. household in 2002 dollars.[1] The contribution of trade to consumer welfare has grown as trade has increased. The real gains from trade to U.S. consumers in 2002 were almost six percent of 2002 U.S. household real median income ($42,409), or about $2,500 per household. Focusing only on the *increase* in trade from 1992 to 2002, the growth in U.S. consumer benefit per household per year in 2002 dollars during these years was $1,229 to $2,080 ($1,952 in 1996 dollars times 1.065 to allow for

[1]The U.S GDP deflator increased by about 6.5 percent between January 1996 and January 2002, suggesting that the results of column (a), line (2) would be about $21.5 thousand if measured in 2002 dollars.

TABLE 1

ESTIMATED BENEFITS TO U.S. CONSUMERS FROM INCREASED TRADE (PER U.S. HOUSEHOLD), 1992-2002

Source	(a) Cumulative Benefit 1992-2002	(b) Annual Benefit in 1992	(c) Annual Benefit in 2002	(d) = (c) - (b) Increase From 1992 to 2002
(1) Based upon findings by USITC (2003)	$21,422	$1,216	$2,445	$1,229
(2) Based upon estimates in the Economic Report of the President (1998)	$20,207	$1,025	$2,540	$1,515
(3) Based upon research of Frankel and Romer (1999)	–	–	–	$1,486 - $1,952
(4) Estimates of the Office of the USTR (2001)	–	–	–	$1,300 - $2,000 [a]

[a] This range represents the United States Trade Representative's (USTR's) estimate in 2001 of the annual benefit accruing to American families due to the two major trade agreements of the 1990s – NAFTA (1993) and the Uruguay Round (1994).

Note: All figures calculated by the authors are inflation-adjusted. Specifically, estimates in (1) are in 2002 dollars, while those in (2) and (3) are based upon U.S. real GDP (chained 1996 dollars). A detailed set of calculations which underlie these estimates are available from the authors upon request. For comparison purposes, 2002 U.S. household real median income was $42,409 (U.S. Census Bureau).

increase in the implicit GDP deflator between 1996 and 2002). For the same period, we estimate that real disposable income per U.S. household increased by $10,387 per year. Accordingly, expanded trade during this period accounted for about 12-20 percent of the increase in real disposable income of U.S. households.

To understand why trade liberalization can increase net economic welfare in general, we next discuss the recognized impacts of free trade. We then explain the specific benefits of increased trade on the U.S. economy and its consumers, review several quantitative studies of trade and its effects, derive our estimates, and discuss in more detail the impact of trade on U.S. consumers for the 1992-2002 period.

The Impacts of Trade Liberalization

Economists dating back to David Hume (1752), Adam Smith (1776), and David Ricardo (1817) have recognized that free markets and free trade can be a key source of economic prosperity and promote the efficient use of an economy's resources. These insights, and the analyses based on them, argue that there are gains from free trade due to increased specialization and comparative advantage. That is, trade allows nations to increase their overall productivity by shifting capital and other resources to sectors of their economy where they are more productive relative to other sectors. Such international specialization leads countries that trade to higher productivity and higher living standards than if they did not trade.

Free trade fosters competition and encourages efficient use of resources, which lowers prices, enhances variety, and improves product quality for those goods demanded by consumers. As a result of increased competition, free trade spurs innovation and efficiency on the part of domestic firms. Freer trade reduces the costs of domestic producers by reducing the costs of imported inputs, thus reducing prices of finished goods and services. According to the 2003 *Economic Report of the President* (CEA, 2003, p. 231), trade liberalization:

> … brings greater specialization according to comparative advantage, lower prices, and a wider selection of products and services for both consumers and firms. Openness to trade allows exporters to sell their output in a larger market; workers in export industries benefit as the resulting higher prices for the goods they make translate into higher wages and incomes.

