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INSTITUTE FOR INTERNATIONAL ECONOMICS

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Preface

A basic paradigm of economic theory is the Law of One Price—the idea that the price of a precisely defined product should be the same in all markets in all countries, after allowing for transportation costs. Otherwise, a smart arbitrageur could buy the product in a cheap market, sell it in a dear market, and pocket the difference.

Empirical economists have found that the Law of One Price, for all its logic, does not describe actual markets. Not only do transportation costs separate markets but a host of other public and private barriers serve to frustrate the Law of One Price: tariffs, quotas, currency fluctuations, soft and hard cartels, uncompetitive retail distributors . . . the list goes on. As a result, the Law of One Price is more widely violated than almost any other paradigm of economic theory. Not only do prices for the same product differ from city to city and country to country, but they differ by huge amounts. It is not uncommon for a precisely defined item (such as pair of men's shoes) to cost four times as much in one city as in another.

Some of the barriers that separate markets are inescapable features of geography and culture. Others can be reduced by public policy—freer trade and investment, less currency volatility, and stronger competition policy. Still other barriers can be reduced by new technologies—cheaper air transport and telecommunications, e-commerce, and express delivery services.

In this study, the authors—Reginald Jones Senior Fellow Gary Clyde Hufbauer, Visiting Fellow Erika Wada, and Tony Warren of the Australian National University—speculate on the benefits that could be realized if enlightened public policy and new technology made the world economy a friendlier place for *convergence* toward the Law of One Price. The authors do not expect prices to become identical from country to country but they do believe that price variation in the world economy might plausibly converge to the extent of price variation now experienced within the United

States. On this assumption, the authors suggest that the world benefits of price convergence could reach at least $600 billion annually—with a large share of the benefits accruing to middle-income and low-income countries. The authors compare their calculations with estimates made using standard trade models and find that the figures are in the same ballpark. Hence policy steps toward achieving price convergence, including further trade liberalization, could have very large payoffs for people in all parts of the world.

The study is part of the Institute's Globalization Balance Sheet series designed to examine both the underappreciated benefits and underquantified costs of globalization. Other published works from this project include *Globalization and the Perceptions of American Workers* by Kenneth F. Scheve and Matthew J. Slaughter, *Job Loss from Imports: Measuring the Costs* by Lori Kletzer, and *Why Global Commitment Really Matters!* by Howard Lewis III and J. David Richardson. Additional research and publications are in progress.

The Institute for International Economics is a private nonprofit institution for the study and discussion of international economic policy. Its purpose is to analyze important issues in that area and to develop and communicate practical new approaches for dealing with them. The Institute is completely nonpartisan.

The Institute is funded largely by philanthropic foundations. Major institutional grants are now being received from the William M. Keck, Jr. Foundation and the Starr Foundation. A number of other foundations and private corporations contribute to the highly diversified financial resources of the Institute. About 31 percent of the Institute's resources in our latest fiscal year were provided by contributors outside the United States, including about 18 percent from Japan. Partial funding for the Institute's Globalization Balance Sheet series is being provided by the Toyota Motor Corporation, in light of the great interest in these issues in both the United States and Japan. The Andrew W. Mellon Foundation is also supporting these studies.

The Board of Directors bears overall responsibilities for the Institute and gives general guidance and approval to its research program, including the identification of topics that are likely to become important over the medium run (one to three years), and which should be addressed by the Institute. The Director, working closely with the staff and outside Advisory Committee, is responsible for the development of particular projects and makes the final decision to publish an individual study.

The Institute hopes that its studies and other activities will contribute to building a stronger foundation for international economic policy around the world. We invite readers of these publications to let us know how they think we can best accomplish this objective.

C. Fred Bergsten
Director
December 2001

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We appreciate the helpful comments of C. Fred Bergsten, Richard Cooper, Robert Z. Lawrence, Marcus Noland, Olivier Renard, Shang-Jin Wei, and John Williamson. We are especially grateful for the intellectual and moral support from J. David Richardson in the face of controversy engendered by this study.

This project required a lot of data scrubbing and analysis. Our research associates, Hyun Koo Cho, Aylin Isik, Shirin Pakfar, and Anita Rajan, ably carried out this crucial and exacting work. Marla Banov and Madona Devasahayam organized the publication, including copyediting of the text, tables, and equations, all with great care.

Executive Summary

This study presents speculative calculations that illustrate potential benefits from price convergence among countries. Some price convergence should result from global economic integration; hence, our analysis can be viewed as a facet of the broader globalization debate. The dataset is large, but certainly not ideal for our calculations: it includes only consumer goods, not capital goods and intermediate goods. Many arbitrary assumptions are made along the way in order to reach numerical results. Moreover, our method of analysis is simple partial equilibrium, not general equilibrium. In other words, we examine the benefits of price convergence for individual products and individual countries, one at a time. We do not consider the impact of price changes in product x for production and consumption of product y. Nor do we consider the impact of price changes on production in country A and consumption in country B. These interactions may be important, but to model them in a general equilibrium framework would be a substantially larger task.

In this inquiry, we attempt a fresh look at global economic integration by examining existing price divergence and possible price convergence across a range of consumer goods and countries. Familiar models of economic integration look at trade and investment volumes and changes in factor productivity that result from lower barriers of all kinds (tariffs, regulation, investment restrictions, transportation and communication costs, corruption burdens, etc.). We regard our exercise as complementary to traditional approaches. Moreover, we view our calculations as merely a first step in the use of price data to examine the benefits of economic integration. We encourage future researchers to use better datasets and models to assess the consequences of price convergence.

1

Introduction

Price divergence is readily apparent to anyone who shops. Travelers from Chicago to Paris are hit by sticker shock. Products ranging from London Fog raincoats to Viagra are available over the Internet at half their retail store prices. Common experience tells us that prices for identical products differ among countries, cities, and even neighboring shops. On the other hand, common experience also tells us that open markets and greater competition will force a degree of price convergence, if not identical prices.

In today's world economy with freer trade and investment, improved transportation and communications, e-commerce, and worldwide delivery networks (UPS, FedEx, DHL, and similar services), the competitive model is becoming a *better* description of economic reality.[1] We emphasize "better," for the competitive model is still far from a generally applicable description of market behavior. This study examines the potential benefits from price convergence resulting from more competition and market integration, not *perfect* competition and market integration. To be specific, our calculations of potential benefits assume that the world economy can attain the same degree of competition and market integration—and hence price convergence—as now exists within the United States. We

1. The Uruguay Round (1995) was an outstanding example of policy-driven multilateral liberalization. Other examples at a regional level include the European Union, the North American Free Trade Agreement (NAFTA), and the Southern Cone Common Market (Mercosur). Significant sectoral liberalization was achieved in the World Trade Organization Basic Telecommunication Agreement of February 1997 and Information Technology Agreement of April 1997. All of these agreements are intended to promote market integration.

use simple partial equilibrium analysis to assess the benefits from narrowing the range of worldwide price dispersion to the range now observed in the United States.

Our assumption that US experience provides a benchmark for the world economy seems bold. However, between 1990 and 1999, the standard deviation of tradable goods prices between European cities converged to approximately the same magnitude as observed between US cities.[2] Moreover, as table A.1 (appendix A) indicates, maximum and minimum prices for tradable goods usually differ by a factor of two or more among US cities. Therefore, using US price experience as the benchmark for our study is a far cry from assuming that the "law of one price" will prevail in the world economy.

We calculate the potential benefits of price convergence on a country-by-country basis, for select regional groups, and for the world as a whole. The data we use for price comparisons are stated for narrowly defined items (such as "mushrooms") within product sectors (for example, "fresh vegetables and fruits"). However, we do not present calculations on an item or sector basis. (The items and sectors are listed in appendix A, table A.1.) There are two reasons for not presenting detailed calculations. First, we do not believe the price data at an item or sector level are sufficiently reliable. Instead, we believe that errors in individual price observations will, to a significant degree, be "washed out" by aggregating benefits calculations to the country level. Moreover, we think the degree of price convergence that we impose in making our calculations is more plausible for an entire country than for items or sectors within a country.

If prices converged to a range that we characterize as the broad world price band (BWPB; corresponding to observed divergence within the United States), the potential static benefits—calculated starting with market exchange rates—could reach 2.1 percent of global GDP or $0.6 trillion per year (table 1.1).[3]

The gap between market exchange rates and purchasing power parity (PPP) exchange rates is often significant. The difference between market exchange rates and purchasing power parity rates (PPP rates) is explained and illustrated in box 1.1. At first impression, some readers may think that the gains we have calculated are nothing more than a reflection of the gap between market rates and PPP rates. For example, in 1999, the market rate for the Brazilian real was 2.0 reals/US dollar, while the PPP rate was 0.9 real/US dollar. This difference implies that the Brazilian real was significantly undervalued at the market rate compared with its PPP rate. Consequently, many Brazilian goods were "cheap" by US standards. The

2. See Rogers, Hufbauer, and Wada (2001) and Rogers (2001).

3. The countries covered in our study (see table 1.1) represent 95 percent of world GDP measured at market exchange rates. Static gain calculations, expressed in dollars, refer only to the countries covered in tables 1.1 and 1.2.

Box 1.1 Market exchange rates versus purchasing power parity exchange rates

What is the difference between a market exchange rate and a PPP exchange rate? A market exchange rate is used to exchange a currency. For example, an American who travels to Brazil in June 2001 and exchanges US dollars for Brazilian reals would receive about 2.3 reals per US dollar. The market exchange rate is 2.3 Brazilian reals per US dollar.

Purchasing power parity (PPP) exchange rates, on the other hand, are hypothetical rates calculated so that a given amount of a common currency (say $1,000) could purchase the same quantity of goods and services in both countries. For example, if a loaf of bread costs $1 in a Chicago supermarket, and the same loaf costs 1 Brazilian real in a Rio de Janeiro supermarket, the PPP rate for bread is 1 Brazilian real per $1. To calculate PPP rates, however, prices for a "representative" basket of goods and services are compared. For example, a "representative" basket might contain a kilogram of rice, a quart of milk, a quarter-kilogram of bacon, a half-kilogram of chicken, and one T-shirt, and might cost $40 in Chicago. A basket containing the same items might cost 60 Brazilian reals in Rio de Janeiro. In this example, the PPP exchange rate is 1.5 Brazilian reals per $1.

In the example just given, if the market exchange rate is 2.3 Brazilian reals per US dollar, and if the enumerated basket is truly representative of all goods and services, a traveler from the United States to Brazil should find that goods and services in Brazil are by and large cheaper than in the United States. Exchanging $100, the traveler would receive 230 Brazilian reals. With 230 Brazilian reals, the traveler could buy 3.8 of the enumerated "representative" baskets in Brazil costing 60 reals each. In the United States, with $100 the traveler could only buy 2.5 "representative" baskets, costing $40 each.

The gap between market exchange rates and PPP exchange rates is often significant (see table 3.3 in chapter 3). In appendix C, we repeat the familiar finding that per capita income levels are the major factor explaining the gap between two exchange rates (given the importance of nontradable sectors). Exchange rate systems, such as a fixed rate or a floating rate system, do not seem to make much difference. However, based on the simple regression results reported in appendix C, we conclude that an array of trade and investment barriers affecting tradable products, coupled with the importance of nontradable sectors, are important in determining the size of the gap between market exchange rates and PPP rates.

hypothetical convergence of Brazilian prices toward the BWPB might seem to be nothing more than the flip side of realigning the market exchange rate of the Brazilian real toward its PPP rate. This is not the case. Indeed, we present an alternative set of calculations to demonstrate that international price convergence is a deeper story than the familiar gap between market exchange rates and PPP exchange rates.

In our alternative calculations, we start with PPP exchange rates. The alternative calculations confirm the presence of large potential benefits from international price convergence, even after the difference between market exchange rates and PPP exchange rates has been eliminated from the picture. In fact, the calculated gains are actually much larger when the starting point is PPP rates rather than market exchange rates. The world total is 6.3 percent of global GDP or $2.4 trillion per year (table 1.2).

Table 1.1 Potential benefits at country level, calculated with market exchange rates (percent of GDP)

	Benefits from falling prices	Benefits from rising prices	Table benefits	GDP (in US$ billions)
High-income group, weighted total benefits	**0.49**	**0.12**	**0.61**	**23,076.1**
Australia	0.22	0.61	0.84	364.7
Austria	0.41	0.01	0.41	211.9
Belgium	0.08	0.02	0.10	249.7
Canada	0.03	0.18	0.21	603.8
China (Hong Kong)	0.73	0.00	0.73	166.0
Denmark	0.55	0.02	0.57	174.1
Finland	0.26	0.00	0.26	126.5
France	0.41	0.10	0.51	1,451.8
Germany	0.78	0.21	0.99	2,361.8
Greece	0.17	0.16	0.33	120.7
Ireland	0.03	0.02	0.05	68.8
Israel	0.27	0.01	0.28	89.0
Italy	0.10	0.69	0.79	1,171.9
Japan	1.82	0.00	1.82	3,798.2
Kuwait	0.03	0.17	0.19	30.2
Luxembourg	0.07	0.04	0.11	17.4
Netherlands	0.23	0.26	0.49	378.4
New Zealand	0.22	0.46	0.68	52.7
Norway	0.30	0.00	0.30	145.9
Portugal	0.03	0.80	0.83	99.4
Singapore	0.77	0.35	1.12	84.4
Spain	0.22	0.91	1.14	553.2
Sweden	0.26	0.00	0.26	226.5
Switzerland	0.94	0.00	0.94	264.5
Taiwan	0.12	0.10	0.22	321.9
United Arab Emirates	0.14	0.30	0.44	44.6
United Kingdom	0.12	0.02	0.14	1,387.4
United States	0.06	0.01	0.07	8,510.7
Middle-income group, weighted total benefits	**0.16**	**3.68**	**3.84**	**3,663.2**
Algeria	n.a.	n.a.	n.a.	33.4
Argentina	0.10	0.75	0.85	298.3
Bahrain	0.18	0.12	0.29	6.1
Brazil	0.02	9.32	9.34	776.4
Chile	0.04	0.88	0.92	72.9
Colombia	0.09	1.70	1.79	62.8
Costa Rica	0.02	3.81	3.83	8.8
Czech Republic	0.01	3.25	3.26	55.0
Ecuador	0.02	36.74	36.76	14.5
Egypt	0.56	1.50	2.06	82.7
Guatemala	0.07	1.53	1.60	19.0
Hungary	0.03	7.28	7.31	31.9
Iran	0.28	4.50	4.78	160.2
Jordan	0.56	2.34	2.90	7.1
Korea	0.27	0.05	0.32	320.7
Malaysia	0.09	0.79	0.89	70.2
Mexico	0.11	1.24	1.35	415.0
Panama	0.10	1.53	1.62	9.2
Paraguay	0.02	37.03	37.04	8.4
Peru	0.02	1.03	1.04	62.7

(table continues next page)

Table 1.1 *(continued)*

	Benefits from falling prices	Benefits from rising prices	Table benefits	GDP (in US$ billions)
Philippines	0.03	3.36	3.39	65.1
Poland	0.02	2.66	2.67	128.0
Romania	0.04	1.52	1.56	38.2
Russia	0.70	3.71	4.41	276.7
Saudi Arabia	0.28	0.63	0.91	128.9
Serbia	0.10	3.26	3.36	21.2
South Africa	0.02	2.08	2.10	116.7
Sri Lanka	0.04	7.56	7.60	15.7
Thailand	0.11	2.33	2.45	111.3
Tunisia	0.17	3.93	4.11	20.0
Turkey	0.06	4.05	4.11	110.2
Uruguay	0.12	1.50	1.62	20.8
Venezuela	0.16	0.38	0.54	95.0
Low-income group, weighted total benefits	**1.79**	**17.62**	**19.41**	**1,665.2**
Bangladesh	0.24	9.38	9.63	32.9
Cameroon	0.56	1.50	2.06	8.5
China	2.88	0.73	3.61	918.9
India[a]	0.22	63.45	63.67	379.0
Indonesia	0.24	2.81	3.05	98.8
Kenya	0.17	5.40	5.57	9.2
Nigeria	1.12	2.74	3.86	56.5
Pakistan	0.18	36.64	36.82	61.3
Vietnam	0.47	14.49	14.96	96.2
Zimbabwe	n.a.	n.a.	n.a.	4.0
World total, weighted by GDP	**0.52**	**1.57**	**2.09**	**28,404.5**

n.a. = not available

a. Excludes fresh and frozen meat.

Notes: Based on calculations at a city level (appendix B). Total is weighted by country size, measured by GDP. The Spearman rank correlation coefficient for gains measured with market exchange rates versus EIU PPP rates is 0.84 (95 percent level of confidence).

Source: Authors' calculations.

Calculated gains are larger when PPP rates are used for two reasons: first, low-income countries become more important in the world GDP picture, and second, middle-income and high-income countries realize more gains from falling prices. The main conclusion we draw from the PPP calculations is that our original set of calculations—those based on market exchange rates—cannot be brushed aside simply on the argument that market exchange rates differ sharply from PPP rates.

In our calculations (whether based on market exchange rates or PPP rates), we exclude service items in which trade is nonexistent or very limited. Excluded items belong to the following sectors (see table A.1, appendix A): books and newspapers; dry cleaning, haircut, and other services; domestic help; entertainment, meal, and hotel; transportation; housing;

Table 1.2 Potential benefits at country level, calculated with the Economist Intelligence Unit PPP rates (percent of GDP)

	Benefits from falling prices	Benefits from rising prices	Total benefits	GDP (in US$ billions)
High-income group, weighted total benefits	**0.31**	**0.13**	**0.44**	**22,369.1**
Australia	0.55	0.27	0.83	410.3
Austria	0.31	0.02	0.33	196.4
Belgium	0.09	0.02	0.11	252.4
Canada	0.19	0.01	0.20	795.2
China (Hong Kong)	0.95	0.00	0.95	182.3
Denmark	0.25	0.08	0.33	143.9
Finland	0.19	0.00	0.20	116.4
France	0.30	0.17	0.47	1,365.8
Germany	0.45	0.52	0.96	2,128.8
Greece	0.31	0.08	0.39	135.2
Ireland	0.05	0.01	0.06	72.9
Israel	0.53	0.00	0.54	103.5
Italy	0.18	0.45	0.64	1,288.4
Japan	0.91	0.11	1.02	2,909.5
Kuwait	0.68	0.00	0.68	53.2
Luxembourg	0.05	0.05	0.10	16.7
Netherlands	0.21	0.28	0.49	371.9
New Zealand	0.81	0.06	0.87	71.6
Norway	0.12	0.00	0.12	121.0
Portugal	0.55	0.16	0.71	146.6
Singapore	0.59	0.62	1.21	72.6
Spain	0.54	0.38	0.93	665.6
Sweden	0.11	0.00	0.12	195.3
Switzerland	0.30	0.19	0.49	192.2
Taiwan	1.05	0.00	1.05	533.9
United Arab Emirates	0.14	0.30	0.44	44.6
United Kingdom	0.06	0.03	0.09	1,272.2
United States	0.06	0.01	0.07	8,510.7
Middle-income group, weighted total benefits	**1.79**	**0.19**	**1.98**	**7,635.8**
Algeria	3.65	0.00	3.65	70.2
Argentina	0.51	0.17	0.68	399.7
Bahrain	1.21	0.00	1.22	9.9
Brazil	1.79	0.32	2.11	1,729.1
Chile	2.41	0.00	2.41	207.3
Colombia	2.79	0.00	2.79	168.4
Costa Rica	1.57	0.09	1.67	20.8
Czech Republic	0.89	0.12	1.01	112.5
Ecuador	1.46	0.22	1.67	64.0
Egypt	3.14	0.00	3.14	193.2
Guatemala	2.26	0.00	2.26	48.2
Hungary	0.28	0.79	1.07	54.6
Iran	2.62	0.05	2.67	464.3
Jordan	3.06	0.06	3.12	15.5
Korea	1.94	0.00	1.94	596.8
Malaysia	2.37	0.00	2.37	217.7
Mexico	1.55	0.06	1.61	806.3
Panama	2.02	0.00	2.02	22.7
Paraguay	1.11	5.04	6.15	18.3
Peru	1.21	0.00	1.21	141.5

(table continues next page)

Table 1.2 *(continued)*

	Benefits from falling prices	Benefits from rising prices	Total benefits	GDP (in US$ billions)
Philippines	2.70	0.00	2.70	235.7
Poland	0.61	0.18	0.79	229.8
Romania	1.11	0.00	1.11	90.8
Russia	1.84	1.04	2.88	392.6
Saudi Arabia	1.68	0.02	1.69	199.7
Serbia	n.a.	n.a.	n.a.	n.a.
South Africa	0.62	0.00	0.62	288.5
Sri Lanka	2.65	0.01	2.66	51.2
Thailand	2.99	0.00	2.99	359.2
Tunisia	2.12	0.08	2.19	51.1
Turkey	0.73	0.53	1.27	183.1
Uruguay	0.39	0.41	0.79	27.4
Venezuela	1.20	0.01	1.21	166.4
Low-income group, weighted total benefits	**24.54**	**1.56**	**26.10**	**8,212.8**
Bangladesh	2.17	0.01	2.18	114.5
Cameroon	6.04	0.00	6.04	28.9
China	35.50	0.00	35.50	5,044.6
India[a]	4.89	7.83	12.72	1,633.6
Indonesia	7.39	0.00	7.39	460.1
Kenya	4.02	0.00	4.02	29.2
Nigeria	6.02	0.03	6.05	139.9
Pakistan	3.20	0.19	3.39	228.9
Vietnam	17.40	0.00	17.40	511.7
Zimbabwe	3.59	0.12	3.71	21.5
World total, weighted by GDP	**5.81**	**0.45**	**6.26**	**38,217.6**

n.a. = not available
PPP = purchasing power parity

a. Excludes fresh and frozen meat.

Notes: Based on calculations at a city level (appendix B). Total is weighted by country size, measured by GDP.

Source: Authors' calculations.

and utilities. While trade in these items is very limited, many of them are amenable to the forces of economic integration through the medium of foreign direct investment. Foreign direct investment can improve production and distribution technology in many service sectors, but technological convergence need not necessarily lead to price convergence. For example, if Société Lyonnaise d'Eau applies better technology to distribute household water in a country where water is abundant and cheap (such as Thailand), water rates might fall relative to rates in a country (such as Israel) where technology is already very good, but water is scarce and expensive. While we think this example is highly atypical, it illustrates the distinction between eliminating trade barriers and eliminating investment barriers.

