APPENDIX A

History of The ICP

Economic statisticians have long recognized that using exchange rates to compare the levels of economic activity between economies can lead to quite misleading results. Several projects were initiated in the 1950s and 1960s to examine the alternatives to exchange rates for making such comparisons. In the early 1950s, the Organisation for European Economic Co-operation (OEEC) produced purchasing power parities (PPPs) for France, the Federal Republic of Germany, Italy, the United Kingdom, and the United States. In the early 1960s, PPP comparisons were carried out in Latin America. Around the mid-1960s, the Conference of European Statisticians set up a project to make PPP-based comparisons between some market economies and some centrally planned economies. Comparisons were also made in the second half of the 1960s between several Eastern European economies by the Council for Mutual Economic Assistance (COMECON). Economic statisticians from Hungary and Poland were heavily involved in this work. A key initiative was to extend the concept of consumption expenditure for the ICP to include individual consumption expenditure by government along with private final consumption expenditure to form an aggregate of total individual consumption called "consumption expenditure of the population (CEP)." The aim of measuring CEP was to minimize the effect on the volume comparisons of differences in institutional arrangements, particularly regarding the extent to which the government and private sectors provided health and education services in different economies. In this respect, the ICP was more than two decades ahead of the *System of National Accounts, 1993 (SNA93)*, which set out the concept of "actual final consumption expenditure" (defined almost identically to CEP) as an official national accounts measure.

In 1965, the United Nations Statistical Commission (UNSC) discussed in some detail the problems inherent in exchange rate comparisons and agreed that the United Nations Statistical Office (UNSO) should develop a more suitable methodology for making international comparisons of activity levels. In 1968, the UNSC considered a report that outlined a project (to be run from 1968 to 1971) aimed at developing PPP-based comparisons for a small group of economies. It agreed that a project should go ahead to develop, test, and document techniques that would lead to more robust international comparisons. The UNSO had only limited resources available; therefore, the UNSC requested that other international organizations and UN member economies assist in this project. At this stage, the proposal endorsed by the UNSC was to cover GDP measured from both the expenditure and production (or output) sides of the national accounts. The work in Phase I concentrated on the expenditure side of the accounts because it was less difficult to implement in practice, given

that a single set of expenditures was involved, rather than both outputs and inputs, which gave rise to the added complexity of double deflation.

Later in 1968, the UN International Comparison Project (ICP) was developed as a joint undertaking between the UNSO and the University of Pennsylvania, which established a special unit funded by a grant from the Ford Foundation. The World Bank became involved, providing financial assistance directly and also through a grant from the Scandinavian economies, which was channeled through the World Bank. The United States Agency for International Development and the United States Social Science Research Council assisted with monetary contributions. The United Kingdom offered in-kind statistical support for participating economies. The director of the UNSO was responsible for supervising the project. An advisory board, which had been set up to provide technical advice, considered detailed proposals for the project at a meeting held in October 1969.

Phase I of the ICP was run in two stages. The first was a pilot project based on data collected for 1967 for six economies (Hungary, India, Japan, Kenya, the United Kingdom, and the United States). The second stage was benchmarked to 1970. Another four economies (Colombia, France, the Federal Republic of Germany, and Italy), which had not been able to report the necessary data for 1967, were included in this stage. The output consisted of a number of different sets of estimates, including multilateral comparisons between all 10 economies for GDP and a range of its components for 1970. The results of Phase I were released in *A System of International Comparisons of Gross Product and Purchasing Power* (Kravis and others 1975). Details presented in this publication include the overall results of the multilateral comparison for 1970, a variety of bilateral comparisons for both 1967 and 1970, and the outcomes from various experiments on important issues (such as rents, motor vehicle prices, and the consistency of some different quantity comparisons).

Phase II involved a further six economies, initially for a broader comparison for 1970, but with the main aim being to update the PPPs and associated statistics to 1973. The six extra economies included in Phase II of the ICP were Belgium, Iran, Korea, Malaysia, the Netherlands, and the Philippines. Detailed results for the 16 economies were published in 1978 in *International Comparisons of Real Product and Purchasing Power* (Kravis, Heston, and Summers 1978).