Standard economic models predict that free trade will increase national welfare and, conversely, that protectionism will decrease national welfare. Broadly speaking, this is because in a country that chooses to engage in protectionism, the domestic price of imports will rise. As a result, some domestic consumers will switch from the now relatively more expensive imported items to domestically produced substitutes, which presumably are less desirable than the imported goods prior to protection. This constitutes a welfare loss to the consumer. Also, domestic production expands for those products that are considered substitutes by consumers to the now higher-priced imported products. Because such domestic production would not have been feasible, efficient, or profit maximizing without protection, there is a loss to the domestic economy. Artificially raising the profitability of firms in the protected industry by reducing foreign competition may induce too many resources to enter that industry, exceeding the efficient amount of domestic resources devoted to that industry. Since it is well established that the gains to these now-protected producers plus any gains to the government (e.g., from increased tariff revenue, revenue from auctioning/selling import licenses) are almost certainly less than the sum of the losses to consumers and the inefficiencies, there is a net welfare loss to the protectionist country.[2] Recognizing that net gains from trade exist, multilateral trade-liberalization talks conducted under the auspices of the World Trade Organization (WTO) have resulted in worldwide tariff rates falling with a corresponding increase in world economic growth.[3]

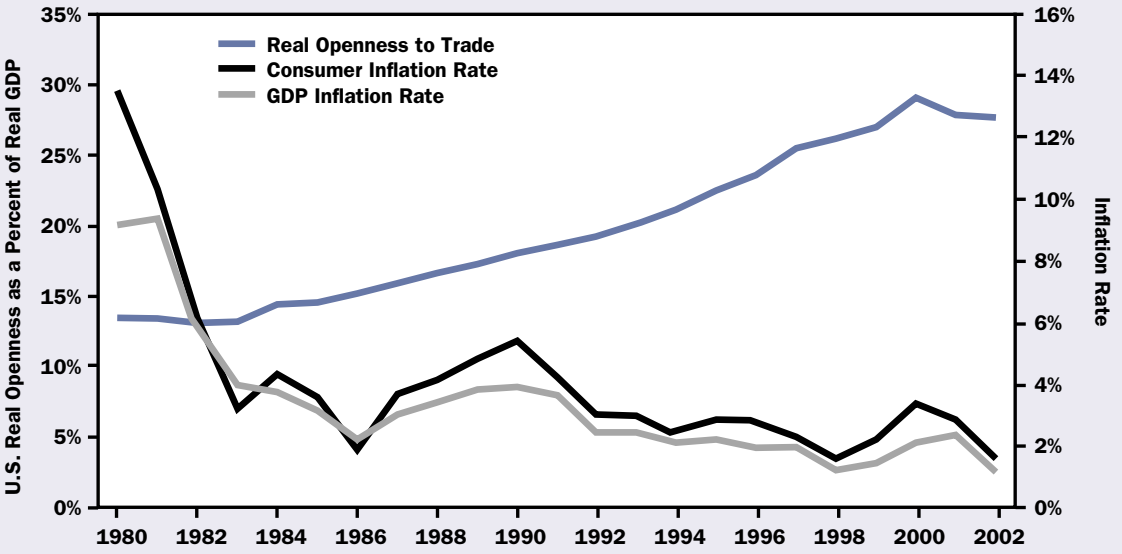
Although increased trade leads to higher incomes and faster growth for the economy overall, it can displace some domestic workers in import-competing industries who find themselves subject to increased competitive pressures. As stated in the CEA's 2002 *Economic Report of the President* (pp. 272-73),

[2]Apart from lowering national welfare, protectionism generally results in income redistribution away from consumers and to the government and the domestic producers of protected commodities/services.

[3]The WTO's website states that "[i]ts main function is to ensure that trade flows as smoothly, predictably, and freely as possible [because] the data show a definite statistical link between freer trade and economic growth." The WTO estimates that as a result of the various rounds of trade negotiations, by the mid-1990s, industrial countries' tariff rates on industrial goods had fallen steadily to less than four percent. However, commensurate with multilateral tariff reductions, countries increasingly have sought relief from imports through a variety of managed-trade mechanisms often referred to as non-tariff barriers ("NTBs"). Examples include the various administered-protection programs contained in both U.S. and international trade law (e.g., safeguard or "escape-clause" actions, and anti-dumping and countervailing duty laws) that allow for the enactment of duties without violating existing tariff-reduction agreements.

FIGURE 1

U.S. OPENNESS AND INFLATION RATES, 1980-2002



Source: Export, import, and real GDP data for 1980-2001 come from the CEA's 2003 *Economic Report of The President*, Table B-1, pp. 276-77. Data for 2002 come from the Bureau of Economic Analysis, *www.bea.gov*. CPI-U (All items) and GDP implicit price deflator data come from the CEA's 2003 *Economic Report of The President*, Tables B-60 (p. 345) and B-3 (p. 280), respectively.