Box 1.2 Why do some low-income countries gain so much, and others so little?

Our calculations of static benefits, starting with market exchange rates, show very high gains for some low-income countries, such as India and Nigeria. At the same time, a few low-income countries, such as China and Kenya, have gains less than 10 percent of GDP. Why is the variation so large?

The very large gains calculated for a few developing countries, notably India and Nigeria, reflect the fact that their major cities are comparatively cheap places to live. In these countries, internal migration is relatively fluid, ensuring a large pool of very cheap labor in the urban centers. As a result, average per capita income in cities is somewhat similar to the low average per capita income in the countryside.

By contrast, internal labor mobility is very limited in China. Limited labor mobility has widened the income gap between "privileged" cities and the rest of China. The Chinese cities covered in the Economist Intelligence Unit (EIU) database, namely Beijing, Guangzhou, and Shanghai, are expensive places to live. Per capita income in those cities is more than four times the level in poor provinces. As a result, when the calculations start with market exchange rates, China appears to gain little from price convergence. Conversely, when the calculations start with PPP exchange rates, China appears to gain a lot.

What these calculations are saying is that, at PPP exchange rates, prices for most goods and services in Beijing, Guangzhou, and Shanghai would fall sharply. Substantial consumer benefits would result in the "privileged" cities. Comparable benefits would not occur throughout China, but our methodology assumes that the cities covered in the EIU dataset are representative of the entire country. A similar anomaly occurs for Kenya, Vietnam, and a few other developing countries.

In terms of our country classification, the covered Chinese cities are more like middle-income countries than low-income countries (see table below). China may have as much to gain by integrating its own internal markets—the markets between "privileged" cities and the rest of the country—as by integrating with the world economy. The same may be true for Kenya, Vietnam, and a few other developing countries.

(box continues next page)

When the calculations are made starting with market exchange rates (table 1.1), the weighted total benefits for high-income countries are 0.6 percent of GDP; for middle-income countries, 3.8 percent of GDP; and for low-income countries, 19.4 percent of GDP. Potential static benefits are strikingly large for some low-income and middle-income countries. For example, the potential static benefits from convergence to the BWPB would be 63.7 percent of GDP for India and 36.8 percent for Pakistan (table 1.1). For these poor countries, most of the benefits arise because of the large gap between market exchange rates and PPP exchange rates. If instead we run the calculations starting with PPP rates (table 1.2), the potential static benefits from convergence to the BWPB would be 12.7 percent of GDP for India and 3.4 percent for Pakistan. By contrast, the picture is exactly reversed for China: starting with market exchange rates, the price convergence benefits for China are 3.6 percent of GDP; starting with PPP rates, they are 35.5 percent of GDP. The PPP-based calculation for China is an anomaly that reflects enormous internal price distortions within China (see box 1.2).

Box 1.2 *(continued)*
Income disparity within China (per capita GDP in 1997)

	Percent of average	US dollars[a]
China	**100**	**732**
Shanghai	424	3,102
Beijing	275	2,016
Tianjin	227	1,662
Zhejiang	173	1,267
Guangdong	172	1,256
Jiangsu	154	1,126
Fujian	152	1,115
Liaoning	140	1,027
Shandong	125	914
Heilongjiang	119	873
Hebei	100	732
Xinjiang	97	711
Hubei	97	711
Hainan	94	687
Jilin	91	663
Shanxi	78	571
Inner Mongolia	77	565
Hunan	76	559
Henan	73	534
Anhui	72	529
Guangxi	72	525
Jiangxi	68	501
Sichuan	68	499
Qinghai	67	490
Yunnan	66	487
Ningxia	66	485
Shaanxi	61	447
Tibet	53	385
Gansu	52	378
Guizhou	36	267

a. Per capita GDP is converted into US dollars using the market exchange rate of 8.3 yuans/US dollar.

Source: China Statistical Publishing House (1998).

The very large difference in potential benefits for India (63.7 percent of GDP versus 12.7 percent) and for Pakistan (36.8 percent of GDP versus 3.4 percent) does, however, reflect the starting point—market exchange rates or PPP exchange rates. Starting with market exchange rates, a scenario of price convergence would compel Indian and Pakistani prices to rise sharply for nearly all tradable goods. In isolation, rising prices would imply a sharp deterioration of Indian and Pakistani competitiveness in world markets, followed by current account deficits and loss of foreign exchange reserves. However, even with the wonders of e-commerce, air cargo, and an end to border barriers, rising prices will not occur in isolation. Rather, the realignment of prices will force the reallocation of resources among economic sectors and a dramatic reorganization of market structures. Moreover, the realignment of internal prices will require huge infrastructure investments, including roads, ports, airports, and much else to accommodate the trade volumes engendered by deep economic integration. These changes will take time—perhaps decades. At

the end of the process, India, Pakistan, and other emerging economies will become far more powerful competitors in world markets than they are today.

In our view, an appropriately conservative calculation of near-term potential benefits for all country groups is obtained by taking whatever figure is lower for each individual country—benefits based on the market exchange rate or benefits based on the PPP exchange rate. On this conservative basis, the potential static benefits from convergence to the BWPB would reach 0.6 percent of global GDP, or $0.2 trillion per year for all countries (table 1.3). For high-income countries, the benefits would be 0.4 percent of GDP; for middle-income countries, 0.4 percent; and for low-income countries, 3.7 percent.

As a general finding, when potential benefits are calculated starting with market exchange rates, the larger the size of potential benefits, the larger the share of benefits that is accounted for by rising product prices. In other words, over the long term, starting with current market exchange rates, low-income and middle-income countries might gain the most benefits from price convergence, which lead to rising product prices, not falling product prices. This finding contradicts the notion that free trade and market integration usually mean lower prices. It also contradicts the notion that lower prices are the main source of net gains from international exchange. To be sure, lower prices translate into improved consumer welfare. When prices fall, the gains to consumers exceed the losses to domestic producers and workers, yielding net gains for the country as a whole. But higher prices also bring benefits. The reason (spelled out in appendix A) is that, when prices rise for internationally traded products, the gains to domestic producers and workers exceed the losses to domestic consumers, again yielding net gains for the country as a whole.

At first sight, it seems odd that both rising and falling prices for internationally traded goods can bring net gains to a country. But this result is just an aspect of the old law of comparative advantage. When a country's local price for an item is lower than the world price, market integration and price convergence will benefit local producers and workers more than they will harm local consumers. The opposite happens when the country's local price is higher than the world price.

We reach a simple conclusion from these speculative calculations. The potential gains from the integration of world markets, and the compression of price divergence, are large. This is not a new finding, but our calculations represent a new way of reaching a familiar result.

Many scholars have concluded that when a country has denser trade and investment relations with the world economy, it will enjoy a higher income, other things being equal.[4] Their results are based both on

4. For a summary of the literature, see Hufbauer (2001).

Table 1.3 Potential benefits at country level, calculated with the lesser of market exchange rates or PPP exchange rates (percent of GDP)

	Benefits from falling prices	Benefits from rising prices	Total benefits
High-income group, weighted total benefits	**0.28**	**0.08**	**0.36**
Australia	0.22	0.27	0.50
Austria	0.31	0.01	0.32
Belgium	0.08	0.02	0.10
Canada	0.03	0.01	0.04
China (Hong Kong)	0.73	0.00	0.73
Denmark	0.25	0.02	0.27
Finland	0.19	0.00	0.19
France	0.30	0.10	0.40
Germany	0.45	0.21	0.66
Greece	0.17	0.08	0.25
Ireland	0.03	0.01	0.04
Israel	0.27	0.00	0.27
Italy	0.10	0.45	0.56
Japan	0.91	0.00	0.91
Kuwait	0.03	0.00	0.03
Luxembourg	0.05	0.04	0.09
Netherlands	0.21	0.26	0.47
New Zealand	0.22	0.06	0.28
Norway	0.12	0.00	0.12
Portugal	0.03	0.16	0.18
Singapore	0.59	0.35	0.94
Spain	0.22	0.38	0.61
Sweden	0.11	0.00	0.11
Switzerland	0.30	0.00	0.30
Taiwan	0.12	0.00	0.12
United Arab Emirates	0.14	0.30	0.44
United Kingdom	0.06	0.02	0.08
United States	0.06	0.01	0.07
Middle-income group, weighted total benefits	**0.16**	**0.22**	**0.38**
Algeria	3.65	0.00	3.65
Argentina	0.10	0.17	0.26
Bahrain	0.18	0.00	0.18
Brazil	0.02	0.32	0.34
Chile	0.04	0.00	0.04
Colombia	0.09	0.00	0.09
Costa Rica	0.02	0.09	0.11
Czech Republic	0.01	0.12	0.13
Ecuador	0.02	0.22	0.24
Egypt	0.56	0.00	0.56
Guatemala	0.07	0.00	0.07
Hungary	0.03	0.79	0.82
Iran	0.28	0.05	0.33
Jordan	0.56	0.06	0.62
Korea	0.27	0.00	0.27
Malaysia	0.09	0.00	0.09
Mexico	0.11	0.06	0.17
Panama	0.10	0.00	0.10

(table continues next page)

Table 1.3 Potential benefits at country level, calculated with the lesser of market exchange rates or PPP exchange rates (percent of GDP) *(continued)*

	Benefits from falling prices	Benefits from rising prices	Total benefits
Paraguay	0.02	5.04	5.06
Peru	0.02	0.00	0.02
Philippines	0.03	0.00	0.03
Poland	0.02	0.18	0.20
Romania	0.04	0.00	0.04
Russia	0.70	1.04	1.74
Saudi Arabia	0.28	0.02	0.30
Serbia	0.10	3.26	3.36
South Africa	0.02	0.00	0.02
Sri Lanka	0.04	0.01	0.05
Thailand	0.11	0.00	0.11
Tunisia	0.17	0.08	0.25
Turkey	0.06	0.53	0.59
Uruguay	0.12	0.41	0.53
Venezuela	0.16	0.01	0.17
Low-income group, weighted total benefits	**1.79**	**1.86**	**3.65**
Bangladesh	0.24	0.01	0.25
Cameroon	0.56	0.00	0.56
China	2.88	0.00	2.88
India[a]	0.22	7.83	8.05
Indonesia	0.24	0.00	0.24
Kenya	0.17	0.00	0.17
Nigeria	1.12	0.03	1.14
Pakistan	0.18	0.19	0.37
Vietnam	0.47	0.00	0.47
Zimbabwe	3.59	0.12	n.a.
World total, weighted by GDP	**0.35**	**0.20**	**0.55**

n.a. = not available
PPP = purchasing power parity

a. Excludes fresh and frozen meat.

Notes: Based on calculations at city level (appendix B). Total is weighted by country size, measured by GDP.

Source: Authors' calculations.

cross-country econometric studies and on calculations using computable general equilibrium (CGE) models. As recent examples, we cite the CGE findings of Brown, Deardorff, and Stern (forthcoming) and Scollay and Gilbert (2001). Brown, Deardorff, and Stern calculate that global free trade in both goods and services, with all post-Uruguay Round trade barriers completely removed, would increase world welfare by $1.9 trillion annually, calculated at market exchange rates. This calculation encompasses both static and dynamic gains. By contrast, Scollay and Gilbert calculate that global free trade in goods alone, counting only static gains,

would increase world welfare by $0.16 trillion annually. As these two CGE results suggest, different specifications can lead to substantially different conclusions as to the magnitude of gains from trade liberalization.

Our conservative calculation of world welfare gains from international price convergence is $0.2 trillion for merchandise trade alone (merchandise accounts for about 75 percent of world trade in goods and services). In other words, by applying a static partial equilibrium framework to price divergence data, we reach results that are about the same magnitude of gains calculated by Scollay and Gilbert, using a CGE model that captures static benefits.

When the details of our results are contrasted with CGE calculations, important differences emerge in the distribution of benefits between high-income, middle-income, and low-income countries.[5] The Brown, Deardorff, and Stern (forthcoming) static-plus-dynamic estimates suggest that 80 percent of the global benefits from complete liberalization would accrue to high-income countries. Only 20 percent would accrue to middle-income and low-income countries. By contrast, Scollay and Gilbert's (2001) static estimates suggest that 45 percent of the global benefits would accrue to high-income countries,[6] while 55 percent would accrue to middle-income and low-income countries. Similarly, our conservative calculations suggest that the global benefits are distributed about 50 percent to high-income countries and 50 percent to middle-income and low-income countries.

Probably the big reason for the distributional difference between Brown, Deardorff, and Stern (on the one hand) and Scollay and Gilbert and ourselves (on the other) has to do with the differing distribution of static and dynamic gains. Roughly speaking, static gains from import liberalization (as a percentage of GDP) are proportional to the height of the country's own trade barriers before liberalization and imports as a share of GDP. Static gains from liberalized access to export markets will, as a rough approximation, depend on the export share of GDP, since countries face the same global market. Dynamic gains, on the other hand, are more nearly proportional to GDP, since all countries enjoy approximately the same benefit per unit of GDP from a more open global economy. Rich countries generate most of the world's GDP; hence, they get most of the dynamic benefits (and hence most of the total gains). However, middle-income and low-income countries tend to have higher trade barriers and

5. A CGE model with lesser dynamic effect, designed by Anderson et al. (2000, table 4), suggests that world welfare gains from complete liberalization would total $254 billion annually, of which 55 percent would accrue to high-income countries and 45 percent to low-income countries.

6. In the Scollay and Gilbert calculations (2001, table 3.2e), the United States actually loses (through terms-of-trade effects) from liberalization.

larger trade shares than rich countries. This helps explain their greater share of static gains. A second reason for the difference is that Brown, Deardorff, and Stern capture gains from liberalized services trade. Since high-income countries dominate trade in services (both exports and imports), they probably capture nearly all the gains.

2

The Law of One Price and Its Limits

The law of one price (LOP) states that prices in different parts of the world for a given product should be the same when expressed in a common currency. The LOP closely approximates reality at the wholesale level for a few globally traded goods (such as crude oil and rubber) and financial products (such as foreign exchange, corporate shares, and interbank loans).

However, empirical studies uniformly show that the LOP does not describe most markets—even as a rough approximation. Detailed comparisons of levels and changes in prices quoted by sellers from different countries indicate that only homogenous primary commodities are equated internationally by arbitrage.[1] Williamson and Milner (1991, 238) write: "[T]he hypothesis that arbitrage quickly equates goods prices internationally has probably been rejected more decisively by empirical evidence than any other hypothesis in the history of economics."

Literature Survey

In response to Williamson and Milner (1991), the immediate question is: why does arbitrage fail? Scholars who have examined the data usually start by attributing price dispersion to distance and borders. Then they bring other factors into play. Our study focuses on a different question—

1. For early examples of this research, see Isard (1977) and the special issue of the *Journal of International Economics* (August 1978), particularly Kravis and Lipsey (1978). See also Mussa (1986), Parsely and Wei (1995), and Engel and Rogers (1999).

sizing up the potential benefits of price convergence rather than examining the reasons for price divergence. Nevertheless, it is useful to start by surveying the literature on the causes of price divergence.

That the law of one price fails to hold across international borders does not surprise most people. Countries differ dramatically in terms of the costs of production and distribution on the one hand, and the patterns of demand on the other. Tariff and nontariff barriers as well as transportation and cultural barriers limit the scope for arbitrage to operate across borders. Monopoly and oligopoly firms practice price discrimination, both within and among countries. A familiar example is the cost of air travel: the price of an economy-class ticket between Los Angeles and London, on the same flight, can easily vary between $200 and $1,500.

In examining price divergence, Kravis and Lipsey (1983) usefully distinguished between short-term and long-term influences of national price levels. Short-term influences are primarily associated with money market conditions. These forces are most apparent when comparing changes in national price levels translated at market exchange rates. Much of the year-to-year relative change in national price levels can be explained by exchange rate fluctuations (more on this below, in the discussion of exchange rate pass-through). However, sustained national differences in PPP rates are also evident. We now turn to what Kravis and Lipsey call longer-term or structural factors to explain sustained differences in PPP price levels.

Longer-term factors that result in sustained differences in price levels between countries can be grouped into two broad categories: factors that affect the costs of production and consumption within a country and factors that prevent arbitrage from equalizing prices. Among the factors that affect the costs of production within a country, differences in taxation and government restrictions have an obvious impact (Balassa 1964). Of greater importance are differences in factor costs. Two major models have been proposed to explain why factor costs differ across countries. The productivity-differential model focuses on differences in labor productivity to explain factor cost differentials (Kravis, Heston, and Summers 1978). The factor-proportions explanation, on the other hand, focuses on the relative abundance of factors to explain price differences (Ohlin [1933] 1967; Bhagwati 1984). Retail prices, for example, are comparatively high in Tokyo and Hong Kong because the scarcity of urban land leads to very high rents per square meter, both for retail space and apartments where retail workers live.

Supply side theories, however, do not fully explain price differences across countries. Differences in demand must be taken into account. Consumer preferences can vary markedly across countries, dramatically affecting prices. For instance, Australian wine was exceedingly cheap for many decades when consumers did not value quality Australian vintages, either domestically or internationally. A dramatic change in consumer preferences, aided by clever marketing, has resulted in significant price increases for quality Australian wine despite a massive expansion in output.

Table 2.1 Average tariffs and estimated tariff equivalents by countries/regions

Countries/regions	Average tariff on merchandise[a]	Estimated tariff equivalent barriers	
		Business/financial services	Construction
North America[b]	6.0	8.2	9.8
Western Europe	6.0	8.5	18.3
Australia and New Zealand	5.0	6.9	24.4
Japan	6.0	19.7	29.7
China	18.0	18.8	40.9
Taiwan	n.a.	2.6	5.3
Other NICs	n.a.	2.1	10.3
Indonesia	13.0	6.8	9.6
Other Southeast Asia	10.0	5.0	17.7
India	30.0	13.1	61.6
Other South Asia[c]	25.0	20.4	46.3
Brazil	15.0	35.7	57.2
Other Latin America	12.0	4.7	26.0
Turkey[c]	13.0	20.4	46.3
Middle East and North Africa	20.0	4.0	9.5
CECs and Russia	10.0	18.4	51.9
South Africa	6.0	15.7	42.1
Other sub-Saharan Africa	n.a.	0.3	11.1
Rest of world	n.a.	20.4	46.3

CECs = Central European countries
n.a. = not available
NICs = newly industrialized countries

a. Tariff averages are unweighted across all commodities and for the latest available year, in many cases 1997 or 1998. Country coverage of regions is not comprehensive. Reported figures should be regarded as indicative of the prevailing order of magnitude.
b. North America values were calculated by assigning Canada/Mexico numbers to the United States.
c. Estimated tariff equivalent barriers, business/financial services and construction for other South Asia and Turkey were assigned estimated rest-of-world values.

Source: Francois and Hoekman (1999).

Differences in production costs and the structure of demand are a necessary but not sufficient explanation for why price levels differ across countries. Why does international arbitrage not operate to equalize prices? Among the forces identified in the literature are transport costs (Usher 1968), tariff and nontariff barriers to trade and investment, and market organization. We do not dwell on transport costs beyond the obvious observation that high transport costs separate the markets of cities such as Delhi and Frankfurt. As for tariff and nontariff barriers, these are pervasive, even after the accomplishments of the General Agreement on Tariffs and Trade (GATT), the World Trade Organization (WTO), and regional trade agreements. For example, Francois and Hoekman (1999) used a gravity model to indirectly estimate implied nontariff barriers for business/financial services and construction work, and then compared their findings to tariff levels on merchandise imports (table 2.1). They found

that barriers for business and financial services are about the same height as for merchandise trade, even though explicit border barriers are seldom imposed on business and financial services. Moreover, they estimated even higher implicit barriers for construction services. Trade barriers interfere with arbitrage in a major way. However, the implied extent of price variation that can be accounted for by tariff and nontariff barriers is much smaller than the actual variation exhibited in prices between countries. Rarely, for example, do tariff and nontariff barriers exceed 100 percent; still, it is common for prices to diverge by a factor of two or more.

Another reason for price variation is the wide prevalence of noncompetitive market structures, ranging from monopolies (common for public utilities) to soft cartels. Producers with market power often find that their interests are served by discouraging foreign firms from making inroads into the local market. In an empirical study of high Japanese prices, Noland (1995) found evidence that oligopoly behavior and *keiretsu* practices were part of the explanation. A dramatic example of price discrimination was recently reported in the pharmaceutical industry. Responding to public pressure, major drug companies have drastically cut the price of their "cocktail" ingredients for AIDS treatment in Africa. Bristol-Myers Squibb, for example, will market Zerit at $54 per patient per year in Africa, compared to a cost of $3,589 in the United States and Europe (*Wall Street Journal*, 15 March 2001, B1). Pharmaceutical price discrimination can be justified by the economic necessity of charging high prices in rich countries to fund research and development costs, and the moral imperative of charging low prices in poor countries to save lives. The same social justification does not apply with equal force to most other industries. Yet, as Evenett, Levenstein, and Suslow (forthcoming) show, private cartels are alive and well in many segments of the world economy.

Another manifestation of market power is the common phenomenon of less than one-for-one exchange rate pass-through, when firms set their local prices. Goldberg and Knetter (1997) surveyed the extensive empirical literature on exchange rate pass-through and concluded that in many cases half or more of the effect of exchange rate changes is offset by destination-specific markups over cost. This implies that half or less of the change in exchange rates is transmitted into price changes in the destination market. Varian (1989) argues that price discrimination (which is the main cause of incomplete exchange rate pass-through) reflects three underlying market forces: (1) sorting of customers, (2) prevention of resale, and (3) the presence of market power.

Impediments to arbitrage operate within countries as well as among countries. Engel and Rogers (1999) examined monthly price index data for 43 different goods in 29 US cities between 1986 and 1996. They found that nominal price stickiness and distance were the major reasons for the dispersion of month-to-month price index changes within the United

States.[2] Parsely (1996) found a similar pattern for price level differentials within the United States. Our own data, summarized in box 2 (chapter 1), reveals enormous impediments to arbitrage within China. Goods and services are substantially more expensive in the major cities than elsewhere in China.