For Phase III, ICP product lists were modified in consultation with a number of economies, including India and the COMECON group, to make the ICP product specifications more generally applicable (for example, by removing characteristics such as brand names that were specific to the United States). The greater diversity of economies in Phase III meant that the range of products to be priced had to be expanded further so that all participating economies could price a sufficient number of products that were representative of their expenditures. At this time, the project leaders considered the pros and cons of continuing with a single global comparison or moving to regional comparisons that would be linked to produce worldwide results. The trade-off involved was that regionalizing the project should lead to improved comparisons between economies within a region, but at the expense of the comparisons between economies in different regions because of the difficulties inherent in linking results between regions. In the event, Phase III went ahead as a single global comparison, although some regional results were presented, having been calculated for the relevant economies from the globally based results. Details were released in 1982 in *World Product and Income: International Comparisons of Real Gross Product* (Kravis, Heston, and Summers 1982).

There was a large increase—from 30 to 60—in the number of economies participating in Phase IV of the ICP, benchmarked to 1980. Some major changes also occurred in this round. The University of Pennsylvania ended its involvement in the benchmark comparisons and handed over responsibility to the UNSO. Another significant change was the regionalization of the ICP for the first time. The large number of economies involved from all around the world was partly behind the regionalization. Another important factor was the decision by the OECD to set up a PPP program for its member economies in conjunction with the PPP program being run by Eurostat for economies in what is now the European Union. Apart from the Eurostat-OECD "region," the other regions involved in Phase IV were Africa, Asia and the Pacific (Asia-Pacific), and Latin America. Regions were linked using a "core country" (sometimes called a "bridge country") approach, in

which selected economies priced some product specifications from another region to provide a relationship, or link, between their region and the other region.

Phase V of the ICP saw only a small increase in the number of economies participating (from 60 to 64), with a number of new economies replacing some that had been in Phase IV, but had dropped out of Phase V. Once again, a regional approach was adopted. The regions included were Africa, Asia-Pacific, the Caribbean, and Eurostat-OECD. In addition, three Eastern European economies were added to Western Europe, using Austria as a link country. The core country approach was used again to link regions, but some of the links were problematic because of difficulties encountered by several core countries in collecting a sufficiently broad range of prices for products from the "other" region.

Phase VI of the ICP, benchmarked to 1993, was an ambitious project aimed at producing PPP-based comparisons for 118 economies around the world. However, it was beset by difficulties from the outset. Lack of funding was the major problem, although the lack of overall project coordination also led to some major deficiencies in the final outcome. Although the 1993 ICP round produced some reasonable results, it proved virtually impossible to link the regions with each other or with the results from the Eurostat-OECD PPP program, which was also benchmarked to 1993. A major review of the ICP was commissioned as a result of the failure of this round. This led to the introduction of major changes in the 2005 ICP regarding funding, governance, and linking of regional results.

Relationship of the ICP with the Eurostat-OECD PPP program

Eurostat started a PPP program for a handful of European Economic Community (EEC) economies in the late 1960s, and (as noted above) three of these economies (France, the Federal Republic of Germany, and Italy) also provided data for Phase I of the ICP. In the early 1980s, the OECD joined with Eurostat in running an expanded PPP program. The aim was to cover all the OECD economies (at that time, all the economies in what is now the European Union were also OECD member economies). In effect, the expansion was aimed at incorporating Australia, Canada, Japan, New Zealand, and the United States into the PPP program, an outcome that was achieved for the 1985 round. At that time, the Eurostat-OECD PPP program was being run every five years. However, after the 1990 round, a decision was made to shorten the gap between rounds to three years. Twenty-four economies participated directly in the 1993 Eurostat-OECD round. A number of Eastern European economies, Russia, and the CIS member economies also participated in a special round whose results were linked into the Eurostat-OECD results, using Austria as a link country.

The Eurostat-OECD PPP program continued to include a number of non-OECD and non-EU member economies for each of the 1996, 1999, and 2002 rounds. The numbers of economies participating in each of those rounds were 32, 43, and 42, respectively.