It is true that some domestic firms will not be able to compete effectively with imports, and these firms may be forced to reduce their work force or even cease operations. At the same time, however, the opportunity for increased trade will lead other firms to expand their operations and increase hiring, in order to serve the international market as exporters. These firms tend to be the more productive ones in the economy.…The shifting of jobs across sectors [due to import competition] may take time, and some workers may face dislocation. However, the displacement of some workers by imports should not be an excuse for discouraging trade, any more than the costs to some workers of technological change should stop the development of innovations…. Imposing trade restrictions in an effort to save those jobs will only destroy, or prevent the creation of, jobs in other sectors.

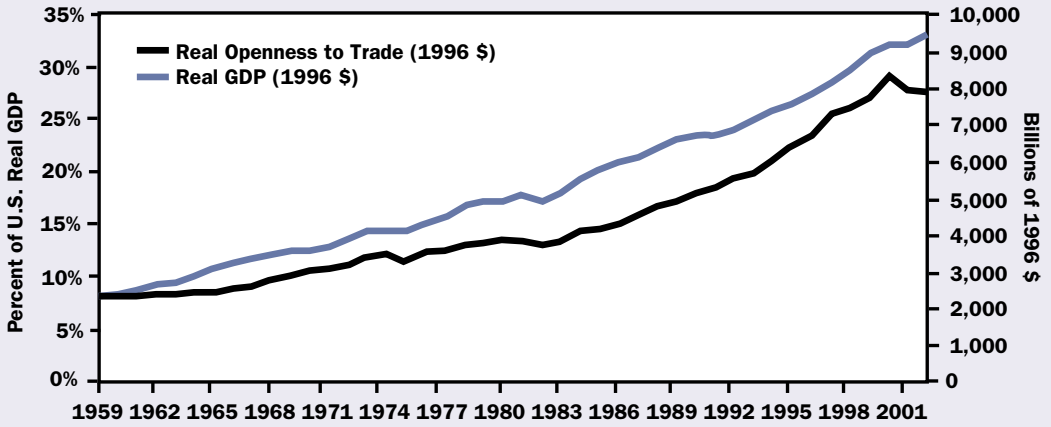
Because increased imports likely will displace workers in less competitive import-competing sectors, workers in these industries will incur adjustment costs. However, since the aggregate benefits of free trade are greater than these costs, the "winners" under trade liberalization should be able to compensate the "losers" and still be better off *vis-à-vis* no trade. In practice, this means providing adjustment assistance to those workers displaced by increased trade.[4] According to the Institute for International Economics (current):

> Trade liberalization is often the focal point for anxiety about job insecurity, and job loss is costly for workers displaced from manufacturing industries where import competition is strong. Comprehensive adjustment and skill-building programs are therefore critical for workers hurt by this process. Unless workers can acquire the education and skills needed to succeed in a highly competitive economy, the long-run political support needed to sustain that economy will fail to develop.

[4]While such adjustments costs generally are "up-front" and of relatively short duration (i.e., they disappear when a dislocated worker finds a new job paying at least the same amount as the lost job), the benefits of more open trade occur and compound over time and never "disappear." The United States has been providing trade adjustment assistance to workers displaced by international trade since 1962 (periodically updated). This program provides both monetary compensation (called Trade Readjustment Allowances, or TRAs) and retraining to assists workers who the U.S. Labor Department deem are hurt by foreign competition.

FIGURE 2

REAL GDP AND U.S. EXPORTS PLUS IMPORTS AS A PERCENT OF REAL U.S. GDP



Source: Data for 1959-2001 come from the CEA's 2003 Economic Report of The President, Table B-1, pp. 276- 77.

TABLE 2

CORRELATION BETWEEN U.S. OPENNESS AND U.S. INFLATION RATES, 1980-2002

	Openness	P-value
Consumer Inflation Rate	-0.558	0.006**
Economy-wide Inflation Rate	-0.683	0.000**

** Significantly different than zero at the 1 percent level of significance.

Benefits of Free Trade

Given the general impacts of trade and our estimation of the impact of increased trade on U.S. consumers, it is important to understand clearly the specific benefits to trade.