Even when tariffs are zero and there are no explicit nontariff barriers, an international border dramatically augments the extent of price divergence between cities. Engel and Rogers (1998) examined the border effect between Canada and the United States and calculated that it added 75,000 miles to the cross-country volatility of relative prices.[3] Using the same regression results but a different computation method, Parsely and Wei (1999) calculated that the Canada-US border added 101 million miles to cross-country price volatility! In a later paper, Rogers and Smith found that the US-Mexico border effect on price divergence between 1980 and 1997 was nearly 10 times the magnitude of the US-Canada border effect. However, during the 1988-94 period, when the peso was stable in nominal terms, the US-Mexico border effect was substantially smaller than for the period as a whole.

These empirical findings underscore the failings of the law of one price, but they do not mean that separated markets have zero influence on each other. Parsely and Wei (1996) found that the rate of price convergence is at least three times as fast for tradable products as for nontradable products. Their analysis was based on an examination of actual prices (not price indexes) for 51 goods and services in 48 US cities. Parsely and Wei also found that price convergence occurs much faster among US cities than across national borders. Finally, they confirmed that price convergence is faster when initial price differences are larger, and convergence is slower when distance between cities is greater.[4]

In an earlier study, Parsely and Wei (1995) examined deviations from purchasing power parity (PPP) for 12 tradable sectors in 14 Organization for Economic Cooperation and Development (OECD) countries using OECD sectoral data. They found that greater levels of exchange rate volatility and higher transportation costs increased the deviations from PPP. They also found that the rate of price convergence is faster

2. Sticky nominal prices can persist only because arbitrage functions poorly. In that sense, they are a result as much as a cause of price dispersion.

3. Engel and Rogers (2000) found similar but less extreme results for European borders. In their European study, Engel and Rogers distinguished between a "real border effect" (trade barriers of various kinds) and a "sticky consumer price effect" (prices expressed in local currency units do not respond one-for-one to exchange rate changes). Leonard (1999) has confirmed that relative prices for goods separated by an international border exhibit much greater price divergence than between cities within a country.

4. A subsequent study by O'Connell and Wei (1997) confirmed that large price disparities between US cities decay faster than small disparities.

when initial deviations are larger, and that changes in prices—not changes in nominal exchange rates—carry out most of the observed convergence.

Parsely and Wei (1995) found that customs unions and free trade agreements did not significantly reduce price differences between country pairs. More recent empirical analysis by Frankel and Rose (2000) strongly suggests, however, that a free trade area, like a common currency, sharply increases the magnitude of bilateral trade flows (by a factor of two or more). Their econometric observation corresponds to the observed trade boom within NAFTA and Mercosur.[5] Future analysis might show—contrary to Parsely and Wei (1995)—that these arrangements also reduce the very strong border effect on prices.[6]

Examining actual prices over 88 quarters for 27 products among 48 cities each in the United States and Japan, Parsely and Wei (1999) reached a number of new and interesting conclusions. They explained retail price differences between city pairs by distance, shipping costs, the stickiness of prices expressed in local currencies coupled with exchange rate variability,[7] and the all-important border. The authors calculated that the US-Japan border is equivalent to adding 43,000 trillion miles to the within-country volatility of relative prices! The importance of this astronomical number is that borders can create enormous price divergence, vastly larger than the estimated effects of distance and shipping costs. Parsely and Wei (1999) also calculated that the border effect diminished over the 88 quarters at a rate of about 0.4 percent per year.

To lay the groundwork for our benefit calculations, we emphasize that exchange rate variability, border barriers, and shipping costs all reflect policy choices. Distance is defined by geography, but shipping costs are determined by both technology and policy choice, such as how much competition is permitted in sea freight and air cargo, and to what extent ports are operated privately rather than publicly. Likewise, exchange rate variability and border barriers are subject to policy choices. All these policy choices in turn affect the extent of price divergence between countries.

5. See, for example, Mutti (2001) and Weintraub (2000).

6. A recent study by Moodley, Kerr, and Gordon (2000) found somewhat stronger cointegration of US and Canadian producer prices after the Canada-US Free Trade Agreement (CUSTA) entered into force in 1990. The authors, however, interpret their finding as the outcome of long-term forces, not a CUSTA effect.

7. Retail price stickiness reflects, of course, the failure of arbitrage between markets. It is interesting that Rogers and Smith (2001) conclude that price stickiness in local currency, coupled with exchange rate variability, has a greater impact than border barriers on price divergence between US and Mexican cities.

Trade, Direct Foreign Investment, and Price Convergence

Lower barriers in a global economy should bring more price convergence, even at the retail level, where local markups are an important cause of price divergence. For example, if halogen floor lamps are produced in China more cheaply than in the United States, Chinese firms will sell more of their lamps in the US market, rather than in China. If transport costs are modest and no trade barriers impede commerce, the enlarged supply of halogen floor lamps in the US market will cause the US unit price to fall. Meanwhile, the diminished supply of halogen floor lamps in the Chinese market will cause the Chinese unit price to rise. In an ideal economic world with zero friction, no product taxes, and equivalent markups in all wholesale retail distribution, the price of halogen floor lamps in the US and Chinese markets would become identical.

Free investment also promotes market integration, but in less obvious ways than trade. Multinational enterprises (MNEs) will enter markets where they can cheaply produce goods and services, using their proprietary know-how and superior access to world capital markets. Producing in lower-cost locations, MNEs tend to bid up local wages. The typical US MNE operating abroad, for example, pays about 50 percent higher wages to its workers than the national average wage level in its host country (Graham 2000). MNEs will use their internal supply channels to move tradable products from countries where they can be made cheaply to countries where they can be sold dearly. Hence, working both in the factor markets (bidding down the price of capital and bidding up the price of labor) and in product markets, direct investment also brings about price convergence for tradable products.

However, for nontradable products, MNE activity may improve the technology of local production without necessarily promoting price convergence. As our earlier example of Société Lyonnaise d'Eau illustrated, price divergence could in fact widen if better MNE technology improves production of nontradable products in countries where they are already cheap because of low input costs. We think this example is atypical. In most cases, we believe, MNE activity in nontradable products will promote price convergence because the biggest reasons for sharp price differences are differences in production and distribution technology and the extent of monopoly power in purely local markets, not input cost differences.

McDonald's illustrates MNE activity in a nontraded product. The famous "Big Mac Index" published in *The Economist* essentially captures price divergence for this well-known hamburger. By contrast, the prices of the main ingredients of a Big Mac—bread, cheese, lettuce, and ground beef—represent locally produced goods. If McDonald's operations worldwide serve to narrow price divergence, then price variations of the Big Mac (measured by the coefficient of variation, i.e., the standard deviation

Table 2.2 Price variation of multinational brands versus local products (coefficients of variation)

Multinational brand		Local products	
Big Mac	0.32	Ingredients of Big Mac (average)	0.50
		Bread	0.43
		Cheese	0.50
		Lettuce	0.53
		Ground beef	0.54
Kodak color film	0.30	Cost of developing film	0.45
International daily newspaper	0.46	Daily local newspaper	0.60
Time magazine	0.37		
Coca-Cola	0.37	White sugar	0.54
IKEA furnishings	0.41	Household items	0.37

Notes: Except for IKEA furnishings, the coefficients of variation were calculated using price data in the following countries: United States, Israel, United Kingdom, Japan, Euro area countries, Argentina, United Arab Emirates, Saudi Arabia, Chile, Taiwan, Colombia, Mexico, Indonesia, Greece, Singapore, Egypt, South Korea, Brazil, Czech Republic, Thailand, South Africa, Philippines, Poland, Hong Kong, Russia, Turkey, China, Hungary, and Malaysia.

For IKEA furnishings and household items, the coefficients of variation were calculated using price data in the following countries: Austria, Belgium, Hong Kong, Denmark, Finland, France, Germany, Italy, Netherlands, Norway, Singapore, Spain, Sweden, Switzerland, United Kingdom, United Arab Emirates, United States, Czech Republic, Hungary, Malaysia, Poland, Indonesia, Australia, Canada, and Kuwait.

Sources: The Economist, 8 January 2000, 100; Haskel and Wolf (1999); and authors' calculations.

divided by the mean) should be smaller than the price variations of its ingredients.

Table 2.2 provides the coefficients of variation for Big Mac prices versus similar coefficients for local goods (bread, cheese, etc.). Similar paired comparisons are made for four other MNE-branded products and locally produced goods. The pairs include Kodak color film versus the cost of developing color pictures, an international foreign daily newspaper and *Time* versus a daily local newspaper, Coca-Cola versus sugar, and IKEA furnishings versus household items. Among this limited set of products, the coefficients of variation for locally produced goods are moderately larger than the coefficients for the multinational brand prices (except for IKEA furnishings versus household items). This limited comparison provides only weak evidence that MNE activity may on balance promote price convergence even among nontradable and difficult-to-trade items.

Lower Barriers, Better Technology, More Convergence

If all barriers to trade and investment were removed, and if free competition prevailed in all markets, prices of individual products would converge among cities around the world. But they would not become identical. Prices for individual products are determined by forces and frictions

besides the play of open and competitive markets. Different distribution markups, transportation and communication costs, and different product taxes are all at work. These forces and frictions are city-specific or country-specific. Land costs differ enormously from city to city, depending on income levels and population pressure. Hence the costs of retail, wholesale, office, and living space differ enormously. Differences will persist even if all trade and investment barriers vanish, and markets become perfectly competitive.

In the halogen floor lamp example, trade enables US consumers to purchase Chinese lamps, but US consumers may still pay a much higher price for the identical lamp than Chinese consumers. This higher price may reflect a higher sales tax in the United States, the higher cost of operating US retail stores, and transportation and storage costs between China and the United States.

For all these reasons, our working hypothesis holds that open and competitive markets—fostered by eliminating trade and investment barriers, by the Internet and e-commerce, by falling transportation and communication costs, and by rapid delivery services—will improve price convergence but will not achieve the law of one price.

3

The Broad World Price Band

To calculate the potential static benefits of approaching (but certainly not reaching) the Law of One Price, we used a detailed price data set collected by the Economist Intelligence Unit (EIU).[1] The dataset includes prices of 157 narrowly defined consumer goods and services in 109 cities located in 70 countries around the world (see table A.1, appendix A). We group the items into eight sectors of predominantly tradable consumer goods, and seven sectors of predominantly nontradable services. Table A.1 in appendix A lists the items within each sector (shown in boldface type), and identifies the items that are excluded from our benefit calculations. One excluded category is nontradable services, identified by the letter N. The other excluded category comprises items that are highly and differentially taxed (cigarettes, whiskey, and gasoline), identified by the letter H. Both categories are excluded from the benefit calculations, because trade and investment barriers and cartels may not be the main reason for price divergence.

We should add a further remark on the distinction between tradable and nontradable products. In reality, no sharp line separates the two. Every item sold at retail embodies a large amount of nontradable inputs, namely the costs of wholesale and retail distribution. On the other hand, most nontradable services embody significant tradable inputs. Electricity, for example, requires fuel (such as coal or oil), power plants, transmission lines, and transformers, which are all tradable goods. Ideally, we would compare prices after stripping out the nontradable component, either at the front end or back end of the production process. Instead, we have simply

1. We scrubbed the data set provided by the Economist Intelligence Unit for obvious anomalies (mainly problems with exchange rate conversions) before doing the benefit calculations.

applied a crude distinction between tradable and nontradable products, and then excluded nontradable items from our calculations. Likewise, instead of stripping out high excise taxes from items such as cigarettes, we have simply excluded high-tax items from our main calculations.

The regression analysis that we present later suggests, however, that extreme price divergence among nontradable items and highly taxed items is explained by essentially the same forces as extreme divergence among tradable items. Also, table D.1 in appendix D presents the potential static benefits from "total" price convergence, including high-tax items and some service sectors, but excluding domestic help, entertainment, and housing. (We excluded these three sectors from our "total" price convergence calculations because they are dominated by labor and real estate costs.) The research of Parsely and Wei (1996) shows that service prices within the United States converge, though at a slower rate than goods prices. Hence, we believe the potential benefits calculation presented in tables 1.1, 1.2, and 1.3 are understated by the exclusion of nontradable products from the calculations. However, as a practical matter, the calculated benefits increase only marginally by adding service sectors and high-tax items in making the "total" price convergence calculations (compare tables 1.1 and D.1).

Since the early 1980s, the EIU has collected detailed consumer price data annually in order to calculate cost-of-living indexes for MNEs that move their professionals and executives from place to place around the world. The price figures are collected by EIU survey teams working in designated cities. The teams are instructed to find local prices of tightly specified consumer goods and services. We used the price set for 1999 to calculate the benefits of price convergence.

Based on US experience, only about 30 percent of merchandise trade consists of final consumer goods. Approximately 15 percent of merchandise trade is capital goods, while the remaining 55 percent is intermediate goods (Huether and Richardson 2000). Our dataset is limited to final consumer products, and does not cover intermediate or capital goods. In the analysis that follows, we boldly assume that the items in the EIU dataset represent the extent of price divergence for all final consumer goods in each country. We do not make an explicit assumption about price divergence among intermediate or capital goods. However, our calculations for price convergence in consumer goods indirectly presuppose an unknown degree of price convergence among intermediate and capital goods, because these are input costs in the production of consumer goods.

Other datasets are available that could be used for this analysis. One prominent alternative is the price data on 150 final products (consumer goods and capital goods) in 60 countries, collected by the OECD and the United Nations. This dataset was pioneered by Kravis, Heston, and Summers (1978) for the purpose of calculating PPP exchange rates, and has subsequently been updated by the two institutions. We hope that our

study will provoke other researchers to improve upon the analysis by examining the OECD/UN datasets (among others), using more sophisticated models.[2]

That said, our analysis is based on the EIU dataset for consumer goods. We calculate the potential benefits of price convergence city by city, and then aggregate the results to illustrate the impact on a country, regional, and world basis. To repeat, in these calculations, we excluded the designated nontradable services and highly taxed items in table A.1 (appendix A). We then assumed that the remaining 105 products in the EIU dataset are, in a very limited sense, representative of tradable consumer goods.

In the interest of clarity, we shall restate our assumption about the representative character of EIU price data. We assumed that all consumer goods in each country exhibit roughly the same extent of price divergence as the 105 tradable items in the dataset. The EIU products are chosen based on an executive's lifestyle, which obviously differs from the average person's consumption pattern. Moreover, the number of products in the EIU dataset is far smaller than the number of products consumed in the real world. However, the EIU dataset covers a decent range, from basic products (e.g., spaghetti and laundry detergent) to luxury products and consumer durables (e.g., wine and compact cars). Our core assumption is that the extent of cross-city divergence in these prices roughly represents the extent of cross-city divergence in prices of the much larger range of tradable goods consumed by the entire population.

For the purpose of our calculations, we first computed the consumption weights as a percentage of GDP for each boldface sector in table A.1 (appendix A). These sector weights appear in table 3.1 for three countries: the United States, Mexico, and India. We assume that the sector weights for the United States apply to all rich countries, the sector weights for Mexico apply to all middle-income countries, and the sector weights for India apply to all poor countries. Within each sector, we assign an equal weight to each of the items in the EIU dataset. In other words, within the processed foods sector, we give equal weights to bread, butter, cheese, corn flakes, and all the other items. We do not suppose that expenditure on olive oil, for example, is as large as expenditure on bread. However, we assume that the price divergence for olive oil is as representative of price divergence within the overall processed foods sector as the price divergence for bread.

As the next step in the calculation, we make a speculative guess as to the extent of "natural" price divergence in a world economy that is free of policy barriers, highly competitive, and integrated by global corporations and e-commerce, but still separated by country-specific and city-specific forces and frictions. We postulate that dismantling all policy barriers,

2. Lawrence and Bradford (forthcoming), for example, are analyzing the price data underlying OECD purchasing power parity estimates to simulate the impact of wholesale price convergence across major economies.

Table 3.1 Consumption patterns (percent of GDP)

Sector	Consumption share of GDP (percent)						Average coefficients of price variations in sector	
	High-income countries[a]		Middle-income countries[b]		Low-income countries[c]			
	Total group share	Share per item	Total group share	Share per item	Total group share	Share per item	Market exchange rate	PPP exchange rate
Processed foods	2.7	0.2	6.5	0.4	13.4	0.8	1.98	1.09
Fresh vegetables and fruit	1.7	0.2	4.2	0.4	8.7	0.8	2.08	0.90
Meat and fish (fresh or frozen)	3.0	0.2	7.2	0.4	15.0	0.8	1.91	0.76
Beverages	3.0	0.2	3.7	0.2	2.8	0.1	2.09	1.14
Household items	11.6	0.6	9.1	0.5	5.5	0.3	2.83	0.91
Cigarettes and tobacco	0.8	0.3	0.6	0.2	4.5	1.5	1.16	0.65
Clothing	3.6	0.2	3.2	0.2	5.0	0.3	1.19	0.74
Automobiles	3.8	0.9	1.3	0.3	0.2	0.1	1.70	1.06
Books and newspapers	2.6	0.7	1.3	0.3	0.5	0.1	0.53	0.77
Dry cleaning, haircut, and other services	4.6	0.7	2.0	0.3	1.5	0.2	0.83	0.69
Domestic help	2.0	0.7	0.9	0.3	0.8	0.3	0.90	0.58
Entertainment, meal, and hotel	7.2	0.7	3.5	0.3	2.1	0.2	1.43	0.79
Transportation	6.0	0.7	3.1	0.3	1.6	0.2	1.77	0.99
Housing	11.4	1.4	10.3	1.3	1.0	0.1	1.16	1.52
Utilities	3.9	0.6	8.2	1.4	11.3	1.9	1.58	1.00
Total for calculated sectors	29.5	2.4	35.2	2.3	50.7	3.2		

PPP = purchasing power parity

a. Based on the United States.
b. Based on Mexico.
c. Based on India.

Source: Authors' calculations based on UN national accounts data.

accompanied by a high degree of competition and the spread of global corporations, would establish a broad world price band (BWPB) for each product. In free and competitive markets, the width of the BWPB would reflect the persistent country-specific and city-specific forces and frictions.

Appendix B explains our calculation of the BWPB in detail, and table A.1 in appendix A presents the BWPB for each product. In short, we define the BWPB for product *i* as the average price for product *i* in 17 US cities in the EIU dataset plus or minus two standard deviations of the prices observed among those 17 US cities.[3] A glance at table A.1 in appendix A shows that the upper margin of the band is often two to four times the lower margin. Moreover, the upper (lower) margins of the BWPB are often higher (lower) than the extreme prices observed in the 17 US cities. Only 4.3 percent of observed values in the 17 US cities exceed the upper or lower margin of the BWPB. These comparisons underscore the fundamental point that our working hypothesis—convergence to the BWPB in a world of free trade, free investment, and e-commerce—is not an extreme proposition. This degree of convergence simply corresponds to the extent of convergence already experienced within the United States.[4]

Centering the BWPB on US experience implies that, in a competitive and free world economy, prices elsewhere that are above or below the BWPB would converge toward the upper and lower margins of US experience, rather than, for example, to the upper and lower margins of Indian experience. To restate this proposition, when the dollar price of product *i* in city *n* is above or below the BWPB, we presume that the price in question will fall or rise to the margins of a band centered on average US prices. This simplistic assumption is debatable. However, given the size of the US economy, together with the size of European and Canadian economies that have somewhat similar price structures, constructing the BWPB around US experience positions the hypothetical price band at the economic center of gravity in the world economy. Essentially we are saying two things. First, liberalization will affect prices elsewhere more than in the United States, Canada, or the European Union. Second, the extent of price divergence found among 17 US cities defines the extent of price divergence that would prevail worldwide if barriers were eliminated and a reasonable degree of competition prevailed.

3. For a few items, the average US price minus two standard deviations produces a negative number. In those few cases, we made an adjustment by deleting extreme prices from the data, such as the rental rate on a two-bedroom apartment in New York City. These anomalous items are concentrated in nontradable services, which in any event are excluded from our benefit calculations. See appendix A for the list of products for which adjustments were made.

4. As a matter of reference, table A.2 provides the broad world price band values constructed around the European price experience (EU-11). As might be expected, the EU-based BWPB is usually wider than the US-based BWPB.

Appropriate Exchange Rates

In order to compare local prices to the BWPB, the local price must first be converted into US dollars. For this part of the calculation, we use two different exchange rates. The market exchange rate is taken from the *Financial Times* during the week of the EIU price survey. In addition, we have PPP exchange rates, calculated and supplied by the EIU (table 3.2). (The correlation between EIU PPP rates and World Bank PPP rates is 0.99.)[5] The reason for using PPP rates is to "wash out" the extent of price divergence between countries that corresponds to the difference between market exchange rates and PPP rates.

Table 3.3 presents the two different exchange rates for 1999: the market exchange rates and the EIU PPP rates for the 73 covered countries.[6] The last column of table 3.3 shows the type of exchange rate regime each country adopts: fixed, limited flexible, managed flexible (e.g., crawling peg), and independent float.

Simple regression analysis suggests that the difference between market exchange rates and EIU PPP rates is largely determined by a country's income level. This familiar finding can be traced to Balassa (1964) and Samuelson (1964).[7] A choice of exchange rate system (floating, fixed, etc.) does not appear to affect the wedge between market rates and PPP rates (see appendix C).[8]

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5. Using the famous "Big Mac" index, we also computed the implied Big Mac PPP exchange rates for 36 countries (see table 3.2). The foot of table 3.2 shows correlation coefficients between market exchange rates, EIU PPP rates, and Big Mac PPP rates. The correlation between market exchange rates and Big Mac PPP rates is 0.97. The correlation between EIU PPP rates and Big Mac PPP rates is 0.76 (see table 3.2). The comparison suggests that the Big Mac index reflects market exchange rates to a greater extent than it reflects EIU PPP rates. Cumby(1996), in fact, found that the half-life of market exchange rate deviations from Big Mac parity is about one year, shorter than the four- to five-year half-life of deviations from purchasing power parity.

6. All exchange rates are expressed in local currency units per US dollar. A higher figure, therefore, indicates a less valuable local currency.

7. See Pelkmans, Gros, and Ferrer (2000, annex 1) for an exposition of the Balassa-Samuelson effect. The basic argument has three parts: (1) labor productivity is low in poor countries; (2) hence, money wages translated at the market exchange rate are low; and (3) nontraded goods are far more labor intensive than traded goods. Consequently, prices at market exchange rates for nontraded goods are far below PPP prices. Since nontraded goods are a big part of the consumption basket, the PPP exchange rate has a higher value than the market exchange rate.