APPENDIX B

Governance of the ICP 2005

A review of the 1993 ICP concluded that one of its major shortcomings was the lack of formal governance. In particular, there was insufficient coordination between regions, which meant that the processes were not standardized and the results inconsistent. At the outset of the 2005 ICP, the World Bank implemented a governance structure to ensure that consistent results would be produced in each region by coordinating the work globally, establishing a single set of standards, providing centralized technical and practical guidance, and ruling on issues that had the potential to be interpreted in different ways in the regions. Several tiers of governance were necessary, ranging from worldwide coordinating groups to regional bodies. However, the basic level of governance comprised the national coordinators in each economy to ensure that the relevant agencies in their economy approached the ICP with a consistent aim as to what was required and how to achieve it.

The **Executive Board** was established to provide strategic leadership and make decisions about priorities, standards, the overall work program, and the budget. It also had a key role in providing oversight of the activities of the ICP global office. The Board members are eminent economists/statisticians and experienced statistical managers. Many are heads of national statistical offices or of the statistics departments in international organizations, while others are managers of economic statistics divisions, having skills and experience in national accounts or price statistics.

The **Global Office** was established in 2002 within the World Bank in Washington, DC, to carry out the day-to-day work required to implement the ICP worldwide. The **Global Manager** was responsible for its operations, supported by a team of professional statisticians and administrative staff. The global office reported regularly to the Executive Board, with annual work programs and budgets requiring the approval of the Board. Important activities carried out by the global office and its external consultants were the development of ICP standards, the preparation of the framework to determine the goods and services to be priced, preparing the *ICP 2003–2006 Handbook* and the *ICP Operational Manual*, producing the software for countries to edit and input prices data (the "ToolPack" system), analyzing data collected for the ICP, and aggregating the prices and national accounts data within and between regions. Since its inception, the global office has been subject to the World Bank's administrative and fiduciary rules and regulations. On day-to-day activities, the global office reported to the director of the World Bank's Development Data Group. It also regularly prepared reports for the Executive Board and the UNSC.

The **Technical Advisory Group (TAG)** was responsible for providing advice on technical issues related to the ICP. The TAG's responsibilities were to resolve conceptual and methodological matters. The TAG members, appointed by the Executive Board, were all internationally known experts

in the fields of prices or national accounts. To overcome shortcomings of previous rounds, several major methodological improvements were implemented, with the TAG providing technical advice.

Regional offices coordinated ICP work in each of the five geographic regions (Africa, Asia-Pacific, Commonwealth of Independent States, Latin America, and Western Asia) through the African Development Bank (AfDB); the Asian Development Bank (ADB); the Statistical Office of the Commonwealth of Independent States (CISSTAT), in partnership with the State Statistical Service of the Russian Federation (Rosstat) and the Bureau of Economic Analysis (Moscow); Statistics Canada, in cooperation with the Economic Commission for Latin America and the Caribbean (ECLAC); and the Economic and Social Commission for Western Asia (ESCWA). In addition, the economies included in the regular PPP program run by OECD and Eurostat were treated as though they were in an autonomous region for the purposes of incorporating their estimates into the worldwide estimates.

In most economies, different agencies were involved in providing the national accounts and prices data for the ICP. In such cases, one agency was nominated as the **national coordinating office,** and within that agency a **national ICP coordinator** was appointed. The main roles of the national coordinator were to ensure that the economy's ICP data (national accounts, prices, and wages) were correctly estimated, that statistical and field staff (involved in collecting prices) were trained in the concepts underlying the ICP and the practical implications for collecting prices, that data were edited and entered into the ICP database, and that editing queries from the regional coordinator were handled promptly. The national coordinators also attended the data validation workshops that were held in each of the regions to check the consistency of the data supplied within each region.