Free Trade Reduces The Price of Goods and Services to Consumers

The impact of free trade in reducing prices and inflation has been discussed and documented by Kenneth S. Rogoff, former Chief Economist and Director of Research of the International Monetary Fund (IMF). He stated (2003, p. 1), "[i]n recent years, inflation around the world has dropped to levels that, only two decades ago, seemed frustratingly unattainable" due to increased globalization (among other factors). Romer (1993) finds a country's openness to trade reduces its inflation rate, and the IMF (2001) reports that a common finding in the relevant empirical research literature is that greater openness to trade is associated with lower inflation.[5]

Examining the trends in estimates of U.S. inflation and openness to trade (i.e., the sum of the real value of imports plus exports divided by real GDP) suggests that increased trade dampens inflation in the United States. As illustrated in Figure 1, over the period 1980-2002, there has been a general increase in real openness to trade and downward trends in the overall U.S. and consumer inflation rates. Statistical correlation analysis more formally shows that U.S. inflation tends to be lower when trade increases. As shown in Table 2, both measures of U.S. inflation are negatively correlated with U.S. openness during 1980-2002, although other factors (e.g., U.S. monetary policy after 1980) presumably have also contributed to the low U.S inflation post-1980.

Free Trade Boosts Economic Growth, Enhances Productivity, and Raises Incomes

The U.S. economy has become increasingly open to trade. As illustrated in Figure 2, the value of U.S. imports and exports relative to U.S. GDP has increased over time in real terms for the period 1959-2002. As exports and imports have risen over time, GDP has also increased roughly in parallel with the trade increases. There are many reasons for the growth in U.S. real GDP over time. However, research indicates that increased trade has contributed substantially to U.S. growth, and we use that research as one method to quantify how much free trade has added to the income of the average U.S. household.

Research firmly establishes a link between a country's increased trade and economic well-being. The IMF (2002, p. 132) concludes, "[the] evidence indicates that trade

[5]The IMF also notes that the effect of openness to trade on inflation can be sensitive to the sample, specification, and period of estimation (2001, p. 123). It should be noted that while Lane (1997) confirmed Romer's empirical finding of the negative association between openness and inflation, Terra (1998) finds that such a link is sensitive to the time period and identity of countries under study.

openness makes an important contribution to higher productivity and income per capita, and that trade liberalization contributes to growth."[6] Similar findings have been developed by the U.S. International Trade Commission (USITC, 2003, pp 67 and 113 and Chapter 4) and the World Bank (2004).

The Organization for Economic Cooperation and Development (1998, pp. 10 and 39) finds that nations relatively open to trade have achieved double the annual average growth as those that are relatively closed, and states "the efficiency benefits of an open trade and investment regime contribute to economic growth and hence rising incomes." The 2003 *Economic Report of the President* (CEA, 2003. pp. 231-233 and 242) summarizes the findings of a study of developing countries between income growth and openness to trade. It finds that had the average "globalizer" country and the average "nonglobalizer" country each begun with an income per capita of $1,000 in 1980, by 2000 the globalizer's income per capita would have grown to $2,300 and the nonglobalizer's only to $1,240. This publication also states,

> In short, international competition provides incentives to increase efficiency and productivity, leading in turn to higher income per capita…Research suggests that a 1 percent increase in a country's trade relative to its GDP is associated with an increase in its income per capita of 3 percent. Moreover, evidence suggests that it is increased trade that leads to increased income rather than the reverse.

Because trade liberalization boosts productivity and economic growth, and economic growth means more jobs, this translates into increased income. Several studies have quantified the link between expanded trade and higher income. For example, according to the WTO (2003, p. 8),

> The WTO's own estimates for the impact of the 1994 Uruguay Round trade deal were between $109 billion and $510 billion added to world income (depending on the assumptions of the calculations and allowing for margins of error). More recent research has produced similar figures. Economists estimate that cutting trade barriers in agriculture, manufacturing and services by one third would boost the world economy by $613 billion – equivalent to adding an economy the size of Canada to the world economy.

The clearly dominant view is that more open trade policies are associated with higher per capita income. Irwin (2002, p. 40) concludes that even taking into account the criticisms of the existing studies, there is a positive effect of trade on income.[7]

The "Dynamic" Effects of Increased Trade

The standard analysis of trade liberalization and associated benefits typically takes into account only the "static" impacts, such as a reallocation of resources to more efficient uses and the benefits accruing to consumers from lower prices. The estimates usually do not capture the "dynamic" effects on growth, such as those arising from greater economies of scale, productivity gains, and access to improved technologies, that trade liberalization can be expected to bring. If incorporated, then the net welfare gain due to trade liberalization would be even greater. According to the CEA (1999, p. 236):

> The benefits to an economy from international trade are of two types: static gains provide a one-time increase in income, whereas dynamic gains result in a more or less permanent increase in the economy's rate of growth. The former can be significant, but it is the accumulation over time of the latter that can generate much larger improvements in living standards.