8. This finding implies that the adoption of an alternative exchange rate system (such as the system of target zones advocated by Williamson [2000]) would not significantly impel market exchange rates to approach PPP levels.

Table 3.2 Big Mac Index and the Economist Intelligence Unit PPP rates

Country	Market exchange rate (local currency per US dollar)	Price of Big Mac		Implied Big Mac rate (local currency per US dollar)	EIU PPP rate (local currency per US dollar)
		In US dollars	In local currency		
High-income countries					
Austria	13.3	2.6	35.1	14.4	13.7
Belgium	39.1	2.6	102.9	42.2	36.8
China (Hong Kong)	7.8	1.3	10.2	4.2	7.1
Denmark	7.2	2.6	19.0	7.8	8.3
France	6.4	2.6	16.7	6.9	6.4
Germany	1.9	2.6	5.0	2.0	2.0
Greece	320.0	2.0	649.6	266.2	264.9
Israel	4.2	3.5	14.5	6.0	3.5
Italy	1,877.9	2.6	4,938.9	2,024.2	1,623.1
Japan	104.0	2.9	296.4	121.5	159.6
Netherlands	2.1	2.6	5.6	2.3	2.1
Singapore	1.7	1.9	3.2	1.3	2.0
Spain	161.0	2.6	423.5	173.6	127.5
Sweden	8.4	2.6	22.0	9.0	9.5
Switzerland	1.6	2.6	4.1	1.7	2.0
Taiwan	30.7	2.3	70.3	28.8	20.0
United Kingdom	0.6	3.1	1.9	0.8	0.7
United States	1.0	2.4	2.4	1.0	1.0
Middle-income countries					
Argentina	1.0	2.5	2.5	1.0	0.7
Brazil	1.9	1.6	3.0	1.2	0.9
Chile	529.0	2.4	1,259.0	516.0	175.6
Colombia	1,919.0	2.2	4,241.0	1,738.1	577.9
Czech Republic	35.1	1.6	54.4	22.3	16.9
Egypt	3.4	1.9	6.5	2.7	1.5
Hungary	246.0	1.2	292.7	120.0	136.5
Korea	1,135.0	1.8	2,020.3	828.0	667.3
Malaysia	3.8	1.2	4.5	1.9	1.2
Mexico	9.6	2.1	20.2	8.3	5.1
Philippines	40.2	1.4	54.7	22.4	10.8
Poland	4.1	1.3	5.5	2.3	2.2
Russia	27.3	1.2	33.3	13.7	7.0
South Africa	6.1	1.5	8.9	3.7	2.5
Thailand	37.2	1.5	55.1	22.6	11.6
Turkey	536.7	1.2	649.4	266.2	216.5
Low-income countries					
China	8.3	1.2	9.9	4.1	1.5
Indonesia	7,195.0	2.1	14,749.8	6,045.0	1,908.4

PPP = purchasing power parity

Note: Correlation between market exchange rates and Big Mac PPP = 0.97; correlation between EIU PPP rates and Big Mac PPP rates = 0.76 (both significant at the 95 percent level of confidence).

Sources: For Big Mac Index: The Economist, 8 January 2000, 100; *for market exchange rate:* various issues of *Financial Times; for EIU PPP rate:* Economist Intelligence Unit; *for implied Big Mac rate:* authors' calculations.

Table 3.3 Exchange rate comparisons

(local currency units per US dollar, 1999)

Country[a]	Market rate[b]	EIU PPP rate[c]	Exchange rate regime[d]
High-income countries			
Australia	1.6	1.4	IFL
Austria	12.7	13.7	FX
Belgium	37.2	36.8	FX
Canada	1.5	1.2	IFL
China (Hong Kong)	7.8	7.1	FX
Denmark	6.9	8.3	LF
Finland	5.5	6.0	FX
France	6.1	6.4	FX
Germany	1.8	2.0	FX
Greece	296.6	264.9	LF
Ireland	0.7	0.7	FX
Israel	4.0	3.5	MF
Italy	1,784.5	1,623.1	FX
Japan	122.3	159.6	IFL
Kuwait	305.3	173.5[e]	FX
Luxembourg	37.2	38.8	FX
Netherlands	2.0	2.1	FX
New Zealand	1.9	1.4	IFL
Norway	7.9	9.5	MF
Portugal	184.8	125.3	FX
Singapore	1.7	2.0	MF
Spain	153.3	127.5	FX
Sweden	8.2	9.5	IFL
Switzerland	1.5	2.0	IFL
Taiwan	33.2	20.0	IFL
United Arab Emirates	3.7	3.7	LF
United Kingdom	0.6	0.7	IFL
United States	1.0	1.0	IFL
Middle-income countries			
Algeria	n.a.	19.8	MF
Argentina	1.0	0.7	FX
Bahrain	377.0	233.3[e]	LF
Brazil	2.0	0.9	IFL
Chile	499.1	175.6	MF
Colombia	1,550.3	577.9	MF
Costa Rica	272.6	115.6	MF
Czech Republic	34.5	16.9	MF
Ecuador	12,000.0	2,720.0	MF
Egypt	3.4	1.5	FX
Guatemala	6.8	2.7	IFL
Hungary	233.4	136.5	MF
Iran	3,000.0	1,035.5	FX
Jordan	711.5	324.4[e]	FX
Korea	1,241.8	667.3	IFL
Malaysia	3.8	1.2	FX
Mexico	9.9	5.1	IFL
Panama	1.0	0.4	FX
Paraguay	2,902.5	1,338.0	MF
Peru	3.4	1.5	IFL
Philippines	39.2	10.8	IFL
Poland	3.9	2.2	MF
Romania	13,335.0	5,602.1	MF

(table continues next page)

Table 3.3 *(continued)*

Country[a]	Market rate[b]	EIU PPP rate[c]	Exchange rate regime[d]
Russia	1.0	0.7[e]	MF
Saudi Arabia	3.8	2.4	LF
Serbia	10.7	n.a.	LF
South Africa	6.2	2.5	IFL
Sri Lanka	69.7	21.4	MF
Thailand	37.5	11.6	IFL
Tunisia	1.2	0.5	MF
Turkey	359.9	216.5[e]	MF
Uruguay	11.1	8.4	MF
Venezuela	576.4	329.2	MF
Low-income countries			
Bangladesh	48.5	13.9	FX
Cameroon	604.5	178.1	FX
China	8.3	1.5	FX
India	42.5	9.9	IFL
Indonesia	8,885.0	1,908.4	IFL
Kenya	63.6	20.1	MF
Nigeria	87.8	35.5	MF
Pakistan	49.9	13.4	MF
Vietnam	13,898.0	2,612.2	LF
Zimbabwe	n.a.	7.1	IFL

n.a. = not available

a. Countries are organized alphabetically within income groups. Income groups are determined by per capita GDP, using World Bank PPP rates.
b. Market rates used by the Economist Intelligence Unit (EIU) for translating the 1999 survey results into dollar prices.
c. EIU PPP rates were calculated by EIU.
d. Exchange rate regimes are divided into four types: IFL (independently floating), the most flexible exchange rate system; MF (managed floating), including (a) crawling peg, (b) exchange rates within crawling bands, and (c) managed floats with no preannounced path; LF (limited flexibility), pegged exchange rates within bands that do not change (or crawl) over time; and FX (fixed), including (a) exchange arrangements with no separate legal tender (dollarization), (b) currency board arrangements, and (c) conventional fixed pegs.
e. For consistency with the market exchange rates, the EIU PPP exchange rates are expressed with the same degree of digit accuracy.

Note: Correlation coefficient for market exchange rates and EIU PPP rates = 0.92 (significant at 95 percent level of confidence).

Sources: World Bank; Economist Intelligence Unit (for PPP rates); International Monetary Fund (for exchange rate regimes); various issues of *Financial Times*; and authors' calculations.

In addition to exchange rate disparity (market exchange rates compared with PPP rates), other barriers and practices are also at work to increase price dispersion. Among these are visible trade barriers, such as tariffs and quotas, and an array of regulatory and private monopolistic advantages that serve to limit entry by new competitors. E-commerce and other new technology forces are just beginning to attack the entrenched advantages of established firms.

4

Potential Static Benefits: Methodology

In an ideal analysis, we would have calculated the benefits of price convergence using a CGE model that linked all product markets and all countries. We lacked the resources for such an exercise. Instead, using elementary supply and demand analysis, we calculated the partial equilibrium changes in consumer surplus and producer surplus resulting from the specified degree of price convergence. The positions of demand and supply schedules in each country are assumed to remain unchanged in this analysis. For this reason, among others, the calculations are static rather than dynamic. Based on changes in consumer and producer surplus, we calculated the potential net gain or static efficiency benefits on a partial equilibrium basis. It must be emphasized that these calculations do not capture the interactions among markets in a single country, nor the interactions among markets across countries.

We should also note that our calculated benefits are conservative. To begin with, we excluded nontradable services and highly taxed items, even though evidence suggests that these items are subject to the same convergence forces as tradable goods. In the second place, we assumed that prices converge only to the edge, not the center of the broad world price band.[1] Third, we assumed that local demand and supply schedules are fixed in their respective positions. This means, among other things, that we ruled out dynamic gains when local firms become more efficient in response to import competition. Finally, we assumed low demand and

1. Table A.3 in appendix A presents static benefits calculated assuming that prices converge to the edge of a one-standard-deviation price band (the narrow world price band). Benefits are substantially larger than those calculated using the broad world price band.

supply elasticities (the assumed sum of the absolute value of demand and supply elasticities is 1.0 for all products). Changing the elasticity assumption alone would alter the calculated benefits in a linear manner. For example, if the sum of the absolute value of demand and supply elasticities were doubled to 2.0, the potential benefits shown in our calculations would also be doubled.

In partial equilibrium analysis, with fixed demand and supply schedules, when price convergence lowers the price for product *i* in city *n*, the net gain equals the difference between the positive change in consumer surplus and the negative change in producer surplus. When price convergence raises the price for product *i* in city *n*, the net gain equals the difference between the positive change in producer surplus and the negative change in consumer surplus.

Figure B.1 in appendix B illustrates potential benefits when the original price of product *i* in city *n*, shown by *b*, is higher than the upper limit of the broad world price band shown by *d*. Following liberalization, the price of product *i* is assumed to drop to *d*. Accordingly, the consumer surplus in city *n* increases from area *abc* to area *adf*, while the producer surplus in city *n* decreases from area *boc* to area *doe*. Hence the net gain is the triangle *cef*. This triangle *cef* represents the static benefits of price convergence calculated using partial equilibrium analysis.

Figure B.2 in appendix B illustrates the case when the price of product *i* in city *n*, shown by *b*, is lower than the lower limit of the BWPB, shown by *d*. Following liberalization, the price of product *i* is assumed to rise to *d*. Accordingly, the consumer surplus in city *n* decreases from area *abc* to area *ade*, while the producer surplus increases from area *boc* to area *dof*. The net gain is shown by the shaded triangle *ecf*.

In other words, whether convergence causes the local price to rise or fall, the country enjoys net static benefits in a partial equilibrium framework.

An additional point should be noted. The demand and supply schedules in figures B.1 and B.2 are drawn to incorporate existing imports and exports of product *i* by city *n*. The point of the diagrams is to illustrate additional imports or exports, as the case may be. The linear distance *ef* in figure B.1 represents additional imports; the linear distance *ef* in figure B.2 represents additional exports.

5

Calculation of Benefits Country by Country

Tables 1.1 and 1.2 illustrate the potential net gains from price convergence in the tradable items resulting from country-by-country liberalization and integration. If a country opened its market to foreign goods and competitive conditions, we assumed that product prices would converge to the BWPB. We performed both market exchange rate and PPP calculations.

Our calculations suggest that if all trade and investment barriers were removed in the 70 countries covered, the potential static benefits from price convergence would reach about 2.1 percent of global GDP, starting with market exchange rates (table 1.1). The figure would be much larger, about 6.3 percent of GDP, starting with PPP exchange rates (table 1.2).[1] Our conservative calculations, using the lesser figure for gains in each country (whether based on market rates or PPP rates) suggest global static benefits of at least 0.6 percent of GDP (table 1.3).

Benefits Calculated Starting with Market Exchange Rates

The calculation of potential benefits starting with market exchange rates entails an important assumption: price convergence would compel market exchange rates to more closely approximate PPP rates. However, the transition for a developing country from its market exchange rate to a PPP rate would require dramatic changes in the structure of domestic production. All prices would not move in the same direction or propor-

1. Figures are calculated city by city, and are weighted both by city size and country size to obtain global estimates. See appendix B for the computation method.

tion. Some would rise sharply, some would fall sharply, and some would remain about the same. The country's external balance could change dramatically in the midst of all these changes. Moreover, the various price changes would compel a significant reallocation of resources. The realignment of a market exchange rate toward a PPP exchange rate could not occur in a vacuum, nor could it occur by a wave of the government hand. The transition, if it occurred, would be an integral part of the development process over a period of years.

The best economic tool for sizing up these complex changes may be the CGE model. As mentioned earlier, the construction of a suitable CGE model was beyond our resources. Instead, our calculations are based on the simple partial equilibrium analysis already outlined. We assume that the benefits only extend to the goods component of total personal consumption (see the representative weights for the United States, Mexico, and India in table 3.1). We applied the representative weights for itemized goods as a percentage of GDP to calculate each country's potential benefit (see table 1.1). We added up the benefits for individual countries to calculate country group and world totals by applying the GDP weights shown in table 1.1.

Based on the partial equilibrium approach and the various assumptions embedded in our calculations, the potential static benefits starting with market exchange rates are strikingly large for some countries (table 1.1). Weighting countries according to their economic importance, the static benefits for all countries are 2.1 percent of world GDP. For high-income countries, however, total benefits are only about 0.6 percent of GDP. This is small compared to the benefits for middle- and low-income countries: the total benefits for middle-income countries are 3.8 percent of GDP, and 19.4 percent of GDP for low-income countries. Even so, the total benefits for high-income countries are comparable to the benefits computed, under static economic assumptions, from eliminating tariff and nontariff barriers—but not further compressing price divergence. For example, Hufbauer and Elliott (1994, 8-10) calculated that US welfare gains from eliminating all tariffs and quotas on US imports in 1990 would be about $20 billion, approximately 0.4 percent of US GDP.[2]

The larger benefits (as a percentage of GDP) calculated for lower-income countries suggest the old saying "no pain, no gain." As the representative weights in table 3.1 indicate, far larger portions of the economy in low-income countries are exposed to potential competition in consumption goods. Moreover, the extent of price distortion in low-income countries is generally far more extensive than in high-income countries.

2. Of course, benefits from removing tariff and nontariff barriers calculated with dynamic models—such as in Brown, Deardorff, and Stern (forthcoming)—are much larger. These authors suggest that US static and dynamic benefits from eliminating all post-Uruguay Round barriers would reach $537 billion, or 5.9 percent of US GDP. By contrast, Scollay and Gilbert (2001) calculate US static losses (mainly a terms-of-trade effect) of 0.6 percent of GDP.

For the world as a whole, about 75 percent of potential gains are generated by rising prices, and 25 percent by falling prices. This defies conventional wisdom, which equates open and competitive markets with falling prices. As a general rule, the larger the size of potential benefits (as a percent of GDP), the larger the share of benefits that is generated from rising prices. For middle-income and low-income countries, this means that more than 90 percent of potential static benefits result from rising prices. Rising prices imply higher wages for millions of unskilled workers. By contrast, for high-income countries, potential static benefits are generated more from falling prices than from rising prices. Falling prices mainly translate into consumer benefits.

Benefits Calculated Starting with PPP Exchange Rates

Table 1.2 records potential static benefits calculated starting with PPP rates. These are benefits that persist even after eliminating the difference between market exchange rates and PPP rates. The weighted world total is 6.3 percent of world GDP. For high-income countries, the weighted total benefit is about 0.4 percent of GDP, for middle-income countries, about 2.0 percent of GDP, and for low-income countries, about 26.1 percent of GDP.

As these figures suggest, total benefits calculated by starting with PPP exchange rates are substantially larger than the benefits calculated starting with market exchange rates. This is a surprise. We would expect, for most countries and most products, that PPP rates would bring observed prices closer to the margins of the BWPB than market exchange rates. Hence, we would expect that the gains from the price convergence imposed by the BWPB would be smaller. Instead it turns out (in contrast to our expectations) that the higher weighting for China, and the larger gains from falling prices in high-income and middle-income countries, are stronger forces that work to enhance calculated gains when the starting point is PPP rates. We do not put great stock in the calculations starting with PPP exchange rates, however, because they reflect the peculiar circumstances of the "privileged" Chinese cities. However, the calculations do present a rough-and-ready indication of the potential benefits from internal market integration within China between the "privileged" cities and the rest of the country. In any event, the PPP calculations are a useful antidote against one common reaction to our calculations starting with market exchange rates. The PPP calculations refute the claim that our calculated gains—starting with market exchange rates—simply reflect the gap between PPP rates and market rates.

The use of different exchange rates as a starting point to carry out the calculations does not substantially affect the ranking of countries that are most likely to gain. The Spearman rank correlation between the market

Table 5.1 Potential benefits at regional level, calculated with market exchange rates (percent of GDP)

	Benefits as share of GDP[a]	
Region	**Market rates**	**EIU PPP**
EU-11	0.76	0.59
AFTA[b]	4.54	6.05
NAFTA	0.13	0.14
Mercosur	7.11	1.73

AFTA = Association of Southeast Asian Nations (ASEAN) Free Trade Area.
NAFTA = North American Free Trade Agreement.
Mercosur = Southern Cone Common Market.
PPP = purchasing power parity

a. Figures were derived from calculated benefits from price convergence based on market exchange rates and PPP rates, tables 1.1 and 1.2. Potential benefits for each country were weighted by the size of country (country share of regional GDP).
b. Figures do not include Brunei, Laos, and Myanmar.

Source: Authors' calculations based on EIU dataset.

rate calculation and the PPP rate is 0.84 and is statistically significant. India, Indonesia, and Vietnam are among the top beneficiaries of price convergence, no matter what exchange rate is used. Again, the exception to the general story is China, where the potential static benefits are much larger starting with PPP rates than with market exchange rates. The reasons have to do with the enormous difference between the national average price level in China (the basis for calculating the PPP rate) and the substantially higher price level in the major Chinese cities that are covered in the EIU dataset (see box 1.1).

Additional Calculations

As a matter of interest, we calculated the potential benefits of price convergence for selected regional groups, starting with both market exchange rates and PPP rates. The results appear in table 5.1. The Southern Cone Common Market (Mercosur) and ASEAN Free Trade Area (AFTA) stand to benefit the most. On the other hand, the EU and North American Free Trade Agreement (NAFTA) show relatively small gains. These regional results are consistent with our findings that developing countries have more to gain from price convergence than developed countries.

We also calculated potential static benefits assuming that prices converge to a narrow world price band (NWPB)—a price band with one standard deviation around the average price in the 17 US cities. This calculation envisages dramatic price convergence within the United States and Europe, and other rich nations, as well as substantial price conver-

gence on a global basis. Conceivably, the technology of e-commerce (business-to-business and business-to-consumer) could bring about dramatic convergence on this scale. Potential static benefits would obviously be much larger if prices converged to the NWPB rather than the BWPB (see table A.3 in appendix A). For example, potential benefits calculated starting with market exchange rates are more than doubled if prices converge to the NWPB rather than the BWPB. However, there is as yet little evidence that this high degree of convergence can be reached. Indeed, over the past decade, the extent of price divergence within the United States, both overall and for tradable goods, has been quite stable.[3] This observation suggests that new economic forces have so far had little impact on price divergence.

3. By contrast, there has been considerable price convergence for tradable goods within the Euro area since 1990. See Rogers, Hufbauer, and Wada (2001, table 1), and Rogers (2001, tables 1a and 1b).

6

Implied Imports and Exports

We can calculate the implied change in national imports and exports arising directly from the assumed convergence of prices. Returning to figure B.1 in appendix B, the line segment *ef* shows the increment in imports by city *n* of item *i,* when the local price is above the upper margin of the broad world price band. Likewise, in figure B.2, the line segment *ef* shows the increment in exports by city *n,* when the local price is below the lower margin of the broad world price band. Assuming that all incremental imports and exports involve trade outside national borders, it is possible to calculate the import and export consequences of our static model. The results of this exercise are summarized in table B.1 (starting with market exchange rates) and the details are spelled out in the text of appendix B.

For most countries, the calculated increment in exports does not equal the calculated increment in imports. This discrepancy reflects the limitations of partial equilibrium analysis: no condition is built into the partial equilibrium model that forces export changes to equal import changes. If a general equilibrium framework were used instead, price convergence among consumer goods would cascade through the economic structure, and a closing condition would ensure balance between imports and exports. We think these general equilibrium effects would normally entail larger trade flows than those portrayed in table B.1. Countries with more imports than exports would increase their exports, because idle local resources would seek employment in the export sector. Conversely, countries with more exports than imports would increase their imports, as excess local demand was satisfied by foreign goods. In other words, general equilibrium analysis would predict a larger expansion of world trade flows than portrayed in table B.1. Assuming the additional expansion

followed the principles of comparative advantage, there would be further benefits beyond those we have calculated. Again, this is a difference between static and dynamic calculations.

For example, Brown, Deardorff, and Stern (forthcoming), using a CGE model, calculated that world imports and exports combined (goods and services) would increase by $2 trillion with complete liberalization by all countries of all post-Uruguay Round barriers (the scenario that generated static and dynamic world welfare gains of $1.9 trillion in their model). By comparison, our calculation is $2.1 trillion of additional merchandise exports (table B.1), compared with $0.6 trillion of static world welfare gains (table 1.1, starting with market exchange rates). The implied ratio between static gains and additional trade—about one-to-three—is consistent with other partial equilibrium estimates.[1] In contrast, general equilibrium models typically calculate a ratio between total gains (static plus dynamic) and additional trade at a one-to-two ratio, or even (as in the case of Brown, Deardorff, and Stern, forthcoming) at a one-to-one ratio.[2]

1. See, for example, Hufbauer and Elliott (1994).

2. However, Scollay and Gilbert (2001) arrive at a very different result. These authors use a CGE model to calculate static world gains from global liberalization of 0.56 percent of initial GDP (table 3.2f). Since initial GDP (at market exchange rates) is $28,862 billion in their model, the gains work out to $162 billion (table 2.5b). By contrast, the calculated change in world exports is 23.23 percent of base period (1996-98) exports. Base period exports were about $5,390 billion (International Monetary Fund 2000), indicating an export increase of $1,252 billion. In the Scollay and Gilbert model, net welfare gains are only 13 percent of export expansion.