There was close liaison between the World Bank, Eurostat, and OECD during both the planning and operational phases of the 2005 ICP. The aim was to incorporate the Eurostat-OECD results directly into the ICP by treating the Eurostat-OECD program as a sixth "region" in the world for ICP purposes. The techniques used by Eurostat and OECD differ in some respects from those used in the other regions because the Eurostat-OECD program has developed particular methods over the years that could not always be replicated in other regions. However, the close relationships between the coordinating organizations have meant that the results could be satisfactorily integrated with each other despite the different procedures used.

APPENDIX C

The ICP Classification of Expenditure on GDP

Code[a]	Description
100000	**GROSS DOMESTIC PRODUCT**
110000	**FINAL CONSUMPTION EXPENDITURE BY HOUSEHOLDS**
110100	**FOOD AND NONALCOHOLIC BEVERAGES**
110110	**Food**
110111	***Bread and cereals***
110111.1	Rice
110111.2	Other cereals, flour, and other cereal products
110111.3	Bread
110111.4	Other bakery products
110111.5	Pasta products
110112	***Meat***
110112.1	Beef and veal
110112.2	Pork
110112.3	Lamb, mutton, and goat
110112.4	Poultry
110112.5	Other meats and meat preparations
110113	***Fish***
110113.1	Fresh, chilled, or frozen fish and seafood
110113.2	Preserved or processed fish and seafood
110114	***Milk, cheese, and eggs***
110114.1	Fresh milk
110114.2	Preserved milk and other milk products
110114.3	Cheese
110114.4	Eggs and egg-based products
110115	***Oils and fats***
110115.1	Butter and margarine
110115.3	Other edible oils and fats
110116	***Fruit***
110116.1	Fresh or chilled fruit
110116.2	Frozen, preserved, or processed fruit and fruit-based products
110117	***Vegetables***
110117.1	Fresh or chilled vegetables other than potatoes
110117.2	Fresh or chilled potatoes
110117.3	Frozen, preserved, or processed vegetables and vegetable-based products
110118	***Sugar, jam, honey, chocolate, and confectionery***
110118.1	Sugar
110118.2	Jams, marmalades, and honey
110118.3	Confectionery, chocolate, and ice cream
110119	***Food products n.e.c.***
110119.1	Food products n.e.c.
110120	***Nonalcoholic beverages***
110121	***Coffee, tea, and cocoa***
110121.1	Coffee, tea, and cocoa
110122	Mineral waters, soft drinks, and fruit and vegetable juices
110122.1	Mineral waters, soft drinks, and fruit and vegetable juices

Code[a]	Description
110200	**ALCOHOLIC BEVERAGES, TOBACCO, AND NARCOTICS**
110210	***Alcoholic beverages***
110211	***Spirits***
110211.1	Spirits
110212	***Wine***
110212.1	Wine
110213	***Beer***
110213.1	Beer
110220	***Tobacco***
110221	***Tobacco***
110221.1	Tobacco
110230	***Narcotics***
110231	***Narcotics***
110231.1	Narcotics
110300	**CLOTHING AND FOOTWEAR**
110310	***Clothing***
110311	***Clothing materials, other articles of clothing, and clothing accessories***
110311.1	Clothing materials, other articles of clothing, and clothing accessories
110312	***Garments***
110312.1	Garments
110314	***Cleaning, repair, and hire of clothing***
110314.1	Cleaning, repair, and hire of clothing
110320	***Footwear***
110321	***Shoes and other footwear***
110321.1	Shoes and other footwear
110322	***Repair and hire of footwear***
110322.1	Repair and hire of footwear
110400	**HOUSING, WATER, ELECTRICITY, GAS, AND OTHER FUELS**
110410	***Actual and imputed rentals for housing***
110411	***Actual and imputed rentals for housing***
110411.1	Actual and imputed rentals for housing
110430	***Maintenance and repair of the dwelling***
110431	***Maintenance and repair of the dwelling***
110431.1	Maintenance and repair of the dwelling
110440	***Water supply and miscellaneous services relating to the dwelling***
110441	***Water supply***
110441.1	Water supply
110442	***Miscellaneous services relating to the dwelling***
110442.1	Miscellaneous services relating to the dwelling
110450	***Electricity, gas, and other fuels***
110451	***Electricity***
110451.1	Electricity
110452	***Gas***
110452.1	Gas
110453	***Other fuels***
110453.1	Other fuels
110500	**FURNISHINGS, HOUSEHOLD EQUIPMENT, AND ROUTINE MAINTENANCE OF THE HOUSE**
110510	***Furniture and furnishings, carpets, and other floor coverings***
110511	***Furniture and furnishings***
110511.1	Furniture and furnishings
110512	***Carpets and other floor coverings***
110512.1	Carpets and other floor coverings
110513	***Repair of furniture, furnishings, and floor coverings***
110513.1	Repair of furniture, furnishings, and floor coverings
110520	***Household textiles***
110521	***Household textiles***
110521.1	Household textiles
110530	***Household appliances***
110531	***Major household appliances, whether electric or not***
110531.1	Major household appliances, whether electric or not
110532	***Small electric household appliances***
110532.1	Small electric household appliances
110533	***Repair of household appliances***
110533.1	Repair of household appliances
110540	***Glassware, tableware, and household utensils***
110541	***Glassware, tableware, and household utensils***
110541.1	Glassware, tableware, and household utensils
110550	***Tools and equipment for house and garden***
110551	***Major tools and equipment***
110551.1	Major tools and equipment
110552	***Small tools and miscellaneous accessories***
110552.1	Small tools and miscellaneous accessories
110560	***Goods and services for routine household maintenance***