As discussed below, our estimates of the benefits of free trade to U.S. households do not include these effects, thus making our estimates conservative.

Estimating Gains to U.S. Consumers From Trade

Our research uses information from existing research by academic, government, and other sources. In particular, we take various existing estimates of the aggregate benefits of free trade for the U.S. economy (e.g., growth in real GDP) and use each of them to quantify the impact on U.S. households of increased trade. Table 1 at the begin-

[6]The IMF further notes that recent studies have documented that changes in openness is an important determinant of the change in income per capita within countries over time as well as across countries for a given time period.

[7]After reviewing a 2001 study, which "used dozens of statistical specifications to examine the link between indicators of a country's trade policy and its per capita income," Irwin concludes that "[a]lmost inevitably, more open trade policies are associated with higher per capita income, although the magnitude and significance of the relationship varied considerably."

ning of the article presents our estimates (discussed in more detail below) of the per-household gains from increased trade for the United States, 1992-2002.

Based Upon Findings by the USITC

One method for estimating the gains to U.S. consumers from increased trade can be based on results by the USITC (2003). This publication studies the incremental impact on net U.S. economic welfare of re-imposing on the economy the protection that was eliminated as a result of the five relatively recent trade agreements: the two multilateral agreements—the Tokyo Round (1979) and the Uruguay Round (1994)—and the three preferential trade agreements—the U.S.-Israeli Free Trade Agreement (1985), the U.S.-Canada Free Trade Agreement (1988), and NAFTA (1993).

The USITC's analysis essentially asks the question, would the U.S. economy be worse off (in terms of decreased overall economic welfare) absent the trade liberalization in these five agreements since 1980, and what is the effect? The USITC then quantifies the difference between U.S. economic welfare as observed under liberalization (the benchmark) and the simulated U.S. economy in the absence of the liberalization. The publication estimates the impact of the five agreements (and each one incrementally) and quantifies their effect on overall U.S. welfare expressed in dollar terms.[8] The USITC (2003, p. 326) states its methodology likely yields conservative estimates of the benefits to the U.S. economy due to trade liberalization.

> The estimated impacts produced in the simulations here are conservative from a quantitative and a theoretical perspective. The trade policy changes considered in the analysis are only those that have been quantified in publicly available sources (i.e. tariff and selected non-tariff barriers). The model only considers the effects of relative price changes attributable to trade policy changes. As has been discussed throughout this report, trade policy might plausibly be linked to increasing scale economies or higher productivity levels. Because the evidence for these effects is somewhat mixed, this exercise does not attribute changes in productivity levels or in firm scale to changes in trade policy. Models that allow for increased scale economies and productivity effects from trade liberalization generally suggest larger welfare gains from liberalization.

The USITC's annual estimates of net welfare benefits to the U.S. economy of trade liberalization for the period 1980-2001, combine the effects of increased consumer welfare and any losses in jobs in domestic industries, but it does not provide a separate estimate of the impact on consumers. For example, the USITC estimates net U.S. economic welfare in 2001 (as measured in 2002 dollars) would have been $56 billion lower if the measurable trade barriers eliminated by the five trade agreements were re-imposed. The USITC then calculates that the present value in 2001 of the aggregate U.S. net welfare "gain" due to trade liberalization since 1980 totals approximately $595 billion.

Performing the calculations as described in the Appendix for each year during 1980-2001 provides for an estimate of the cumulative benefit to U.S. consumers of increased trade. During the period 1992 to 2002, this is approximately $2.3 trillion (almost 2.5 percent of aggregate real GDP over 1992-2002), or $21,422 per household, in 1996 dollars. Based upon this analysis, since 1992 the U.S. consumer benefit per household has increased $1,229 (from $1,216 in 1992 to $2,445 in 2002) due to trade liberalization. In 2002 alone, the inflation-adjusted benefit to U.S. consumers due to trade liberalization is approximately $267.3 billion in aggregate. This corresponds to approximately $2,445 per household, or almost 5.8 percent of 2002 U.S. household real median income ($42,409).

Based Upon Estimates in the 1998 Economic Report of the President

The *1998 Economic Report of the President* states:

> The common empirical finding is that increased trade is associated with higher income. For example, one recent study, using data from 123 countries, estimated that every percentage-point increase in openness (measured as the sum of imports and exports, expressed as a percentage of GDP) was associated with a 0.34-percent increase in real income per capita between 1960 and 1985 (CEA, 1998, p. 238).