7

Future Research: Mapping Policy Choices to Price Convergence

Our analysis of potential benefits raises an important question: What is the mapping between policy choices and price convergence? If the only way for an emerging country to achieve price convergence is to acquire the infrastructure and other characteristics of an OECD nation, then the potential benefits illustrated by our calculations could be characterized as minor adjuncts to the process of economic development. On the other hand, to the extent liberalization policies promote price convergence, the benefits could be characterized as a contribution to economic development.

To shed light on this question, we have regressed the number of items in each city that fall outside the BWPB against key national and city characteristics—an openness index, distance from a central US city (Chicago), population, and a per capita income index. The openness index is based on data contained in the Freedom Index (Heritage Foundation and *Wall Street Journal* 2000). We estimated coefficients for two versions of the equation, by first starting with market exchange rates, and then starting with PPP rates. We first estimated an equation for consumer goods only, then for nontradable services and highly taxed items (indicated by N and H in table A.1, appendix A), and last for all items in the EIU dataset (tradable and nontradable items alike). The results appear in table 7.1.

The estimated coefficients and their standard errors in table 7.1 indicate that three of the coefficients are large and very significant: openness, distance, and income level.[1] Surprisingly, the population coefficient is not

1. Per capita GDP did not perform as well as a simple index classifying countries according to the World Bank (table 1) scale: high income, upper middle income, lower middle income, low income.

Table 7.1 Price divergence and potential factors

Dependent variable: Number of items outside of BWPB calculated using market exchange rate

	Sector					
	Tradables		Services and high-tax items		All items	
	Regression coefficients	t-values	Regression coefficients	t-values	Regression coefficients	t-values
Openness index[a]	4.54	2.38	3.21	2.91	7.75	3.00
Population[b]	0.01	1.62	0.01	1.56	0.02	1.65
Distance[c]	0.77	1.70	0.24	1.24	1.01	1.63
Income level[d]	5.95	2.33	1.75	1.31	7.70	2.15
GDP[e]	–0.002	–3.54	–0.001	–3.71	–0.003	–3.76
Constant	8.39	2.03	5.97	2.91	14.36	2.51
Adjusted R-squared	0.64		0.62		0.66	

Dependent variable: Number of items outside of BWPB calculated using PPP exchange rate

	Sector					
	Tradables		Services and high-tax items		All items	
	Regression coefficients	t-values	Regression coefficients	t-values	Regression coefficients	t-values
Openness index[a]	14.57	8.62	5.83	8.06	20.40	9.06
Population[b]	0.00	2.21	0.00	1.23	0.00	2.00
Distance[c]	22.58	2.89	11.66	2.90	34.23	2.92
Income level[d]	1.89	1.33	0.40	0.58	2.28	1.15
GDP[e]	0.00	–5.62	0.00	–4.71	0.00	–5.58
Constant	1.32	0.23	4.73	1.54	6.05	0.74
Adjusted R-squared	0.72		0.68		0.72	

BWPB = broad world price band
PPP = purchasing power parity

a. The openness index is calculated using the Freedom Index (Heritage Foundation and *Wall Street Journal* 2000) and the average of three indexes—monetary policy, trade policy, and black market. The index ranges from 1 (the most open/liberal) to 5 (the least open).
b. Population of the country in 1999 expressed in millions of people.
c. Distance between a city and Chicago expressed in thousands of kilometers.
d. Income level is divided into four groups: high, middle high, middle low, and low. Group 1 is high income, 2 is middle high, and so on.
e. GDP is expressed in US$ billions, and calculated using market exchange rates.

Source: Authors' calculations.

particularly robust—in other words, large countries do not have substantially more price divergence than small countries.

Of most interest, however, is the result that openness is a strong determinant of price divergence. The difference between a high and a low openness index accounts for 10 of the 40 items that (on average) exhibit greater price divergence than the margins of the BWPB. The components of the openness index are the average tariff rate (reflecting trade policy),

the inflation rate (reflecting monetary policy), and the extent of black market activity (reflecting governance). These components are policy-driven variables. Countries that choose to eliminate their trade and investment barriers, practice monetary discipline, and adopt procompetitive policies can achieve a substantial fraction of the benefits described in this study. This policy conclusion is supported by the analysis of Parsely and Wei (1999): they found that the border effect per se swamps other explanatory variables of price divergence, and can have an effect equal to millions of miles of distance between two cities.

The other three variables in our regression equation are, of course, either less susceptible or not susceptible at all to policy choice. There is nothing countries can do about their distance from the United States; however, as noted already, distance is not the most important reason for price divergence. Governments can influence the national population size through immigration policy and pronatal or antinatal measures. Of course, these are controversial policies with delayed results; in any event population size is not a powerful variable. Finally, while income level obviously reflects policy choices over a period of two decades or more, the critical policy choices a country must make to reach a high level of income go far beyond removing trade barriers and instilling competition in the marketplace.

8

Concluding Observations

We reached a simple conclusion from our calculations. The potential gains from the integration of world markets and the compression of price divergence are very large. This is not a new finding, but our calculations represent a new way of reaching a familiar result.

Many scholars have concluded that when a country chooses to have denser trade and investment relations with the world economy, it will enjoy a higher level of income, other things being equal. Their results are based both on cross-country econometric studies and on computable general equilibrium models. We reach the same result by applying simple supply and demand models to make a "what-if" calculation: what if the wide extent of price divergence that now characterizes the world economy could be compressed?

Our calculations, which are based on simple partial equilibrium analysis, show large potential gains. The potential gains are larger, as a percentage of GDP, for middle-income and low-income countries than for high-income countries. Moreover, a substantial share of the gains can be captured by policies that encourage an open economy: low trade and investment barriers, low corruption, and keen competition in the marketplace.

APPENDICES

Appendix A
World Price Bands

Table A.1 shows the upper margin and the lower margin of the broad world price band (BWPB). The BWPB is calculated as the average price in 17 US cities, plus or minus two standard deviations. For 5 of the 154 products, the average price minus two standard deviations produced a negative value. These five products are local-brand beer, the cost of a tune-up, yearly road tax or vehicle registration fee, rent for a two-bedroom furnished apartment, and rent for a two-bedroom unfurnished apartment. Most of these five products are excluded from the calculations because they are services; however, for local-brand beer, the highest and lowest prices in 17 US cities are dropped from the calculation of BWPB so that the lower margin of BWPB is a positive value.

Table A.1 shows the actual maximum and minimum observed prices in the 17 US cities. The US maximum and minimum prices are shown in boldface when they are above (or below) the margins of the BWPB. A glance at table A.1 shows that many observed maximum prices are below the upper margin of the BWPB, and most observed minimum prices are above the lower margin of the BWPB. This is another way of pointing out that the BWPB covers an ample range of price dispersion.

Table A.2 compares the calculated BWPB based on 17 US cities versus 25 European cities (two standard deviations in each case). In most cases, the Europe-based BWPB is much wider than the US-based BWPB. For about 40 percent of products, the ratio between the upper and lower margins based on European cities is about 50 percent wider than the ratio based on US cities. If the European BWPB represents the practical limits

of price convergence, the gains we have described in this paper would be substantially diminished. We think the European BWPB conveys an overly pessimistic impression of the scope for price convergence.

A more optimistic set of calculations comes from a narrow world price band (NWPB). Table A.1 shows the upper and lower margins of the NWPB, defined as the 17-US-city average plus or minus one standard deviation. The NWPB is, of course, much narrower than the BWPB. Table A.3 shows the calculated static benefits if prices converge to the NWPB (starting with market exchange rates). The gains are far larger than when the BWPB serves as the reference price band. For some low-income countries, such as India and Indonesia, the NWPB benefits are unbelievably large. However, world total gains of 14 percent of GDP might eventually be realized through a combination of policy liberalization and new technology.

Table A.1 Alternative world price bands for each product (in US dollars per unit)[a]

Sector/product	Mean	Narrow world price band (one standard deviation)		Broad world price band (two standard deviations)		Actual US prices[b]	
		Upper margin	Lower margin	Upper margin	Lower margin	Maximum	Minimum
Processed foods							
T Bread, white (1 kg)	3.25	3.86	2.64	4.46	2.04	4.38	2.41
T Butter (500 gm)	2.87	3.46	2.27	4.06	1.68	**4.20**	1.99
T Cheese, imported (500 gm)	9.05	10.48	7.62	11.91	6.20	11.44	7.00
T Corn flakes (375 gm)	2.51	2.96	2.06	3.41	1.60	3.41	1.92
T Flour, white (1 kg)	0.99	1.24	0.74	1.49	0.49	**1.53**	0.70
T Margarine (500 gm)	1.62	2.05	1.19	2.48	0.77	2.19	0.87
T Milk, pasteurized (1 liter)	1.11	1.35	0.86	1.60	0.61	1.59	0.79
T Olive oil (1 liter)	12.13	13.97	10.28	15.81	8.44	14.40	**8.29**
T Peanut or corn oil (1 liter)	2.91	3.47	2.36	4.03	1.80	3.91	2.29
T Rice, white (1 kg)	2.41	3.35	1.47	4.29	0.53	**4.68**	1.10
T Spaghetti (1 kg)	2.74	3.60	1.87	4.46	1.01	4.30	1.74
T Sugar, white (1 kg)	1.11	1.31	0.92	1.51	0.72	**1.64**	0.92
T Yogurt, natural (150 gm)	0.58	0.71	0.44	0.84	0.31	**0.96**	0.46
T Peaches (500 gm)	1.40	1.57	1.23	1.74	1.06	**1.88**	1.20
T Peas (250 gm)	0.53	0.64	0.43	0.74	0.33	**0.75**	0.40
T Sliced pineapples (500 gm)	1.32	1.61	1.03	1.89	0.75	**1.97**	1.02
T Tomatoes (250 gm)	0.56	0.74	0.38	0.92	0.20	**1.09**	0.30
Fresh vegetables and fruit							
T Apples (1 kg)	2.73	3.26	2.20	3.78	1.67	3.72	1.96
T Bananas (1 kg)	1.40	1.76	1.04	2.13	0.68	**2.42**	1.08
T Carrots (1 kg)	1.72	2.20	1.24	2.68	0.76	**2.75**	1.06
T Eggs (12)	1.51	2.10	0.92	2.69	0.33	**2.73**	0.95
T Lemons (1 kg)	3.27	4.26	2.28	5.24	1.30	**5.52**	1.33
T Lettuce (per head)	1.25	1.47	1.04	1.69	0.82	**1.79**	0.99
T Mushrooms (1 kg)	6.73	8.45	5.00	10.18	3.27	**11.00**	4.38
T Onions (1 kg)	1.91	2.47	1.35	3.03	0.80	2.84	0.93

(table continues next page)

Table A.1 Alternative world price bands for each product (in US dollars per unit)[a] *(continued)*

	Sector/product	Mean	Narrow world price band (one standard deviation)		Broad world price band (two standard deviations)		Actual US prices[b]	
			Upper margin	Lower margin	Upper margin	Lower margin	Maximum	Minimum
T	Oranges (1 kg)	2.57	3.44	1.69	4.31	0.82	**4.38**	1.50
T	Potatoes (2 kg)	3.11	3.91	2.31	4.71	1.51	4.45	1.74
T	Tomatoes (1 kg)	4.14	5.29	2.98	6.45	1.82	**6.60**	3.28
	Meat and fish (fresh or frozen)							
T	Beef roast (1 kg)	7.89	10.08	5.70	12.27	3.51	**13.19**	4.38
T	Beef steak, entrecote (1 kg)	15.16	17.37	12.95	19.58	10.74	18.72	10.97
T	Stewing beef, shoulder (1 kg)	7.52	9.32	5.72	11.12	3.93	**12.11**	5.48
T	Beef tournedos, filet mignon (1 kg)	23.54	28.60	18.48	33.66	13.42	**35.24**	14.52
T	Ground or minced beef (1 kg)	6.12	7.46	4.79	8.79	3.45	8.48	4.38
T	Veal chops (1 kg)	17.01	21.22	12.81	25.42	8.61	**26.43**	10.53
T	Veal fillet (1 kg)	20.04	22.46	17.62	24.87	15.20	24.21	15.35
T	Veal roast (1 kg)	10.55	14.28	6.82	18.01	3.09	17.60	6.12
T	Lamb chops (1 kg)	13.21	18.31	8.10	23.41	3.00	22.42	6.59
T	Leg of lamb (1 kg)	8.69	10.04	7.34	11.38	6.00	**12.75**	6.59
T	Stewing lamb (1 kg)	6.97	8.88	5.06	10.78	3.16	**10.99**	4.38
T	Bacon (1 kg)	7.56	9.18	5.93	10.81	4.31	9.89	4.85
T	Pork chops (1 kg)	9.25	10.94	7.56	12.63	5.87	13.28	6.81
T	Pork loin (1 kg)	8.07	9.59	6.54	11.12	5.02	10.77	6.15
T	Whole ham (1 kg)	8.91	11.13	6.70	13.34	4.49	**13.19**	5.48
T	Fresh chicken (1 kg)	3.73	4.90	2.55	6.08	1.37	5.48	1.96
T	Frozen chicken (1 kg)	3.90	5.32	2.48	6.74	1.06	6.59	2.18
T	Fresh fish (1 kg)	16.89	20.83	12.94	24.77	9.00	**26.41**	10.99
T	Frozen fish fingers or sticks (1 kg)	10.84	13.53	8.15	16.22	5.46	**16.23**	7.60

Beverages								
T	Coca-Cola (1 liter)	0.77	0.91	0.63	1.04	0.50	1.10	0.59
T	Cocoa (250 gm)	2.95	3.56	2.34	4.17	1.73	4.00	**1.66**
T	Ground coffee (500 gm)	5.78	6.59	4.96	7.41	4.14	7.30	4.57
T	Instant coffee (125 gm)	3.90	4.96	2.83	6.03	1.76	**6.50**	2.42
T	Mineral water (1 liter)	1.84	2.23	1.45	2.62	1.06	2.48	1.09
T	Nesquick, chocolate powder (500 gm)	3.12	3.88	2.35	4.65	1.58	**4.99**	2.11
T	Orange juice (1 liter)	1.84	2.26	1.41	2.69	0.99	2.63	1.37
T	Tea bags (25 bags)	1.65	2.32	0.98	2.98	0.31	**3.07**	0.81
T	Tonic water (200 ml)	0.25	0.32	0.19	0.38	0.13	0.36	0.11
T	Beer, local brand (1 liter)	2.69	3.39	1.98	4.09	1.28	**8.45**	1.58
T	Beer, top quality (330 ml)	1.54	2.09	0.98	2.65	0.42	**2.79**	1.07
T	Gin, Gilbey's or equivalent (700 ml)	11.81	14.71	8.91	17.60	6.02	16.69	8.98
T	Imported French VSOP cognac (700 ml)	38.69	44.27	33.10	49.86	27.51	47.78	**26.66**
T	Liqueur, Cointreau (700 ml)	33.34	38.82	27.86	44.29	22.38	**46.27**	26.03
T	Vermouth, Martini & Rossi (1 liter)	10.38	13.15	7.62	15.92	4.85	**17.47**	6.15
H	Whiskey, Scotch, six years old (700 ml)	19.63	21.73	17.54	23.82	15.45	**24.26**	16.72
T	Wine, common table (1 liter)	10.53	12.31	8.75	14.09	6.97	13.44	8.19
T	Wine, fine quality (700 ml)	34.35	41.74	26.96	49.13	19.57	47.94	24.26
T	Wine, superior quality (700 ml)	15.02	20.76	9.28	26.50	3.53	**28.81**	8.39
Household items								
T	Batteries (two, for flashlight/radio)	3.30	3.88	2.71	4.47	2.12	3.99	2.38
T	Electric toaster (for two slices)	34.52	43.53	25.52	52.53	16.51	49.95	24.06
T	Frying pan (Teflon or good equivalent)	28.18	38.42	17.94	48.67	7.70	45.57	15.45

(table continues next page)

Table A.1 Alternative world price bands for each product (in US dollars per unit)[a] *(continued)*

Sector/product	Mean	Narrow world price band (one standard deviation)		Broad world price band (two standard deviations)		Actual US prices[b]	
		Upper margin	Lower margin	Upper margin	Lower margin	Maximum	Minimum
T Insect killer spray (330 gm)	4.02	5.26	2.79	6.49	1.55	6.46	1.79
T Laundry detergent (3 liters)	11.45	14.20	8.69	16.96	5.93	16.62	8.10
T Light bulbs (two, 60 watts)	2.23	3.10	1.35	3.98	0.47	3.60	1.12
T Liquid dishwashing detergent (750 ml)	2.32	2.68	1.95	3.04	1.59	2.97	1.83
T Soap (100 gm)	1.00	1.16	0.83	1.33	0.66	**1.34**	0.77
T Toilet tissue (two rolls)	0.97	1.23	0.71	1.49	0.44	1.49	0.68
T Aspirin (100 tablets)	7.96	10.51	5.40	13.07	2.85	**15.00**	5.89
T Facial tissues (box of 100)	1.12	1.45	0.79	1.77	0.46	1.75	0.73
T Hand lotion (125 ml)	3.90	5.38	2.43	6.86	0.95	6.45	2.10
T Lipstick (deluxe type)	25.43	30.12	20.74	34.81	16.05	**38.50**	22.26
T Razor blades (five pieces)	4.75	5.51	4.00	6.26	3.25	**6.33**	3.99
T Shampoo and conditioner in one (400 ml)	4.67	6.01	3.32	7.36	1.97	**8.64**	3.49
T Toothpaste with fluoride (120 gm)	2.13	2.56	1.70	2.99	1.27	**3.27**	1.58
T Kodak color film (C 135, 36 exposures)	8.04	9.35	6.73	10.66	5.43	**10.75**	6.89
T Compact disc album	18.74	20.91	16.57	23.08	14.41	**25.06**	15.74
T Color TV set (56 cm)	709.12	868.26	549.98	1,027.40	390.84	**1,199.99**	528.00
T Tennis balls (six)	6.47	9.01	3.93	11.55	1.39	10.38	3.22
Cigarettes and tobacco							
H Cigarettes, local brand (pack of 20)	3.03	3.78	2.29	4.52	1.54	**4.54**	2.18
H Cigarettes, Marlboro (pack of 20)	3.10	3.69	2.50	4.28	1.91	4.11	2.18
H Pipe tobacco, MacBaren type (50 gm)	4.65	5.49	3.81	6.33	2.97	6.11	3.35

Clothing								
T	Business shirt, white	65.10	80.85	49.34	96.60	33.59	95.40	45.00
T	Business suit, two-piece, medium weight	685.12	822.14	548.10	959.16	411.08	872.00	526.00
T	Cardigan sweater	167.74	194.03	141.46	220.32	115.17	201.18	129.90
T	Dress, ready-to-wear, daytime	248.98	313.52	184.45	378.05	119.92	347.20	180.00
T	Raincoat, Burberry type (men's)	436.63	616.87	256.38	797.11	76.14	750.00	222.60
T	Raincoat, Burberry type (women's)	459.58	597.47	321.68	735.37	183.79	**775.75**	298.00
T	Shoes, business wear	216.89	270.71	163.06	324.54	109.23	312.70	160.00
T	Shoes, town	176.66	219.86	133.46	263.06	90.26	249.00	95.00
T	Socks, wool mixture	12.92	16.61	9.22	20.31	5.53	18.27	9.00
T	Tights/pantyhose	11.16	14.56	7.76	17.96	4.36	**18.50**	5.72
T	Boy's dress trousers	45.77	60.83	30.71	75.89	15.65	**80.25**	28.00
T	Boy's jacket, smart	94.99	116.07	73.92	137.15	52.84	126.14	**46.80**
T	Girl's dress	74.36	90.40	58.32	106.44	42.28	99.00	47.84
T	Jeans	37.23	43.39	31.08	49.55	24.92	50.87	27.56
T	Shoes, dress wear	54.70	66.79	42.61	78.88	30.53	71.78	32.00
T	Shoes, sportswear	58.60	68.49	48.71	78.38	38.82	76.13	44.94
Automobiles								
T	Compact car (1300-1799 cc)	20,355.53	24,356.72	16,354.33	28,357.92	12,353.14	**30,975.00**	15,021.90
T	Deluxe car (2500 cc and higher)	78,974.93	93,041.87	64,907.99	107,108.81	50,841.05	101,123.00	57,650.00
T	Family car (1800-2499 cc)	43,006.98	47,592.31	38,421.65	52,177.64	33,836.31	50,925.00	36,000.00
T	Low-priced car (900-1299 cc)	13,054.02	14,903.44	11,204.61	16,752.85	9,355.19	15,888.00	9,999.00

(table continues next page)

Table A.1 Alternative world price bands for each product (in US dollars per unit)[a] *(continued)*

Sector/product	Mean	Narrow world price band (one standard deviation)		Broad world price band (two standard deviations)		Actual US prices[b]	
		Upper margin	Lower margin	Upper margin	Lower margin	Maximum	Minimum
Books and newspapers							
N Daily local newspaper	0.49	0.64	0.34	0.79	0.20	0.75	0.25
N International foreign daily newspaper	1.44	1.87	1.01	2.30	0.58	2.00	1.00
N International weekly news magazine *(Time)*	3.12	3.37	2.88	3.62	2.63	**3.64**	2.95
N Paperback novel (at bookstore)	8.83	10.55	7.10	12.28	5.37	**13.90**	6.99
Dry cleaning, haircut, and other services							
N Dry cleaning, man's suit	9.34	12.11	6.57	14.88	3.80	**16.00**	7.50
N Dry cleaning, trousers	4.60	5.62	3.58	6.63	2.56	**7.00**	3.75
N Dry cleaning, woman's dress	8.40	9.46	7.34	10.51	6.28	10.00	7.50
N Laundry (one shirt)	1.82	2.48	1.15	3.14	0.49	**3.25**	1.25
N Man's haircut (tips included)	42.43	59.25	25.61	76.07	8.79	75.00	25.00
N Woman's haircut and blow dry (tips included)	65.07	90.69	39.45	116.32	13.83	**120.00**	35.00
N Cost of developing 36 color pictures	13.71	16.73	10.69	19.76	7.67	17.39	**6.49**
Domestic help							
N Babysitter's rate per hour	11.70	14.96	8.44	18.22	5.17	16.00	6.75
N Hourly rate for domestic cleaning help	21.04	25.14	16.94	29.24	12.84	27.50	14.75
N Maid's monthly wages (full-time, live-in)	1,939.05	2,531.89	1,346.21	3,124.74	753.37	**3,375.00**	1,250.00