Code[a]	Description
110561	***Nondurable household goods***
110561.1	Nondurable household goods
110562	***Domestic services and household services***
110562.1	Domestic services
110562.2	Household services
110600	***HEALTH***
110610	***Medical products, appliances, and equipment***
110611	***Pharmaceutical products***
110611.1	Pharmaceutical products
110612	***Other medical products***
110612.1	Other medical products
110613	***Therapeutic appliances and equipment***
110613.1	Therapeutic appliances and equipment
110620	***Outpatient services***
110621	***Medical services***
110621.1	Medical services
110622	***Dental services***
110622.1	Services of dentists
110623	***Paramedical services***
110623.1	Paramedical services
110630	***Hospital services***
110631	***Hospital services***
110631.1	Hospital services
110700	***TRANSPORT***
110710	***Purchase of vehicles***
110711	***Motor cars***
110711.1	Motor cars
110712	***Motorcycles***
110712.1	Motorcycles
110713	***Bicycles***
110713.1	Bicycles
110714	***Animal-drawn vehicles***
110714.1	Animal-drawn vehicles
110720	***Operation of personal transport equipment***
110722	***Fuels and lubricants for personal transport equipment***
110722.1	Fuels and lubricants for personal transport equipment
110723	***Maintenance and repair of personal transport equipment***
110723.1	Maintenance and repair of personal transport equipment

Code[a]	Description
110724	***Other services in respect of personal transport equipment***
110724.1	Other services in respect of personal transport equipment
110730	***Transport services***
110731	***Passenger transport by railway***
110731.1	Passenger transport by railway
110732	***Passenger transport by road***
110732.1	Passenger transport by road
110733	***Passenger transport by air***
110733.1	Passenger transport by air
110734	***Passenger transport by sea and inland waterway***
110734.1	Passenger transport by sea and inland waterway
110735	***Combined passenger transport***
110735.1	Combined passenger transport
110736	***Other purchased transport services***
110736.1	Other purchased transport services
110800	***COMMUNICATION***
110810	***Postal services***
110811	***Postal services***
110811.1	Postal services
110820	***Telephone and telefax equipment***
110821	***Telephone and telefax equipment***
110821.1	Telephone and telefax equipment
110830	***Telephone and telefax services***
110831	***Telephone and telefax services***
110831.1	Telephone and telefax services
110900	***RECREATION AND CULTURE***
110910	***Audiovisual, photographic, and information-processing equipment***
110911	***Audiovisual, photographic, and information-processing equipment***
110911.1	Audiovisual, photographic, and information-processing equipment
110914	***Recording media***
110914.1	Recording media
110915	***Repair of audiovisual, photographic, and information-processing equipment***
110915.1	Repair of audiovisual, photographic, and information-processing equipment
110920	***Other major durables for recreation and culture***
110921	***Major durables for outdoor and indoor recreation***
110921.1	Major durables for outdoor and indoor recreation