[8]The USITC's welfare metric captures only the "deadweight loss" to the U.S. economy had trade liberalization not occurred and not any redistributed or transferred "surplus" between consumers and producers that occurs with changes in trade policy. "Deadweight loss" is meant to denote loss in surplus (i.e., income) by domestic producers/consumers due to changes in trade policy that are not re-distributed to some agent in the economy.

We use this relationship to estimate the U.S. consumer benefits from 1992 to 2002 of increased trade. We first determined the change in percentage points in U.S. openness since 1960. For example, in 1992 the measure of U.S. openness was 19.21 percent, which was 10.99 percentage points greater than U.S. openness in 1960 (8.23 percent). Using the above relationship that every percentage-point increase in openness is associated with a 0.34-percent increase in real income per capita since 1960, increased trade was responsible for approximately 3.74 percent (0.34 times 10.99) of the increase in U.S. real GDP per capita from 1960 to 1992. Given that U.S. real GDP per capita in 1992 had grown by $13,661 from 1960 to 1992 (in 1996 dollars), increased trade was responsible for $510 of this increase in 1992 ($13,661 times 3.74 percent). We multiply $510 by the 1992 ratio of real disposable income per capita to real GDP per capita (75.42 percent) to get the increase in real disposable income per capita due to the change in openness. Finally, we multiply this amount by the 1992 U.S. population and divide by the number of households for 1992 to derive an estimate of the increase in real disposable income per household. For 1992, this amount equaled approximately $1,025.

Following this same methodology for 2002, increased trade was responsible for approximately 6.59 percent of the increase in U.S. real GDP per capita by 2002. Since U.S. real GDP per capita in 2002 had grown by $19,691 since 1960, increased trade was responsible for $1,298 of this increase ($19,691 times 6.59 percent). We multiply the $1,298 by the 2002 U.S. population and divide by the number of households for 2002, and then adjust by the 2002 ratio of real disposable income per capita to real GDP per capita (74.49 percent). The resulting amount, approximately $2,540, is an estimate of the increase in real disposable income per household for 2002 due to increased trade. This increase is about 6.0 percent of 2002 U.S. household real median income ($42,409). Doing this calculation for each year during 1992-2002 allows us to estimate the cumulative benefit. We find that from 1992 to 2002, the cumulative benefit to U.S. consumers of increased trade over this time period is approximately $20,207 per household. Moreover, since 1992, the U.S. consumer benefit per household has increased $1,515, from approximately $1,025 to $2,540, in 1996 dollars.

Based Upon Estimates in Frankel and Romer

Frankel and Romer (1999), using a sample of 150 countries (including the U.S.), conducted an empirical investigation of the impact of openness to trade on a country's real GDP per capita. They employ a modeling approach somewhat different (and arguably superior for technical reasons) to most previous studies.[9] These authors concluded that,

> the point estimates suggest that the impact of trade is substantial. In a typical specification, the estimates imply that increasing the ratio of trade to GDP by one percentage point raises income per person by between one-half and two percent…The results of the experiment are consistent across samples and specifications we consider: trade raises income (Frankel and Romer, 1999, pp. 381-82 and 394).

Irwin (2002), in discussing the work of Frankel and Romer (1999), states that

> They have shown that greater trade is not associated with greater income because high-income countries simply trade more. Indeed, the effect of trade on income is strikingly higher once the part of trade that is not driven by income is isolated: the standard estimates suggest that a 1 percent increase in the trade share increases per capita income by about 0.8 percent, but using only geographic determinants of trade raises the estimated effect to about 2 per cent (although this is imprecisely estimated).

We use Frankel and Romer's estimates—that a one percentage point increase in trade share raises annual GDP per capita by between 1.5 percent and about two percent (1.97 percent to be precise)—to calculate the increase in real disposable income per U.S. household since 1992. Between 1992 and 2002 U.S. openness increased from 19.21 percent to 27.61 percent, or 8.4 percentage points. Using the relationship that a one percentage point increase in trade share raises annual GDP per capita by 1.97 percent, the cumulative effect from

[9]Most of the studies preceding Frankel and Romer (1999) that attempted to identify and isolate a relationship between a country's income per capita and openness to trade (among other factors) generally suffered the technical problem that measures of openness may be "endogenous" to income determination. That is, countries whose incomes are high for reasons unrelated to their trade policies (e.g., there may be a good mix of sound domestic monetary/fiscal policy) may trade more so that causation not only runs from "trade-to-income" but also from "income to trade." To address this problem, and unlike previous studies, Frankel and Romer use a country's geographic attributes found to be key determinants of trade—but unrelated to income—to identify the relationship between trade and income.