Entertainment, meal, and hotel								
N	Cinema, one ticket	7.76	8.67	6.84	9.59	5.93	9.25	6.25
N	Fast food snack: hamburger and soft drink	4.06	4.63	3.48	5.21	2.90	5.00	3.31
N	Four best seats at cinema	34.00	39.82	28.18	45.64	22.36	**48.00**	26.00
N	Four best seats at theater or concert	266.88	344.44	189.32	421.99	111.77	365.00	**110.00**
N	Three-course dinner for four persons	394.00	490.35	297.65	586.70	201.30	**620.00**	300.00
N	Visit of four persons to nightclub	148.21	203.08	93.35	257.94	38.49	**260.00**	80.00
N	Two-course meal including wine, dessert, coffee, etc., for one person	115.86	165.93	65.79	216.00	15.71	**240.00**	55.00
N	One drink at bar of first-class hotel (Scotch or local equivalent)	9.42	11.79	7.05	14.17	4.68	14.00	7.80
N	One night in single room at Hilton/Intercontinental Hotel	245.96	293.89	198.03	341.82	150.10	324.75	173.50
N	One night in single room at moderate/comfortable hotel	169.49	229.22	109.77	288.95	50.04	276.00	79.00
N	Simple meal (water, steak, vegetables, dessert, etc.) for one person	37.35	50.70	24.01	64.04	10.66	**70.00**	15.00
Transportation								
N	Annual premium for car insurance	2,439.14	3,174.84	1,703.44	3,910.54	967.75	3,750.00	1,500.00
N	Cost of tune-up (no major repairs)	206.78	307.92	105.64	409.07	4.49	**487.00**	105.00
H	Regular unleaded petrol (1 liter)	0.32	0.38	0.26	0.44	0.19	0.43	0.23

(table continues next page)

Table A.1 Alternative world price bands for each product (in US dollars per unit)[a] *(continued)*

Sector/product	Mean	Narrow world price band (one standard deviation)		Broad world price band (two standard deviations)		Actual US prices[b]	
		Upper margin	Lower margin	Upper margin	Lower margin	Maximum	Minimum
N Yearly road tax or vehicle registration fee	267.88	493.81	41.94	493.81	41.94	**799.00**	**30.00**
N Initial taxi meter charge	2.18	2.76	1.61	3.33	1.03	3.00	1.30
N Rate per additional kilometer	1.21	1.52	0.89	1.84	0.57	1.75	0.57
N Taxi ride from airport to city center	33.68	45.71	21.65	57.74	9.62	**60.00**	17.00
N One week car rental, low price (mileage, taxes, and charges included)	356.79	429.97	283.62	503.14	210.45	**549.00**	275.10
N One week car rental, moderate price (mileage, taxes, and charges included)	437.59	513.86	361.31	590.14	285.03	585.00	321.24
Housing							
N Furnished apartment, 3 rooms (1 bedroom)	1,476.79	2,088.57	865.01	2,700.35	253.22	**2,800.00**	750.00
N Furnished apartment, 4 rooms (2 bedrooms)	1,817.92	2,606.90	1,028.94	3,395.88	239.96	**4,100.00**	800.00
N Furnished house, 5-6 rooms (3 bedrooms)	2,935.71	4,209.48	1,661.95	5,483.24	388.19	5,400.00	1,200.00
N Unfurnished apartment, 4 rooms (2 bedrooms)	1,464.17	1,987.88	940.45	2,511.59	416.74	**3,650.00**	800.00
N Unfurnished apartment, 5-6 rooms (3 bedrooms)	1,950.71	2,868.28	1,033.15	3,785.85	115.58	**3,950.00**	900.00
N Unfurnished apartment, 7-9 rooms (4 bedrooms)	2,855.50	4,207.86	1,503.14	5,560.21	150.79	**5,650.00**	1,795.00

N	Unfurnished house, 5-6 rooms (3 bedrooms)	2,485.71	3,691.22	1,280.21	4,896.72	74.70	**5,150.00**	1,100.00
N	Unfurnished house, 7-9 rooms (3 bedrooms)	3,469.23	5,150.44	1,788.02	6,831.66	106.81	**7,750.00**	1,750.00
Utilities								
N	Electricity	230.71	312.94	148.49	395.16	66.26	350.00	115.00
N	Gas	143.33	196.48	90.19	249.62	37.05	220.00	70.00
N	Heating oil (100 liters)	27.78	33.46	22.11	39.14	16.43	36.72	22.46
N	Telephone and line, monthly rental	23.57	32.45	14.68	41.34	5.80	**45.90**	14.13
N	Telephone, charge per local call from home	0.09	0.11	0.07	0.13	0.04	0.11	0.06
N	Water	76.23	103.35	49.11	130.47	21.99	**150.00**	45.00

a. The NWPB and BWPB represent, respectively, one and two standard deviations around observed prices in 17 US cities.
b. When the minimum or maximum price observed in the 17 US cities exceeds or falls short of the margins of the BWPB, the price is shown in bold.

Note: T = tradable product; H = highly taxed product; and N = nontradable product.

Source: Authors' calculations using the EIU dataset.

Table A.2 Broad world price band (BWPB) centered on 25 European cities[a] versus 17 US cities

Sector/product	European BWPB			US BWPB		
	Upper margin	Lower margin	EU BWPB > US BWPB[b]	Upper margin	Lower margin	US BWPB > EU BWPB[c]
Processed foods						
Bread, white (1 kg)	5.03	1.08	X	4.46	2.04	
Butter (500 gm)	5.53	1.68		4.06	1.68	
Cheese, imported (500 gm)	11.26	3.54	X	11.91	6.20	
Corn flakes (375 gm)	2.96	1.47		3.41	1.60	
Flour, white (1 kg)	1.64	0.45		1.49	0.49	
Margarine (500 gm)	3.15	0.79		2.48	0.77	
Milk, pasteurized (1 liter)	1.42	0.54		1.60	0.61	
Olive oil (1 liter)	16.19	1.95	X	15.81	8.44	
Peanut or corn oil (1 liter)	5.67	0.40	X	4.03	1.80	
Rice, white (1 kg)	4.59	1.95		4.29	0.53	X
Spaghetti (1 kg)	4.19	0.67		4.46	1.01	
Sugar, white (1 kg)	1.82	0.71		1.51	0.72	
Yogurt, natural (150 gm)	0.92	0.10	X	0.84	0.31	
Peaches (500 gm)	2.30	0.66	X	1.74	1.06	
Peas (250 gm)	1.59	0.09	X	0.74	0.33	
Sliced pineapples (500 gm)	2.31	0.66		1.89	0.75	
Tomatoes (250 gm)	0.82	0.13		0.92	0.20	
Fresh vegetables and fruit						
Apples (1 kg)	2.95	0.92		3.78	1.67	
Bananas (1 kg)	2.62	1.29		2.13	0.68	X
Carrots (1 kg)	2.33	0.21	X	2.68	0.76	
Eggs (12)	4.69	0.84		2.69	0.33	
Lemons (1 kg)	4.70	0.17	X	5.24	1.30	
Lettuce (per head)	2.74	0.05	X	1.69	0.82	
Mushrooms (1 kg)	10.24	0.82	X	10.18	3.27	
Onions (1 kg)	1.82	0.53		3.03	0.80	
Oranges (1 kg)	3.14	0.81		4.31	0.82	
Potatoes (2 kg)	3.84	0.62	X	4.71	1.51	
Tomatoes (1 kg)	4.04	0.88		6.45	1.82	
Meat and fish (fresh or frozen)						
Beef roast (1 kg)	24.36	6.00		12.27	3.51	
Beef steak, entrecote (1 kg)	29.74	5.47	X	19.58	10.74	
Stewing beef, shoulder (1 kg)	19.60	3.24	X	11.12	3.93	
Beef tournedos, filet mignon (1 kg)	43.84	9.69	X	33.66	13.42	
Ground or minced beef (1 kg)	12.28	5.23		8.79	3.45	
Veal chops (1 kg)	26.33	5.56	X	25.42	8.61	
Veal fillet (1 kg)	39.15	5.57	X	24.87	15.20	
Veal roast (1 kg)	26.65	6.36		18.01	3.09	
Lamb chops (1 kg)	25.79	4.64		23.41	3.00	
Leg of lamb (1 kg)	24.24	2.72	X	11.38	6.00	
Stewing lamb (1 kg)	22.97	0.98	X	10.78	3.16	

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Table A.2 *(continued)*

Sector/product	European BWPB Upper margin	European BWPB Lower margin	EU BWPB > US BWPB[b]	US BWPB Upper margin	US BWPB Lower margin	US BWPB > EU BWPB[c]
Bacon (1 kg)	19.71	5.49		10.81	4.31	
Pork chops (1 kg)	14.70	2.85	X	12.63	5.87	
Pork loin (1 kg)	18.52	1.14	X	11.12	5.02	
Whole ham (1 kg)	29.62	6.55	X	13.34	4.49	
Fresh chicken (1 kg)	10.42	0.81	X	6.08	1.37	
Frozen chicken (1 kg)	7.11	0.93		6.74	1.06	
Fresh fish (1 kg)	36.99	2.17	X	24.77	9.00	
Frozen fish fingers or sticks (1 kg)	12.47	3.75		16.22	5.46	
Beverages						
Coca-Cola (1 liter)	1.70	0.50	X	1.04	0.50	
Cocoa (250 gm)	4.18	0.91	X	4.17	1.73	
Ground coffee (500 gm)	9.64	2.46	X	7.41	4.14	
Instant coffee (125 gm)	8.52	3.13		6.03	1.76	
Mineral water (1 liter)	2.02	0.24	X	2.62	1.06	
Nesquick, chocolate powder (500 gm)	4.58	1.34		4.65	1.58	
Orange juice (1 liter)	2.81	0.66	X	2.69	0.99	
Tea bags (25 bags)	3.47	0.69		2.98	0.31	X
Tonic water (200 ml)	0.73	0.01	X	0.38	0.13	
Beer, local brand (1 liter)	4.17	0.31	X	4.09	1.28	
Beer, top quality (330 ml)	2.25	0.11	X	2.65	0.42	
Gin, Gilbey's or equivalent (700 ml)	28.00	2.41	X	17.60	6.02	
Imported French VSOP cognac (700 ml)	56.92	14.53	X	49.86	27.51	
Liqueur, Cointreau (700 ml)	39.78	1.94	X	44.29	22.38	
Vermouth, Martini & Rossi (1 liter)	15.27	1.09	X	15.92	4.85	
Whiskey, Scotch, six years old (700 ml)	37.92	1.13	X	23.82	15.45	
Wine, common table (1 liter)	11.90	2.66	X	14.09	6.97	
Wine, fine quality (700 ml)	59.56	5.65	X	49.13	19.57	
Wine, superior quality (700 ml)	21.92	2.10		26.50	3.53	
Household items						
Batteries (two, for flashlight/radio)	6.11	2.46		4.47	2.12	
Electric toaster (for two slices)	63.31	26.76		52.53	16.51	
Frying pan (Teflon or good equivalent)	56.53	7.51		48.67	7.70	
Insect repellent spray (330 gm)	7.42	1.42		6.49	1.55	
Laundry detergent (3 liters)	21.23	5.26		16.96	5.93	

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Table A.2 Broad world price band (BWPB) centered on 25 European cities[a] versus 17 US cities *(continued)*

	European BWPB			US BWPB		
Sector/product	**Upper margin**	**Lower margin**	**EU BWPB > US BWPB[b]**	**Upper margin**	**Lower margin**	**US BWPB > EU BWPB[c]**
Light bulbs (two, 60 watts)	3.94	0.77		3.98	0.47	X
Liquid dishwashing detergent (750 ml)	3.52	1.11	X	3.04	1.59	
Soap (100 gm)	1.21	0.31	X	1.33	0.66	
Toilet tissue (two rolls)	1.98	0.44		1.49	0.44	
Aspirin (100 tablets)	22.63	2.67	X	13.07	2.85	
Facial tissues (box of 100)	2.65	0.96		1.77	0.46	
Hand lotion (125 ml)	5.04	0.57		6.86	0.95	
Lipstick (deluxe type)	34.82	15.30		34.81	16.05	
Razor blades (five pieces)	6.50	1.64	X	6.26	3.25	
Shampoo and conditioner in one (400 ml)	11.41	3.41		7.36	1.97	
Toothpaste with fluoride (120 gm)	4.33	1.87		2.99	1.27	
Kodak color film (C 135, 36 exposures)	10.72	4.69		10.66	5.43	
Compact disc album	31.79	17.02		23.08	14.41	
Color TV set (56 cm)	1,970.97	540.49		1,027.40	390.84	
Tennis balls (six)	25.60	6.93		11.55	1.39	X
Cigarettes and tobacco						
Cigarettes, local brand (pack of 20)	5.54	0.65	X	4.52	1.54	
Cigarettes, Marlboro (pack of 20)	5.54	1.30	X	4.28	1.91	
Pipe tobacco, MacBaren type (50 gm)	10.28	2.30	X	6.33	2.97	
Clothing						
Business shirt, white	118.89	44.13		96.60	33.59	
Business suit, two-piece, medium weight	755.62	463.14		959.16	1.08	
Cardigan sweater	270.66	76.72	X	220.32	115.17	
Dress, ready-to-wear, daytime	431.73	140.05		378.05	119.92	
Raincoat, Burberry type, men's	624.13	168.43		797.11	76.14	X
Raincoat, Burberry type, women's	625.43	284.29		735.37	183.79	X
Shoes, business wear	258.67	112.06		324.54	109.23	
Shoes, town	215.67	82.34		263.06	90.26	
Socks, wool mixture	21.55	6.27		20.31	5.53	
Tights, pantyhose	21.14	5.26		17.96	4.36	
Boy's dress trousers	90.50	36.39		75.89	15.65	X
Boy's jacket, smart	149.15	71.38		137.15	52.84	

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Table A.2 *(continued)*

Sector/product	European BWPB Upper margin	European BWPB Lower margin	EU BWPB > US BWPB[b]	US BWPB Upper margin	US BWPB Lower margin	US BWPB > EU BWPB[c]
Girl's dress	125.98	54.11		106.44	42.28	
Jeans	75.62	34.18		49.55	24.92	
Shoes, dress wear	95.91	36.80		78.88	30.53	
Shoes, sportswear	78.74	41.50		78.38	38.82	
Automobiles						
Compact car (1300-1799 cc)	31,181.02	12,611.04		28,357.92	12,353.14	
Deluxe car (2500 cc and higher)	179,439.63	25,600.49	X	107,108.81	50,841.05	
Family car (1800-2499 cc)	71,401.51	10,236.92	X	52,177.64	33,836.31	
Low-priced car (900-1299 cc)	19,558.71	8,742.27		16,752.85	9,355.19	
Books and newspapers						
Daily local newspaper	1.58	0.38		0.79	0.20	
International foreign daily newspaper	2.75	1.17		2.30	0.58	X
International weekly news magazine *(Time)*	4.43	2.73		3.62	2.63	
Paperback novel (at bookstore)	16.13	7.86		12.28	5.37	
Dry cleaning, haircut, and other services						
Dry cleaning, man's suit	23.50	4.77		14.88	3.80	
Dry cleaning, trousers	10.46	2.92		6.63	2.56	
Dry cleaning, woman's dress	20.68	1.52	X	10.51	6.28	
Laundry (one shirt)	5.56	2.29		3.14	0.49	X
Man's haircut (tips included)	65.55	9.43		76.07	8.79	
Woman's haircut and blow dry (tips included)	108.81	20.75		116.32	13.83	X
Cost of developing 36 color pictures	29.96	7.94		19.76	7.67	
Domestic help						
Babysitter's rate per hour	17.30	1.35	X	18.22	5.17	
Hourly rate for domestic cleaning help	22.61	1.03	X	29.24	12.84	
Maid's monthly wages (full-time, live-in)	2,367.85	213.53	X	3,124.74	753.37	
Entertainment, meal, and hotel						
Cinema, one ticket	12.64	3.63	X	9.59	5.93	
Fast food snack: hamburger and soft drink	7.81	2.67	X	5.21	2.90	

(table continues next page)

Table A.2 Broad world price band (BWPB) centered on 25 European cities[a] versus 17 US cities *(continued)*

	European BWPB			US BWPB		
Sector/product	**Upper margin**	**Lower margin**	**EU BWPB > US BWPB[b]**	**Upper margin**	**Lower margin**	**US BWPB > EU BWPB[c]**
Four best seats at cinema	61.00	12.34	X	45.64	22.36	
Four best seats at theater or concert	501.59	51.39	X	421.99	111.77	
Three-course dinner for four persons	874.33	212.81		586.70	201.30	
Visit of four persons to nightclub	360.60	8.59	X	257.94	38.49	
Two-course meal, including wine, dessert, coffee, etc., for one person	250.33	81.56		216.00	15.71	X
One drink at bar of first-class hotel (Scotch or local equivalent)	22.29	3.18	X	14.17	4.68	
One night in single room at Hilton/Intercontinental Hotel	403.25	110.32	X	341.82	150.10	
One night in single room at moderate/ comfortable hotel	244.39	68.72		288.95	50.04	X
Simple meal (water, steak, vegetables, dessert, etc.) for one person	66.79	24.68		64.04	10.66	X
Transportation						
Annual premium for car insurance	3,791.59	1,021.57		3,910.54	967.75	
Cost of tune-up (no major repairs)	495.72	108.24		409.07	4.49	X
Regular unleaded petrol (1 liter)	1.14	0.66		0.44	0.19	
Yearly road tax or vehicle registration fee	584.73	14.06	X	493.81	41.94	
Initial taxi meter charge	4.38	0.94		3.33	1.03	
Rate per additional kilometer	2.44	0.00	X	1.84	0.57	
Taxi ride from airport to city center	58.50	0.96	X	57.74	9.62	
One week car rental, low price (mileage, taxes, and charges included)	598.03	190.98		503.14	210.45	
One week car rental, moderate price (mileage, taxes, and charges included)	940.92	257.10	X	590.14	285.03	

(table continues next page)

Table A.2 *(continued)*

Sector/product	European BWPB			US BWPB		
	Upper margin	Lower margin	EU BWPB > US BWPB[b]	Upper margin	Lower margin	US BWPB > EU BWPB[c]
Housing						
Furnished apartment, 3 rooms (1 bedroom)	1,929.40	235.18		2,700.35	253.22	
Furnished apartment, 4 rooms (2 bedrooms)	2,428.46	523.63		3,395.88	239.96	X
Furnished house, 5-6 rooms (3 bedrooms)	4,693.40	560.08		5,483.24	388.19	X
Unfurnished apartment, 4 rooms (2 bedrooms)	2,462.30	343.45		2,511.59	416.74	
Unfurnished apartment, 5-6 rooms (3 bedrooms)	3,517.41	211.66		3,785.85	115.58	X
Unfurnished apartment, 7-9 rooms (4 bedrooms)	4,905.80	359.72		5,560.21	150.79	X
Unfurnished house, 5-6 rooms (3 bedrooms)	4,367.16	574.75		4,896.72	74.70	X
Unfurnished house, 7-9 rooms (3 bedrooms)	6,359.85	488.74		6,831.66	106.81	X
Utilities						
Electricity	292.56	15.48	X	395.16	66.26	
Gas	203.49	22.46		249.62	37.05	
Heating oil (100 liters)	68.66	2.87	X	39.14	16.43	
Telephone and line, monthly rental	24.43	5.89		41.34	5.80	X
Telephone, charge per local call from home	0.26	0.01	X	0.13	0.04	
Water	105.45	13.33		130.47	21.99	
Number of "X" observations			67 (42 percent)			22 (14 percent)

a. The 25 EU cities are located in the following countries: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland, and the United Kingdom. Prices were converted into US dollar figures using the market exchange rate.
b. "X" indicates that the ratio of upper margin to lower margin using the EU cities is more than 50 percent larger than the ratio using the US cities.
c. "X" indicates that the ratio of the upper margin to lower margin using the US cities is more than 50 percent larger than the ratio using the EU cities.

Source: Authors' calculations using the EIU dataset.