Code[a]	Description
110923	***Maintenance and repair of other major durables for recreation and culture***
110923.1	Maintenance and repair of other major durables for recreation and culture
110930	***Other recreational items and equipment, gardens, and pets***
110931	***Other recreational items and equipment***
110931.1	Other recreational items and equipment
110933	***Gardens and pets***
110933.1	Gardens and pets
110935	***Veterinary and other services for pets***
110935.1	Veterinary and other services for pets
110940	***Recreational and cultural services***
110941	***Recreational and sporting services***
110941.1	Recreational and sporting services
110942	***Cultural services***
110942.1	Cultural services
110943	***Games of chance***
110943.1	Games of chance
110950	***Newspapers, books, and stationery***
110951	***Newspapers, books, and stationery***
110951.1	Newspapers, books, and stationery
110960	***Package holidays***
110961	***Package holidays***
110961.1	Package holidays
111000	**EDUCATION**
111010	Education
111011	Education
111011.1	Education
111100	**RESTAURANTS AND HOTELS**
111110	Catering services
111111	Catering services
111111.1	Catering services
111120	Accommodation services
111121	Accommodation services
111121.1	Accommodation services
111200	**MISCELLANEOUS GOODS AND SERVICES**
111210	***Personal care***
111211	***Hairdressing salons and personal grooming establishments***
111211.1	Hairdressing salons and personal grooming establishments
111212	***Appliances, articles, and products for personal care***
111212.1	Appliances, articles, and products for personal care
111220	***Prostitution***
111221	***Prostitution***
111221.1	Prostitution
111230	***Personal effects n.e.c.***
111231	***Jewelry, clocks, and watches***
111231.1	Jewelry, clocks, and watches
111232	***Other personal effects***
111232.1	Other personal effects
111240	***Social protection***
111241	***Social protection***
111241.1	Social protection
111250	***Insurance***
111251	***Insurance***
111251.1	Insurance
111260	***Financial services n.e.c.***
111261	***Financial intermediation services indirectly measured (FISIM)***
111261.1	Financial intermediation services indirectly measured (FISIM)
111262	***Other financial services n.e.c***
111262.1	Other financial services n.e.c.
111270	***Other services n.e.c.***
111271	***Other services n.e.c.***
111271.1	Other services n.e.c.
111300	**BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS ON THE ECONOMIC TERRITORY**
111310	Balance of expenditures of residents abroad and expenditures of nonresidents on the economic territory
111311	**BALANCE OF EXPENDITURES OF RESIDENTS ABROAD AND EXPENDITURES OF NONRESIDENTS ON THE ECONOMIC TERRITORY**
111311.1	Final consumption expenditure of resident households in the rest of the world
111311.2	Final consumption expenditure of nonresident households on the economic territory
120000	**INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS**