1992 to 2002 of this increased openness on real GDP per capita is 16.54 percent (1.97 percent times 8.4). Since U.S. real GDP per capita grew by $6,030 in 1996 dollars from 1992 to 2002, increased trade was responsible for $997 of this increase ($6,030 times 16.54 percent). Multiplying this amount by the 2002 ratio of real disposable income per capita to real GDP per capita (74.49 percent) allows for the calculation of the increase in real disposable income per capita based upon the change in openness. Finally, multiplying this amount by the 2002 U.S. population and then dividing by the number of households for 2002 yields the increase in real disposable income per household since 1992.

The increase in the inflation-adjusted benefit to U.S. consumers due to trade liberalization since 1992 ranges from approximately $1,486 per household, (using their 1.5 percent estimated relationship) to $1,952 per household (using their 1.97 percent estimated relationship). This range is somewhat higher than indicated by the USITC-based increase in U.S. consumer benefit per household due to trade liberalization since 1992 ($1,229), especially considering that the Frankel and Romer range is in 1996 dollars, whereas the USITC estimates are in 2002 dollars and the GDP deflator increased by about 6.5 percent between 1996 and 2002. The Frankel and Romer range encompasses the estimate based on the 1998 Economic Report of the President ($1,515).

Estimates of the Office of the U.S. Trade Representative

Our estimates based on the three studies discussed above are similar to those of the Office of the U.S. Trade Representative. Robert B. Zoellick (2002, p.14) stated, "NAFTA (the North American Free Trade Agreement) and the Uruguay Round agreements have resulted in higher incomes and lower prices for goods, with benefits amounting to $1,300-$2,000 (in 1996 dollars) a year for the average American family of four." The four estimates above of the increased annual income per U.S. household since 1992, due to expanded trade—$1,229 (USITC), $1,486 (Frankel and Romer's "1.5 percent"), $1,515 (Economic Report of the President), and $1,951 (Frankel and Romer's "1.97 percent")—are consistent with the USTR's estimates of the effects of NAFTA and the Uruguay Round, keeping in mind that the USITC estimate is in 2002 dollars and the others are in 1996 dollars. Furthermore, Zoellick reported that new global trade negotiations (e.g., the Doha Round), could deliver an annual income gain of nearly $2,500 per year to an average American family of four, according to a University of Michigan study (Zoellick, 2002).

Conclusion

In this article, we discuss the effects of trade and estimate the impact of expanded trade on the income of the average U.S. household. We estimate that the increased trade has had a cumulative aggregate benefit to American consumers of approximately $2.3 trillion over 1992-2002, or between $20,000 and $22,000 per household in 2002 dollars. In 2002 alone, the inflation-adjusted gains from trade to U.S. consumers were almost six percent of 2002 U.S. household real median income ($42,409), or approximately $2,500 per household.

Focusing only on the *increase* in trade from 1992 to 2002, the inflation-adjusted benefits to consumers from freer trade during this period ranged from $1,229 to $2,080 per household, in 2002 dollars. These estimates are consistent with the conclusions of the United States Trade Representative (2003), who estimated that in 2001 the two major trade agreements of the 1990s—NAFTA and the Uruguay Round—generated annual benefits for the average American family of four of between $1,300-$2,000, in 1996 dollars. ■

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Appendix

Technical Derivation of Consumer Benefits Based Upon Findings by the USITC

Since the USITC's economic model only provides net benefit estimates by combining domestic industry losses and consumer gains from trade, their estimates do not separately provide the benefits accruing to U.S. consumers from lower prices due to freer trade. However, we can separate the impact of freer trade on consumers by using their estimates and applying economic principles to calculate the annual U.S. consumer benefit per household due to freer trade. Figure 3 presents the standard aggregate supply and demand diagram economists use in measuring the benefits and costs of trade restrictions.[10]

The annual welfare estimates by the USITC are meant to capture the two triangles denoted as areas B and D in Figure 3. These are the two "deadweight loss" areas asso-