Table A.3 Potential static benefits at country level assuming price convergence to narrow world price band, calculated with market exchange rates

	Benefits from falling prices	Benefits from rising prices	Total benefits
High-income group, weighted total benefits	**1.05**	**1.21**	**2.27**
Australia	0.71	4.95	5.65
Austria	0.72	0.75	1.47
Belgium	0.21	0.67	0.88
Canada	0.07	3.94	4.01
China (Hong Kong)	1.17	0.35	1.52
Denmark	0.89	0.31	1.20
Finland	0.47	0.07	0.55
France	0.82	0.78	1.60
Germany	2.01	2.28	4.29
Greece	0.39	1.95	2.33
Ireland	0.13	0.61	0.74
Israel	0.57	0.50	1.08
Italy	0.30	3.49	3.79
Japan	2.79	0.05	2.83
Kuwait	0.08	3.17	3.26
Luxembourg	0.22	0.48	0.70
Netherlands	0.53	1.85	2.38
New Zealand	0.48	3.38	3.86
Norway	0.65	0.05	0.70
Portugal	0.15	7.28	7.43
Singapore	0.99	1.50	2.50
Spain	0.53	4.27	4.80
Sweden	0.60	0.03	0.63
Switzerland	1.56	0.05	1.61
Taiwan	0.25	0.32	0.56
United Arab Emirates	0.33	4.91	5.24
United Kingdom	0.37	0.17	0.54
United States	0.53	0.88	1.41
Middle-income group, weighted total benefits	**0.41**	**21.32**	**21.72**
Algeria	n.a.	n.a.	n.a.
Argentina	0.29	3.60	3.90
Bahrain	0.36	2.18	2.55
Brazil	0.08	42.20	42.28
Chile	0.11	8.21	8.32
Colombia	0.25	13.33	13.58
Costa Rica	0.13	30.47	30.60
Czech Republic	0.05	11.43	11.48
Ecuador	0.04	97.54	97.59
Egypt	0.94	10.13	11.07
Guatemala	0.59	13.64	14.23
Hungary	0.08	40.80	40.88
Iran	0.43	26.79	27.22
Jordan	1.93	11.67	13.60
Korea	0.53	1.24	1.77
Malaysia	0.14	6.62	6.76
Mexico	0.24	11.40	11.63
Panama	0.19	6.77	6.96
Paraguay	0.16	74.76	74.92

(table continues next page)

Table A.3 *(continued)*

	Benefits from falling prices	Benefits from rising prices	Total benefits
Peru	0.76	32.00	32.77
Philippines	0.07	42.19	42.25
Poland	0.07	21.43	21.51
Romania	0.66	45.19	45.85
Russia	2.11	16.61	18.73
Saudi Arabia	0.58	6.64	7.22
Serbia	0.35	13.59	13.94
South Africa	0.04	21.90	21.94
Sri Lanka	0.18	69.79	69.96
Thailand	0.22	35.88	36.10
Tunisia	0.70	25.78	26.48
Turkey	0.15	22.94	23.09
Uruguay	0.24	8.74	8.99
Venezuela	0.31	15.11	15.41
Low-income group, weighted total benefits	**3.44**	**160.85**	**164.29**
Bangladesh	0.36	29.85	30.22
Cameroon	2.12	30.44	32.56
China	5.35	19.68	25.03
India	0.63	451.44	452.08
Indonesia	0.45	534.89	535.35
Kenya	0.41	129.32	129.74
Nigeria	3.80	21.32	25.12
Pakistan	0.38	113.23	113.60
Vietnam	1.17	160.84	162.01
Zimbabwe	n.a.	n.a.	n.a.
World total, weighted by GDP	**1.11**	**12.83**	**13.93**

n.a. = not available

Note: Based on calculations at city level (appendix B). Total is weighted by country size, measured by GDP.

Source: Authors' calculations.

Appendix B
Static Benefits from Price Convergence

This appendix explains our method of computing the potential static benefits from price convergence. If all barriers to trade and investment were removed, and if perfectly competitive markets were integrated by e-commerce, together with efficient shipping and airfreight, the prices of individual goods would tend to converge among cities around the world. Using simple supply and demand analysis, therefore, we can calculate the resulting changes in consumer surplus and producer surplus. We can also calculate the net gain, which equals the difference between the positive change in consumer surplus and the negative change in producer surplus (or vice versa). The net gain represents the potential static benefit from price convergence.

To carry out the computation of static benefits, we first explain our concept of the broad world price band (BWPB). This band represents our arbitrary guess as to the range of prices that would emerge in a totally competitive environment. We then explain how we calculate the net gains from price convergence.

The Broad World Price Band for Individual Goods

The prices for individual goods are determined by many forces: the average and marginal costs of production and distribution, the strength of demand, the tax on each product, and the extent of competition. Some of these forces are city-specific or country-specific, especially the costs of

distribution (e.g., transportation costs and floor space costs) and taxes on individual products. Specific forces will persist even if all trade and investment barriers vanish and markets become perfectly competitive. Taking specific forces into consideration, eliminating all barriers between countries would not ensure the law of one price. But their elimination might bring about a broad world price band for each product. In perfectly free and competitive markets, the width of the BWPB would reflect differences in city-specific or country-specific costs and product taxes.

We choose the United States as the representative country to construct the BWPBs that we assume would prevail for individual products in an open and competitive world economy. We have several reasons for using the United States as the BWPB reference: the US market is relatively competitive; the United States is geographically large; the United States is relatively diversified in terms of city-specific circumstances; the extent of price dispersion within the United States has been constant for about 5 years[1]; and the United States has the largest number of cities included in the EIU dataset.

The BWPB is defined as the average price of product *i* in US cities plus and minus two standard deviations. This range is intended to capture the normal extent of city-specific or country-specific cost and tax differences. For the United States, a range of two standard deviations captures more than 95 percent of individual price observations.

The BWPB for each product *i*, $\overline{\overline{P}}_i$, is thus defined as follows:

$$\overline{\overline{P}}_i = \overline{P}_{i,US} \pm 2[std\ P_{i,US}] \tag{B.1}$$

where:

i = product,

$$\overline{P}_{i,US} = \frac{1}{A}\sum_{a=1}^{A} P_{i,a} \tag{B.2}$$

A = number of US cities covered in the EIU data

$$std\ P_{i,US} = \sqrt{\frac{\sum_{a=1}^{A}(P_{i,a} - \overline{P}_{i,US})^2}{(A-1)}} \tag{B.3}$$

$\overline{P}_{i,US}$ represents the simple average of the prices of product *i* in the US cities covered by EIU data, and $std\ P_{i,US}$ represents the standard deviation of the city prices. If the price of product *i* in city *n*, outside the United States, is below the lower boundary of the BWPB, we assume that an open

1. O'Connell and Wei (1997).

market will raise the local price until it reaches the lower limit of the BWPB. Conversely, if the local price is above the upper boundary of the BWPB, we assume that an open market will lower the local price until it reaches the upper limit of the BWPB.

We think the broad world price band represents a conservative guess as to the degree of price convergence in a world economy free of trade and investment restraints and integrated by world commerce. Table A.1 in appendix A shows the absolute upper and lower bound prices associated with the BWPB. The upper figure is often two to four times the lower figure—a margin large enough to accommodate known trade barriers as well as country-specific and city-specific frictions.

Price Convergence

The EIU dataset includes price data from more than 70 countries. The original price figures, which are expressed in national currency, are converted into US dollars using the market exchange rate during the collection period. Market exchange rates usually do not reflect the purchasing power of currency for well-known reasons. When the country enters the realm of completely open and competitive markets postulated in our calculations, the exchange rate, or the general price level, will likely move toward a purchasing power level. To provide an alternative assessment of price convergence gains, we also performed calculations starting with PPP exchange rates. We used purchasing power parity exchange rates provided by the Economist Intelligent Unit. These are very highly correlated with the World Bank's PPP rates. Using either market exchange rates or PPP exchange rates as the starting point, local currency prices are converted into the US dollar prices, identified as the dollar price of product *i*.

Price convergence will occur when the dollar price of product *i* falls outside the broad world price band, $\overline{\overline{P}}_i$, as described by the following equations.

$$\overline{\overline{P}}_i = \overline{P}_{i,US} \pm 2[std\, P_{i,US}] \tag{B.1}$$

$$\text{define upper limit of BWPB: } \overset{upper}{P}_i = \overline{P}_{i,US} + 2[stdP_{i,US}] \tag{B.4}$$

$$\text{define lower limit of BWPB: } \overset{lower}{P}_i = \overline{P}_{i,US} - 2[stdP_{i,US}] \tag{B.5}$$

$$\text{dollar price} = P^*_{i,n} = P_{i,n} * \left(1 / exrt_m \right)$$

where:

$exrt_m$ = market exchange rate or PPP exchange rate of country *m*

Then:

if $P^*_{i,n} > \overset{upper}{P_i}$ then

$P^*_{i,n} \downarrow$ by

$$\Delta P^*_{i,n} = P^*_{i,n} - \overset{upper}{P_i} > 0 \tag{B.6}$$

if $P^*_{i,n} < \overset{lower}{P_i}$ then

$P^*_{i,n} \uparrow$ by

$$\Delta P^*_{i,n} = \overset{lower}{P_i} - P^*_{i,n} > 0 \tag{B.7}$$

Whether the price of product i in city n goes up or down, we have specified equations (B.6) and (B.7) so that $\Delta P^*_{i,n}$ is always positive. This device simplifies the calculation process. Also, all exchange rates—both market exchange rates and PPP exchange rates—are defined as the number of local currency units per US dollar. For example, 1.73 Swiss francs per US dollar means *exrt* is 1.73. Accordingly, 1/*exrt* is 0.57.

Net Gain When the Local Price Falls

Figure B.1 illustrates simple supply and demand analysis. In this figure, the dollar price of product i in city n is originally b, which is higher than the upper limit of the BWPB shown by d. At the original price b, domestic demand equals domestic supply plus preexisting imports at quantity c. Following liberalization, the price of product i is assumed to drop to d. At that lower price, domestic supply plus preexisting imports decrease to e while domestic demand increases to f.

The gap between domestic supply and demand, shown by *(f-e)*, is equivalent to the incremental quantity of imports.[2] Accordingly, the consumer surplus in city n increases from area *abc* to area *adf*, while the producer surplus in city n decreases from area *boc* to area *doe*. Hence the net gain is the area *cef*. This triangle *cef* represents the static benefits of price convergence in city n when the upper limit of BWPB is below the dollar price. The size of the net gain triangle *cef* is calculated as follows:

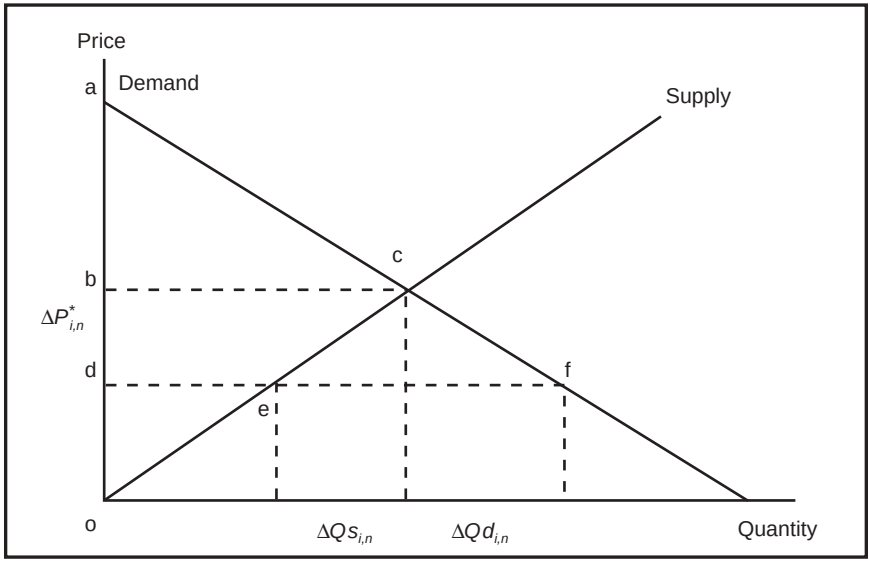
$$\text{area } cef = \tfrac{1}{2}(b - d) * (f - e) \tag{B.8}$$

$$(b - d) = \Delta P^*_{i,n} \tag{B.9}$$

$$(f - e) = \Delta Qs_{i,n} + \Delta Qd_{i,n} \tag{B.10}$$

2. In calculating static benefits, the domestic supply schedule is assumed not to change. Consequently, any change in price will lead to a change in quantity supplied along the given domestic supply curve.

Figure B.1 Potential static benefits when local prices fall



In equation (B.10), *(f – e)* equals the sum of the absolute value of the negative change in the quantity supplied, $\Delta Qs_{i,n}$, plus the positive change in quantity demanded, $\Delta Qd_{i,n}$.

We specify the demand elasticity for product *i* as Ed_i, stated as a positive value. (The demand elasticity is normally negative, but in order to measure the distance *(f – e)*, we use the absolute value of the demand elasticity.) Likewise, we specify the supply elasticity of product *i* as Es_i. (The supply elasticity is normally positive.) With these specifications, equation (B.10) may be expressed as follows.

$$(f - e) = \Delta Qs_{i,n} + \Delta Qd_{i,n} \tag{B.10}$$

$$\text{since } Es_i = \frac{\Delta Qs_{i,n}}{Q_{i,n}} * \frac{P^*_{i,n}}{\Delta P^*_{i,n}} \tag{B.11}$$

$$\Delta Qs_{i,n} = Es_i * \frac{\Delta P^*_{i,n}}{P^*_{i,n}} * Q_{i,n} \tag{B.11a}$$

$$\text{since } Ed_i = \frac{\Delta Qd_{i,n}}{Q_{i,n}} * \frac{P^*_{i,n}}{\Delta P^*_{i,n}} \tag{B.12}$$

$$\Delta Qd_{i,n} = Ed_i * \frac{\Delta P^*_{i,n}}{P^*_{i,n}} * Q_{i,n} \tag{B.12a}$$

therefore

$$(f-e) = (Es_s * \frac{\Delta P^*_{i,n}}{P^*_{i,n}} * Q_{i,n}) + (Ed_i * \frac{\Delta P^*_{i,n}}{P^*_{i,n}} * Q_{i,n}) \quad \text{(B.10a)}$$

$$= (Es_i + Ed_i) * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}} * Q_{i,n} \right) \quad \text{(B.10b)}$$

Hence, the net gain from decreasing the price of product *i* may be calculated as follows.

$$\text{area } cef = \tfrac{1}{2}(b-d) * (f-e) \quad \text{(B.8)}$$

$$= \tfrac{1}{2} \Delta P^*_{i,n} * (\Delta Qd_{i,n} + \Delta Qs_{i,n})$$

$$= \tfrac{1}{2} \Delta P^*_{i,n} * (Es_i + Ed_i) * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}} * Q_{i,n} \right)$$

$$= \frac{(Es_i + Ed_i)}{2} * (\Delta P^*_{i,n})^2 * \frac{Q_{i,n}}{P^*_{i,n}} \quad \text{(B.8a)}$$

Define $\frac{Es_i + Ed_i}{2} = ELCO$, then

$$\text{area } cef = ELCO * (\Delta P^*_{i,n})^2 * \frac{Q_{i,n}}{P^*_{i,n}} \quad \text{(B.8b)}$$

ELCO is a mneumonic expression for "elasticity coefficient." Our calculations assume that *ELCO* takes the value of $^1/_2$ for all goods. For example, when the demand elasticity is unity ($Ed_i = 1$) and supply is fixed ($Es_i = 0$), the sum of the demand and supply elasticities will be 1, and *ELCO* will be $^1/_2$. This is a conservative assumption. When both demand and supply elasticities are unity ($Ed_i = 1$ and $Es_i = 1$), their sum will be 2, and *ELCO* will be 1. An *ELCO* value of 1 would double the calculated benefits shown in our tables. When demand is very sensitive to price ($Ed_i = 3$) and supply is unit elastic ($Es_i = 1$), their sum will be 4, and *ELCO* will be 2. This would redouble the calculated benefits.

To express the net gain in money terms, multiply equation (B.8b) by $\frac{P^*_{i,n}}{P^*_{i,n}}$. This creates the expression:

$$\text{area } cef = ELCO * (\Delta P^*_{i,n})^2 * \frac{Q_{i,n}}{P^*_{i,n}} * \frac{P^*_{i,n}}{P^*_{i,n}} \quad \text{(B.8b)}$$

$$= ELCO * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}} \right)^2 * (Q_{i,n} * P^*_{i,n}) = \text{net gain in money terms} \quad \text{(B.8c)}$$

In other words, the net gain in money terms can be described as *ELCO* multiplied by the squared percentage change in the price, and then multiplied again by the expenditure on the product ($Q_{i,n} * P^*_{i,n}$).

Net gains can also be expressed relative to money GDP:

$$\text{net gain as a percent of } GDP_n \text{ in city } n = ELCO * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}}\right)^2 * \frac{(Q_{i,n} * P^*_{i,n})}{POP_n GDP_m} \quad \text{(B.13)}$$

where

$$POP_n = \frac{\text{population of city } n}{\text{population of all EIU cities in country } m}$$

$$GDP_m = \text{GDP of country } m$$

The third term in equation (B.13) equals the percentage of GDP in city n spent on product i. Note that GDP_n is the GDP of city n, not country m. Since the net gain shown by equation (B.8b) represents the static net gain at the city level, we prorate the population of all EIU cities in country m to calculate the static net gain at the national level. In other words, we assume that each EIU city in country m reflects a slice of national experience. To express net gains at the national level, we simply sum up the experience of all cities in the country:

$$\text{net gain as a percent of GDP} = \sum_{n=1}^{N} ELCO * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}}\right)^2 * \frac{(Q_{i,n} * P^*_{i,n})}{POP_n GDP_m} \quad \text{(B.13a)}$$

N = number of cities in country m covered in the EIU dataset

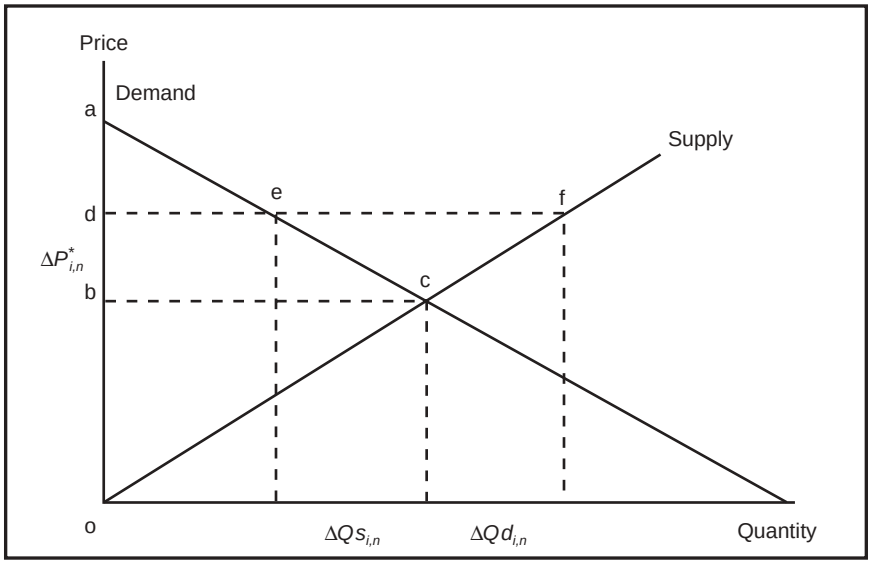
Net Gain When the Local Price Rises

What happens if the dollar price of product i starts off below the lower limit of the broad world price band and then rises with open and competitive markets? In this case, the producer surplus rises, while the consumer surplus falls. The net gain is calculated in the same manner as before.

Figure B.2 illustrates the case when the price of product i in city n, shown by b, is lower than the lower limit of the BWPB, shown by d. At the original price b, domestic supply equals domestic demand plus preexisting exports at quantity c. Following liberalization, the price of good i is assumed to rise to d. At that higher price, domestic supply increases to f while domestic demand plus preexisting exports decrease to e. The gap between domestic supply and demand, shown by $(f - e)$, is equivalent to the incremental quantity of exports. Accordingly, the consumer surplus in city n decreases from area abc to area ade; the producer surplus increases from area boc to area dof. The net gain is shown by the area ecf. The net gain is calculated as follows.

$$\text{area } ecf = \tfrac{1}{2}(d - b) * (f - e)$$
$$= \tfrac{1}{2}\Delta P^*_{i,n} * (\Delta Qd_{i,n} + \Delta Qs_{i,n}) \quad \text{(B.14)}$$

Figure B.2 Potential static benefits when local prices rise



Again, specifying demand elasticity as Ed_i (stipulating a positive number) and supply elasticity as Es_i (also positive) yields:

$$\text{area } ecf = \tfrac{1}{2}\Delta P^*_{i,n} * (Ed_i + Es_i) * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}} * Q_{i,n}\right) \tag{B.14a}$$

$$= ELCO * (\Delta P_{i,n})^2 * \frac{Q_{i,n}}{P^*_{i,n}} \tag{B.14b}$$

multiplying equation (B.14b) by $\frac{P^*_{i,n}}{P^*_{i,n}}$ yields net gains expressed in money terms:

$$\text{net gain in money terms} = ELCO * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}}\right)^2 * (Q_{i,n} * P^*_{i,n}) \tag{B.14c}$$

This net gain of city n can be expressed relative to money GDP as follows:

$$\text{net gain as a share of } GDP_n \text{ in city } n = ELCO * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}}\right)^2 * \frac{Q_{i,n} * P^*_{i,n}}{POP_n GDP_m} \tag{B.15}$$

$$POP_n = \frac{\text{population in city } n}{\text{population of all EIU cities in country } m}$$

$$GDP_m = \text{GDP of country } m$$

The net gains of all cities can be added to calculate gains at the country level.

Product Weights

We assume that the EIU dataset represents the extent of price dispersion for a much wider range of consumer goods than the enumerated items. However, we do not assume that the price data for any given item within a sector is "more representative" than the price data for any other item within that sector. In other words, we assign the same importance to the price observations for "laundry detergent" and "razor blades" within the household items sector. This boils down to the proposition that all items within a sector are given equal weighting. However, each sector is assigned a weight corresponding to its share of GDP, based on the experience of representative countries (see table 3.1). The United States is the representative for rich countries, Mexico for middle-income countries, and India for poor countries. Note that consumer goods are only a part of personal consumption. They represent about 60 to 70 percent of personal consumption, which in turn accounts for 30 to 50 percent of GDP (table 3.1).

Static Benefits from Price Convergence

We can now calculate the net gains if all trade and investment barriers vanished and if markets suddenly became as competitive as those within the United States. The calculation can be carried out country by country, region by region, or for the entire world. Following full liberalization, we assume the prices of individual products will all converge to the BWPB, at the country, regional, or world level.

We can imagine different scenarios that bring different stages of static benefits. For example, when a country opens up its markets unilaterally, price dispersion within the country might be assumed to converge to the BWPB. Internal liberalization could bring similar benefits. Imagine a country such as China or Russia, where domestic markets are segmented by an array of monopolistic and regulatory barriers. Removing these distortions would bring prices closer among cities. In other words, country benefits can result from internal liberalization as well as external liberalization.

Regional integration, such as the NAFTA or EU, can also propel convergence within the region to the BWPB. Similarly, open and competitive markets at a global level will bring worldwide convergence and global benefits.