Code[a]	Description
120100	**INDIVIDUAL CONSUMPTION EXPENDITURE BY NPISHS**
120110	***Individual consumption expenditure by NPISHs***
120111	***Individual consumption expenditure by NPISHs***
120111.1	Individual consumption expenditure by NPISHs
130000	**INDIVIDUAL CONSUMPTION EXPENDITURE BY GOVERNMENT**
130100	**HOUSING**
130110	***Housing***
130111	***Housing***
130111.1	Housing
130200	**HEALTH**
130210	***Health benefits and reimbursements***
130211	***Medical products, appliances, and equipment***
130211.1	Pharmaceutical products
130211.2	Other medical products
130211.3	Therapeutic appliances and equipment
130212	***Health services***
130212.1	Outpatient medical services
130212.2	Outpatient dental services
130212.3	Outpatient paramedical services
130212.4	Hospital services
130220	**PRODUCTION OF HEALTH SERVICES**
130221	***Compensation of employees***
130221.1	Compensation of employees (physicians, nurses, and other medical and nonmedical staff)
130222	***Intermediate consumption***
130222.1	Intermediate consumption
130223	***Gross operating surplus***
130223.1	Gross operating surplus
130224	***Net taxes on production***
130224.1	Net taxes on production
130225	***Receipts from sales***
130225.1	Receipts from sales
130300	**RECREATION AND CULTURE**
130310	***Recreation and culture***
130311	***Recreation and culture***
130311.1	Recreation and culture
130400	**EDUCATION**
130410	***Education benefits and reimbursements***
130411	***Education benefits and reimbursements***
130411.1	Education benefits and reimbursements
130420	***Production of education services***
130421	***Compensation of employees***
130421.1	Compensation of employees (primary, secondary, and postsecondary education)
130422	***Intermediate consumption***
130422.1	Intermediate consumption
130423	***Gross operating surplus***
130423.1	Gross operating surplus
130424	***Net taxes on production***
130424.1	Net taxes on production
130425	***Receipts from sales***
130425.1	Receipt from sales
130500	**SOCIAL PROTECTION**
130510	***Social protection***
130511	***Social protection***
130511.1	Social protection
140000	**COLLECTIVE CONSUMPTION EXPENDITURE BY GOVERNMENT**
140100	**COLLECTIVE SERVICES**
140110	***Collective services***
140111	***Compensation of employees***
140111.1	Compensation of employees (defense and nondefense collective services)
140112	***Intermediate consumption***
140112.1	Intermediate consumption
140113	***Gross operating surplus***
140113.1	Gross operating surplus
140114	***Net taxes on production***
140114.1	Net taxes on production
140115	***Receipts from sales***
140115.1	Receipts from sales
150000	**EXPENDITURE ON GROSS FIXED CAPITAL FORMATION**

Code[a]	Description
150100	**MACHINERY AND EQUIPMENT**
150110	***Metal products and equipment***
150111	***Fabricated metal products, except machinery and equipment [CPA 28.11 to 28.75]***
150111.1	Fabricated metal products, except machinery and equipment
150112	***General purpose machinery [CPA 29.11 to 29.24]***
150112.1	General purpose machinery
150113	***Special purpose machinery [CPA 29.31 to 29.72]***
150113.1	Special purpose machinery
150114	***Electrical and optical equipment [CPA 30.01 to 33.50]***
150114.1	Electrical and optical equipment
150115	***Other manufactured goods n.e.c. [CPA 36.11 to 36.63]***
150115.1	Other manufactured goods n.e.c.
150120	***Transport equipment***
150121	***Road transport equipment [CPA 34.10 to 34.30 and 35.41 to 35.50]***
150121.1	Motor vehicles, trailers, and semitrailers
150121.2	Other road transport
150122	***Other transport equipment [CPA 35.11 to 35.30]***
150122.1	Other transport equipment
150200	**CONSTRUCTION**
150210	***Residential buildings***
150211	***Residential buildings***
150211.1	Residential buildings
150220	***Nonresidential buildings***
150221	***Nonresidential buildings***
150221.1	Nonresidential buildings
150230	***Civil engineering works***
150231	***Civil engineering works***
150231.1	Civil engineering works
150300	***OTHER PRODUCTS***
150310	***Other products***
150311	***Other products***
150311.1	Other products
160000	**CHANGES IN INVENTORIES AND ACQUISITIONS, LESS DISPOSALS OF VALUABLES**
160100	**CHANGES IN INVENTORIES**
160110	***Changes in inventories***
160111	***Changes in inventories***
160111.1	Opening value of inventories
160111.2	Closing value of inventories
160200	**ACQUISITIONS, LESS DISPOSALS OF VALUABLES**
160210	***Acquisitions, less disposals of valuables***
160211	***Acquisitions, less disposals of valuables***
160211.1	Acquisitions of valuables
160211.2	Disposals of valuables
170000	**BALANCE OF EXPORTS AND IMPORTS**
170100	**BALANCE OF EXPORTS AND IMPORTS**
170110	***Balance of exports and imports***
170111	**BALANCE OF EXPORTS AND IMPORTS**
170111.1	Exports of goods and services
170111.2	Imports of goods and services

Source: ICP 2005.