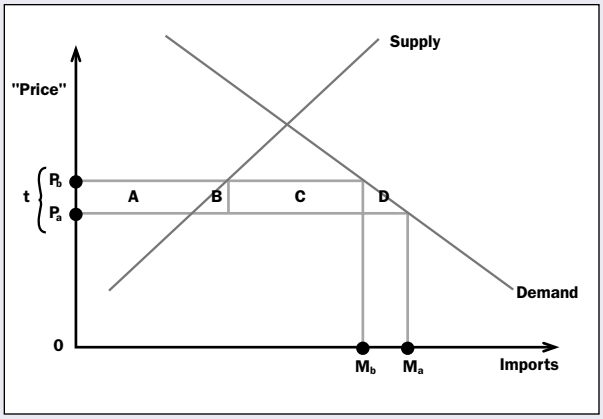
[10]An analysis that protection typically lowers national welfare (as analyzed in Figure 3), as well as the various underlying assumptions to such an analysis, can be found in textbooks pertaining to international economics (e.g., Kreinin (1998), Chapter 4). Depending on the nature of a trade restriction, tariffs can generate revenues for governments imposing them, and there can be complications for a country, such as the United States, that is large compared to many of its trading partners. Accordingly, our use of Figure 3 is for illustrative purposes only.

ciated with increased protection which effectively raises domestic prices from P_a to P_b or, conversely, represent the net gain to the economy of freer trade that results in a general price decline from P_b to P_a. As noted above, in 2001, the USITC estimated this area (B+D) to equal $56 billion. This $56 billion has in effect netted out the losses to domestic industry and increased consumer surplus from freer trade (A+C). However, the gain to consumers from lower prices (P_b to P_a) due to trade liberalization is the area A+B+C+D. Given the USITC's annual estimate for area B+D, we solve for area A+B+C+D using a well-know formula for Area D (see, e.g., Rosen, 1995, p. 313):

$$(1)\ \text{Area D} = \frac{1}{2}\left|\varepsilon_p\right| (P_a M_a t^2)$$

In equation (1), M_a represents the observed annual real value of U.S. imports, and P_a is their "normalized" price assumed equal to 1.0. The term "*t*" denotes the percent difference between P_a and P_b, and ε_ρ denotes the price elasticity of demand (in absolute value). We assume that supply and demand are linear around the implied price change consistent with the USITC's annual welfare estimates, and that demand exhibits unit elasticity.

FIGURE 3



We translate the USITC's annual welfare estimates into annual consumer benefits by using (1). The steps are as follows, and are repeated for each year during the period 1980-2001. The year 2001 is used for illustrative purposes. As noted in the text, performing the calculations below for each year during 1992-2002 provides for an estimate of the cumulative benefit to U.S. consumers of increased trade.

(i) Set equation (1) equal to the USITC's annual welfare estimate of the gain to the U.S. economy due to trade liberalization. In 2001, this equaled almost $56 billion. Because this represents area B+D, we divide it by 2 on the assumption that the two deadweight loss areas can be assumed to be about equal. This yields an estimate of area D of approximately $28 billion. In 2001, M_a equaled $1,492.0 billion, P_a is normalized to equal 1.0, and $|\varepsilon_\rho|$ is assumed to equal 1.0.

(ii) Solve equation (1) for *t*, the percent change in P_b and P_a. For 2001, $t = 0.1936$. That is,

$$\$28 \text{ million} = \left[\frac{\$1{,}492.0 \text{ billion}}{2}\right] \cdot t^2$$

(iii) Using this calculated *t* and $\varepsilon_\rho = 1.0$ allows for the calculation of M_b based on the definition of price elasticity of demand: $\varepsilon_\rho = \frac{\%\Delta Q}{\%\Delta P} = \frac{\frac{Mb-Ma}{Ma}}{\frac{Pb-Pa}{Pa}}$, which can be written as (recall $t = \frac{Pb-Pa}{Pa}$):

$$M_b = (1+t \cdot(-\varepsilon_\rho)) \cdot M_a$$

For 2001, M_b = $1,203.2 billion, calculated using the above equation:

$$\$1{,}203.2 = (1+0.1936 \cdot(-1)) \cdot \$1{,}492.0$$

(iv) With $t = 0.1936$ and M_b = $1,203.2 for 2001, area A+B+C can be computed in Figure 1. That is, area A+B+C = "t" times M_b, or 0.1936 x $1,203.2 = $232.94 billion. Adding back in area D (approximately $28 billion) yields the annual implied benefit to U.S. consumers due to increased trade. For 2001, this is approximately $260.9 billion. Dividing this by the number of U.S. households yields the estimated benefit per household due to increased trade.

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