The countrywide static benefits may be described as follows:

country net gain from opening the market in product i =

$$\sum_{n=1}^{N} ELCO * \left(\frac{\Delta P^*_{i,n}}{P^*_{i,n}} \right)^2 * \frac{Q_{j,n} * P^*_{i,n}}{POP_n GDP_m} = \Pi_{i,m} \tag{B.16}$$

$$\text{country static benefits} = \sum_{i=1}^{I} \Pi_{i,m} \tag{B.17}$$

$\Pi_{i,m}$ = static benefit of country m from price convergence of product i (as shown in equation (B.16))

Regional static benefits are the total of country benefits within the region:

$$\text{regional static benefits} = \sum_{r=1}^{R}\left[(\sum_{i=1}^{I} \Pi_{i,r}) * \frac{GDP_r}{GDP_{region}} \right] \tag{B.18}$$

where:

R = number of countries in a region

$\Pi_{i,r}$ = countrywide benefits from price convergence of product i

GDP_r = country r's GDP

GDP_{region} = total GDP of countries in region r represented in the EIU dataset

Finally, if all trade and investment barriers disappear, and prices around the world move toward the BWPB, world static benefits may be described as follows.

$$\text{world static benefits} = \sum_{m=1}^{M}\left[\sum_{i=1}^{I} \Pi_{i,m} * \frac{GDP_m}{GDP_{world}} \right] \tag{B.19}$$

where:

$\Pi_{i,m}$ = countrywide benefits from price convergence of product i

GDP_m = GDP of country m

GDP_{world} = total GDP of countries represented in the EIU dataset

Implied Imports and Exports

We can calculate the implied change in national imports and exports arising from the assumed convergence of prices. For this exercise, we only use the results based on market exchange rates. Returning to figure B.1, the implied change of imports of product i in city n is given by:

$$\begin{aligned}\Delta M_{i,n} &= (\Delta Qs_{i,n} + \Delta Qd_{i,n})(P^*_{i,n} - \Delta P^*_{i,n}) \\ &= (Es_{i,n} + Ed_{i,n})(\frac{\Delta P^*_{i,n}}{P^*_{i,n}} * Q_{i,n})(P^*_{i,n} - \Delta P^*_{i,n} \\ &= (Es_{i,n} + Ed_{i,n})(Q_{i,n})(\Delta P^*_{i,n} - \frac{(\Delta P^*_{i,n})^2}{P^*_{i,n}})\end{aligned} \tag{B.20}$$

where

$$\text{dollar price} = P^*_{i,n} = p^*_{i,n}\,[1 / exrt_m]$$

Recall that *exrt* is the market exchange rate. The net gain from decreasing the price of product *i*, based on equation (B.8a), can be stated as:

$$\text{net gain from decreasing price} = \frac{(Es_i + Ed_i)}{2} * Q_{i,n} * \frac{(\Delta P^*_{i,n})^2}{P^*_{i,n}} \tag{B.21}$$

Hence, the implied change in imports can be expressed as a function of the net gain, as follows:

$$\text{implied changes in imports} = 2 * net\ gain * (\frac{P^*_{i,n}}{\Delta P^*_{i,n}} - 1) \tag{B.22}$$

By similar reasoning, the implied increase in exports can be expressed as a function of the net gain, as follows:

$$\text{implied changes in exports} = 2 * net\ gain * (\frac{P^*_{i,n}}{\Delta P^*_{i,n}} + 1) \tag{B.23}$$

For convenience, quantity units are all redefined so that the initial price of each item ($P^*_{i,n}$) is \$1. Accordingly, $\Delta P^*_{i,n}$ equals the average percentage above the BWPB (for potential import items) or the average percentage below the BWPB (for potential export items).

As the results in table B.1 indicate, for most countries the calculated increment in exports does not equal the calculated increment in imports. This reflects the limitations of partial equilibrium analysis: unlike general equilibrium analysis, no condition is built in that forces import changes to match export changes.

Table B.1 Implied increase in trade using market exchange rates
(percent of GDP)

	Increase in imports	Increase in exports	Trade expansion (imports + exports)
High-income group, weighted total	**3.25**	**1.07**	**4.32**
Australia	3.36	5.54	8.90
Austria	3.21	0.12	3.33
Belgium	0.68	0.27	0.96
Canada	0.20	2.32	2.52
China (Hong Kong)	4.07	0.00	4.07
Denmark	3.67	0.26	3.93
Finland	2.25	0.01	2.26
France	3.25	1.10	4.35
Germany	7.83	2.56	10.38
Greece	2.27	1.23	3.50
Ireland	0.45	0.16	0.62
Israel	1.86	0.14	2.00
Italy	1.21	5.32	6.53
Japan	7.10	0.04	7.14
Kuwait	0.22	1.47	1.69
Luxembourg	0.80	0.43	1.23
Netherlands	1.90	2.13	4.04
New Zealand	1.90	4.09	6.00
Norway	2.38	0.00	2.38
Portugal	0.59	4.28	4.87
Singapore	4.03	2.33	6.36
Spain	2.19	6.43	8.62
Sweden	1.98	0.00	1.98
Switzerland	4.72	0.04	4.76
Taiwan	1.18	1.09	2.27
United Arab Emirates	1.06	2.23	3.29
United Kingdom	1.37	0.11	1.48
United States	1.44	0.12	1.56
Middle-income group, weighted total	**1.04**	**19.32**	**20.37**
Algeria	n.a.	n.a.	n.a.
Argentina	1.04	5.19	6.23
Bahrain	1.53	1.25	2.79
Brazil	0.24	47.40	47.65
Chile	0.34	6.63	6.97
Colombia	1.01	9.20	10.21
Costa Rica	0.27	19.67	19.95
Czech Republic	0.20	17.20	17.40
Ecuador	0.15	141.52	141.67
Egypt	3.64	8.85	12.49
Guatemala	0.55	11.30	11.85
Hungary	0.27	34.50	34.78
Iran	0.98	20.91	21.90
Jordan	3.12	12.04	15.16
Korea	1.70	0.57	2.27
Malaysia	0.56	6.04	6.61
Mexico	0.94	7.17	8.11
Panama	0.62	8.88	9.51
Paraguay	0.21	138.55	138.76
Peru	0.25	6.54	6.80

(table continues next page)

Table B.1 *(continued)*

	Increase in imports	Increase in exports	Trade expansion (imports + exports)
Philippines	0.16	17.71	17.87
Poland	0.18	15.77	15.95
Romania	0.43	9.33	9.77
Russia	3.45	21.55	25.00
Saudi Arabia	2.44	5.58	8.03
Serbia	n.a.	n.a.	n.a.
South Africa	0.05	13.33	13.39
Sri Lanka	0.32	33.10	33.42
Thailand	0.82	13.10	13.92
Tunisia	1.33	19.32	20.65
Turkey	0.89	22.48	23.37
Uruguay	0.92	9.05	9.97
Venezuela	1.38	2.71	4.09
Low-income group, weighted total	**8.54**	**65.04**	**73.58**
Bangladesh	2.21	37.48	39.69
Cameroon	2.57	10.59	13.16
China	13.54	6.68	20.22
India[a]	1.38	219.05	220.43
Indonesia	1.65	15.82	17.47
Kenya	1.17	27.93	29.10
Nigeria	4.93	15.10	20.03
Pakistan	0.80	144.72	145.52
Vietnam	3.19	69.51	72.70
Zimbabwe	n.a.	n.a.	n.a.
World total, weighted by GDP	**3.26**	**7.04**	**10.30**

n.a. = not available

a. Excludes fresh and frozen meat.

Note: Based on calculations at city level (appendix B).

Source: Authors' calculations.

Appendix C
The Exchange Rate Wedge and the Exchange Rate System

It is often said that the exchange rate system is an important source of exchange rate distortion. In our particular context—comparing market exchange rates and PPP exchange rates—the exchange rate system could make a difference in the "wedge" between the market exchange rate and the purchasing power value of the currency. For example, one might guess that a flexible exchange rate system would make it easier for the market rate of a currency to approach its PPP rate. We use simple regression analysis to examine whether the exchange rate system is an important source of variation between market rates and PPP rates.

We measure the wedge by the difference between the market exchange rate and the PPP rate, divided by the PPP rate. We use both EIU PPP rates and World Bank PPP rates for the analysis. If a country's currency is undervalued at the market exchange rates, the wedge is positive. If a country's currency is overvalued at the market exchange rates, the wedge is negative.

In this exercise, exchange rate regimes are categorized into four different types, following the IMF classification scheme: fixed, limited floating, managed floating, and independently floating. Table 3.3 lists each country's exchange rate system. The regression analysis covers the 68 countries covered in the EIU data. Among the 68 countries, 19 countries have independently floating exchange rate systems (the most flexible exchange rate system); 20 countries have managed floating exchange rate systems (including crawling pegs, exchange rates within crawling bands, and managed floats with no preannounced path); 8 countries have limited

Table C.1 Exchange rate wedges and exchange rate systems

Dependent variable: Log of (market exchange rates / EIU PPP rates) **/ EIU PPP rates**
Number of observations = 65
R-squared = 0.48

	Coefficient
Log of per capita GDP in US dollars	–0.32**
Log of trade value as a share of GDP	0.01
Independently floating system dummy[a]	0.14*
Managed floating system dummy[b]	–0.15
Fixed system dummy[c]	0.09
Constant	3.16**

Dependent variable: Log of (market exchange rates / World Bank PPP rates) **/ World Bank PPP rates**
Number of observations = 61
R-squared = 0.89

	Coefficient
Log of per capita GDP in US dollars	–0.35**
Log of trade value as a share of GDP	0.04*
Independently floating system dummy[a]	0.19**
Managed floating system dummy[b]	0.09
Fixed system dummy[c]	0.06
Constant	2.85**

EIU = Economist Intelligence Unit.
PPP = purchasing power parity
** Significant at 95 percent level of confidence.
* Significant at 90 percent level of confidence.

a. Dummy is 1 if country adopts independently floating exchange rate system, and 0 otherwise.
b. Dummy is 1 if country adopts a managed floating system (such as a crawling peg system), and 0 otherwise.
c. Dummy is 1 if country adopts a fixed exchange rate system, and 0 otherwise.

Source: Authors' calculations.

flexibility exchange rate systems (pegged exchange rates within bands that do not change or crawl over time); and 21 countries have fixed exchange rate systems (including dollarization, currency boards, and conventional fixed pegs). As additional explanatory variables to explain the wedge, besides the exchange rate system, we use per capita income and the trade-to-GDP ratio.

Table C.1 shows the regression coefficients. The exchange rate wedge is mostly explained by the level of income, measured by per capita GDP. This is a familiar result. The trade ratio makes no difference. Turning to exchange rate systems, we found no evidence that a flexible exchange rate regime leads to a smaller wedge between market rates and PPP rates. Instead, we found that the exchange rate wedge is significantly wider for a country that adopts an independently floating exchange rate system, the most flexible exchange rate system. Apart from this result, none of the exchange rate systems has a significant impact on the wedge. We conclude

that an array of explicit and implicit trade and investment barriers on tradable products, coupled with a large nontradable sector, are far more important in determining the size of the wedge between market exchange rates and PPP rates than the exchange rate system.

Appendix D
An Alternative Calculation of the Benefits of Price Convergence in Both Tradable and Service Sectors

In the main text, we focused on international price convergence in tradable sectors in calculating potential benefits. These calculations excluded service items. However, the sharp distinction often made between tradable sectors and service sectors is becoming more an artifact of old classification schemes, and less a reflection of economic substance. Even when trade in service items is limited or nonexistent, foreign direct investment can lead to technology transfer that brings about convergence in the prices of some service items. But this will not happen in all service sectors. For example, housing prices in Tokyo are not going to be as low as in Los Angeles, although Japan may have better construction technology, because land scarcity is critical in Tokyo.

In this alternative calculation, we assess the potential benefits of price convergence in both tradable items and some service items. We excluded domestic help, entertainment, and housing because these sectors are exceedingly resistant to the forces of economic integration.

Tables D.1 and D.2 demonstrate the potential benefits from price convergence in all the covered sectors. The potential static benefits starting with market exchange rates (covering both tradable and service items) are 3.4 percent of GDP or $1 trillion per year (table D.1). These benefits are somewhat larger than the benefits calculated with tradable sectors alone (table 1.1). The additional gains are distributed among high-, middle-, and low-income countries. For high-income countries, the benefits for both tradable and service items are 1.1 percent of GDP whereas the benefits including only tradable items are 0.6 percent of GDP, starting with market

exchange rates. The potential static benefits for middle-income countries including tradable and service items are 7.5 percent, while the benefits including only tradable items are 3.8 percent. For low-income countries, the benefits including tradable and service items are 26.9 percent, while the benefits including only tradable items are 19.4 percent of GDP.

The potential static benefits calculated using PPP exchange rates including tradable and service items are 7.9 percent of GDP or $3.1 trillion per year, while the benefits calculating included only tradable items are 6.3 percent of GDP or $2.4 trillion. Additional gains from including service items are distributed among high-, middle-, and low-income countries more evenly when the benefits are calculated using PPP exchange rates. For high-income countries, the benefits including tradable and service items are 0.8 percent of GDP, while the benefits including only tradable items are 0.4 percent. For middle-income countries, the benefits including tradable and service items are 3.6 percent of GDP, while the benefits including only tradable items are 2.1 percent. For low-income countries, the benefits including tradable and service items are 31.0 percent of GDP, while the benefits including only tradable items are 26.1 percent.

Table D.1 Potential benefits at country level, calculated with market exchange rates (percent of GDP, all sectors except domestic help, entertainment, and housing)

	Benefits from falling prices	Benefits from rising prices	Total benefits	GDP (in US$ billions)
High-income group, weighted total benefits	**0.90**	**0.20**	**1.10**	**23,076.1**
Australia	0.46	0.83	1.30	364.7
Austria	0.73	0.02	0.75	211.9
Belgium	0.26	0.02	0.28	249.7
Canada	0.09	0.20	0.29	603.8
China (Hong Kong)	1.06	0.00	1.06	166.0
Denmark	1.00	0.02	1.02	174.1
Finland	0.63	4.92	5.55	126.5
France	0.89	0.10	0.99	1,451.8
Germany	1.49	0.22	1.71	2,361.8
Greece	0.26	1.59	1.84	120.7
Ireland	0.16	0.02	0.18	68.8
Israel	0.49	0.01	0.50	89.0
Italy	0.53	0.75	1.28	1,171.9
Japan	2.80	0.00	2.80	3,798.2
Kuwait	0.07	3.61	3.68	30.2
Luxembourg	0.14	0.04	0.18	17.4
Netherlands	0.38	0.26	0.64	378.4
New Zealand	0.28	0.50	0.78	52.7
Norway	0.77	0.00	0.77	145.9
Portugal	0.19	1.32	1.51	99.4
Singapore	1.02	1.15	2.16	84.4
Spain	0.39	0.99	1.38	553.2
Sweden	0.65	0.00	0.65	226.5
Switzerland	1.68	0.00	1.68	264.5
Taiwan	0.34	0.16	0.50	321.9
United Arab Emirates	0.22	4.93	5.16	44.6
United Kingdom	0.38	0.02	0.39	1,387.4
United States	0.21	0.07	0.28	8,510.7
Middle-income group, weighted total benefits	**0.44**	**7.08**	**7.52**	**3,663.2**
Algeria	n.a.	n.a.	n.a.	33.4
Argentina	0.36	0.75	1.12	298.3
Bahrain	0.18	1.55	1.73	6.1
Brazil	0.76	9.70	10.46	776.4
Chile	0.23	0.90	1.13	72.9
Colombia	0.10	4.49	4.59	62.8
Costa Rica	0.05	5.77	5.82	8.8
Czech Republic	0.07	4.25	4.32	55.0
Ecuador	0.02	43.47	43.49	14.5
Egypt	0.56	1.85	2.41	82.7
Guatemala	0.34	1.69	2.03	19.0
Hungary	0.31	8.49	8.80	31.9
Iran	0.29	55.92	56.21	160.2
Jordan	1.36	6.90	8.26	7.1
Korea	0.42	0.29	0.71	320.7
Malaysia	0.09	4.43	4.52	70.2
Mexico	0.36	3.80	4.16	415.0
Panama	0.11	1.71	1.82	9.2
Paraguay	0.06	37.47	37.53	8.4

(table continues next page)

Table D.1 Potential benefits at country level calculated with market exchange rates (percent of GDP, all sectors except domestic help, entertainment, and housing) *(continued)*

	Benefits from falling prices	Benefits from rising prices	Total benefits	GDP (in US$ billions)
Peru	0.33	1.33	1.66	62.7
Poland	0.17	4.39	4.56	128.0
Philippines	0.03	4.33	4.36	65.1
Romania	0.38	11.08	11.46	38.2
Russia	0.87	4.48	5.35	276.7
Saudi Arabia	0.57	3.54	4.11	128.9
Serbia	0.13	69.06	69.19	21.2
South Africa	0.02	2.25	2.27	116.7
Sri Lanka	0.08	10.42	10.50	15.7
Thailand	0.11	6.86	6.97	111.3
Tunisia	0.34	6.13	6.48	20.0
Turkey	0.10	4.53	4.63	110.2
Uruguay	0.32	1.53	1.85	20.8
Venezuela	0.36	0.96	1.32	95.0
Low-income group, weighted total benefits	**2.01**	**24.87**	**26.88**	**1,665.2**
Bangladesh	0.25	12.26	12.51	32.9
Cameroon	1.55	3.98	5.53	8.5
China	3.08	1.20	4.27	918.9
India[a]	0.36	80.79	81.15	379.0
Indonesia	0.25	13.50	13.75	98.8
Kenya	0.23	6.41	6.63	9.2
Nigeria	3.05	49.18	52.23	56.5
Pakistan	0.22	45.85	46.08	61.3
Vietnam	0.48	22.09	22.57	96.2
Zimbabwe	n.a.	n.a.	n.a.	n.a.
World total, weighted by GDP	**0.90**	**2.48**	**3.38**	**28,404.5**

n.a. = not available

a. Excludes fresh and frozen meat.

Notes: Based on calculations at city level (appendix B). Group totals are weighted by country GDP size.

Source: Authors' calculations.

Table D.2 Potential benefits at country level, calculated with EIU PPP rates (percent of GDP, all sectors except domestic help, entertainment, and housing)

	Benefits from falling prices	Benefits from rising prices	Total benefits	GDP (in US$ billions)
High-income group, weighted total benefits	**0.61**	**0.22**	**0.82**	**22,369.1**
Australia	1.01	0.37	1.39	410.3
Austria	0.58	0.05	0.63	196.4
Belgium	0.28	0.02	0.29	252.4
Canada	0.39	0.01	0.41	795.2
China (Hong Kong)	1.37	0.00	1.37	182.3
Denmark	0.49	0.08	0.56	143.9
Finland	0.47	6.12	6.59	116.4
France	0.68	0.17	0.85	1,365.8
Germany	0.94	0.55	1.48	2,128.8
Greece	0.49	1.06	1.55	135.2
Ireland	0.21	0.01	0.22	72.9
Israel	0.92	0.00	0.92	103.5
Italy	0.74	0.49	1.23	1,288.4
Japan	1.33	0.11	1.45	2,909.5
Kuwait	1.02	0.52	1.54	53.2
Luxembourg	0.11	0.05	0.16	16.7
Netherlands	0.34	0.28	0.62	371.9
New Zealand	1.09	0.06	1.15	71.6
Norway	0.36	0.00	0.36	121.0
Portugal	1.04	0.23	1.28	146.6
Singapore	0.76	2.02	2.77	72.6
Spain	0.91	0.41	1.32	665.6
Sweden	0.34	0.00	0.34	195.3
Switzerland	0.46	0.19	0.65	192.2
Taiwan	1.82	0.00	1.82	533.9
United Arab Emirates	0.22	4.93	5.16	44.6
United Kingdom	0.25	0.03	0.28	1,272.2
United States	0.21	0.07	0.28	8,510.7
Middle-income group, weighted total benefits	**3.05**	**0.52**	**3.57**	**7,635.8**
Algeria	5.24	1.64	6.88	70.2
Argentina	1.06	0.17	1.23	399.7
Bahrain	1.33	0.03	1.36	9.9
Brazil	4.76	0.32	5.08	1,729.1
Chile	4.23	0.00	4.23	207.3
Colombia	3.40	0.02	3.42	168.4
Costa Rica	1.98	0.09	2.08	20.8
Czech Republic	1.23	0.13	1.36	112.5
Ecuador	3.24	0.23	3.47	64.0
Egypt	3.83	0.00	3.83	193.2
Guatemala	3.73	0.00	3.73	48.2
Hungary	1.21	0.91	2.11	54.6
Iran	2.79	4.28	7.07	464.3
Jordan	4.73	0.36	5.10	15.5
Korea	2.43	0.00	2.43	596.8
Malaysia	2.72	0.04	2.76	217.7
Mexico	2.74	0.38	3.12	806.3
Panama	2.44	0.00	2.44	22.7
Paraguay	1.49	5.04	6.53	18.3

(table continues next page)

Table D.2 Potential benefits at country level, calculated with EIU PPP rates (percent of GDP, all sectors except domestic help, entertainment, and housing) *(continued)*

	Benefits from falling prices	Benefits from rising prices	Total benefits	GDP (in US$ billions)
Peru	3.31	0.00	3.31	141.5
Philippines	3.15	0.00	3.15	235.7
Poland	1.51	0.19	1.70	229.8
Romania	2.57	0.83	3.39	90.8
Russia	2.25	1.16	3.41	392.6
Saudi Arabia	2.32	0.10	2.43	199.7
Serbia	n.a.	n.a.	n.a.	n.a.
South Africa	1.25	0.00	1.25	288.5
Sri Lanka	3.18	0.01	3.19	51.2
Thailand	4.01	0.02	4.03	359.2
Tunisia	3.51	0.16	3.67	51.1
Turkey	0.98	0.55	1.52	183.1
Uruguay	0.70	0.41	1.11	27.4
Venezuela	1.69	0.07	1.76	166.4
Low-income group, weighted total benefits	**29.34**	**1.62**	**30.96**	**8,212.8**
Bangladesh	2.85	0.01	2.85	114.5
Cameroon	9.19	0.00	9.19	28.9
China	42.30	0.00	42.30	5,044.6
India[a]	6.09	7.83	13.92	1,633.6
Indonesia	7.66	0.02	7.68	460.1
Kenya	4.89	0.00	4.89	29.2
Nigeria	8.66	3.09	11.75	139.9
Pakistan	4.06	0.26	4.32	228.9
Vietnam	22.00	0.00	22.00	511.7
Zimbabwe	4.08	0.36	4.44	21.5
World total, weighted by GDP	**7.27**	**0.58**	**7.85**	**38,217.6**

EIU = Economist Intelligence Unit
PPP = purchasing power parity

a. Excludes fresh and frozen meat.

Notes: Based on calculations at city level (appendix B). Totals are weighted by country GDP size.

Source: Authors' calculations.

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