Note: n.e.c. = not elsewhere classified.

a. Basic headings are shown as seven-digit numbers.

APPENDIX D

Productivity Adjustment in the Government Sector

The compensation of government employees, which was used in the ICP to price government services, shows large variation between economies at different levels of development. Some of this variation is the result of differences in productivity. For example, in Asia-Pacific, average compensation (based on exchange rates) in the government health sector of Hong Kong (China) was about 120 times higher than in Lao PDR. If no productivity adjustments were made, economies such as Vietnam, Cambodia, or Lao PDR would be seen as having per capita levels of real consumption of government services comparable to, or even much higher than, that of Hong Kong (China), and even the level of real GDP would be affected for those economies.

To adjust government compensation for productivity, government production is assumed to follow a Cobb-Douglas functional form with constant returns to scale, as in equation (D1):

$$Y_G = C_0 L_G^{\alpha} K_G^{1-\alpha}, \tag{D1}$$

where output (Y_G) is a function of labor (L_G) and the capital stock (K_G) with labor and capital shares of α and $(1-\alpha)$, respectively, and

the scale parameter (c) depends on the units of measurement.

Productivity, measured as output per worker, depends on the amount of capital available per worker, as in equation (D2):

$$\frac{Y_G}{L_G} = C_0 \left(\frac{K_G}{L_G}\right)^{1-\alpha}, \tag{D2}$$

Because the government-specific capital-labor ratio (K_G/L_G) cannot be directly measured, the capital intensity of government in each economy was assumed to be proportional to the capital-labor ratio for the whole economy, K/L. Rewriting equation (D2) to take into account this assumption yields equation (D3):

$$\frac{Y_G}{L_G} = C_1 \left(\frac{K}{L}\right)^{1-\alpha}, \tag{D3}$$

The capital stock was estimated using the perpetual inventory method with geometric decline, as in equation (D4):

$$K_{2005} = \sum_{t=1981}^{2005} \frac{I_t}{(1+.05)^{2005-t}}, \tag{D4}$$

where I_t is investment in year t

and .05 is the assumed depreciation rate.

Sufficient data to estimate capital stocks was available in only a limited number of countries. In these countries, the capital-output ratio (*K/Y*) was found to vary from 2.5 to 3.5, with the value increasing in high-income economies. Therefore, values of 2.5, 3.0, and 3.5 were used for low-, middle-, and high-income economies, respectively. Similarly, empirical studies have found values of α to be in the range of 0.5 to 0.7 for low- to high-income economies, respectively.

With the estimate of the capital stock and data on labor force, labor productivity can be estimated iteratively from the identity, as in equation (D5):[6]

$$\frac{Y_G}{L_G} = c\left(\frac{K_G}{L_G}\right)^{1-\alpha} = c\left(\frac{Y_G}{L_G} \cdot \frac{K_G}{L_G}\right)^{1-\alpha} \quad \text{(D5)}$$

Because productivity in government depends upon the real level of economy wide output (Y), which in turn depends upon the productivity adjustment applied to government services, equation (D5) was to be solved iteratively.[7]

The effects of productivity adjustment vary within each region and across the regions. For example, the adjustment factor for Mongolia was found to be 0.24, meaning that, compared with Hong Kong (China), per capita consumption of government services in Mongolia was adjusted to about a quarter of what it would have been in the absence of any adjustment; the reduction was even larger for Vietnam and Lao PDR.

6. The Cobb-Douglas production function for the whole economy depends on both the quality and quantity of labor and capital. Whereas we can assume that the quality of capital is reflected in its price, and thus is included in our value estimates, differences in the quality of labor are harder to measure because they reflect cross-country differences in professional composition, education, skills, and so forth. For our purposes, we assume that we collect salaries for equivalent qualifications for the government sector, and that therefore L_G refers to standard quality of labor employed in the government sector across countries.

7. First iteration is computed with no adjustment. Then the results for *Y/L* are inserted back into equation (D5). It takes several iterations to converge to the solution, given 0.01 percent target tolerances.

APPENDIX E

Estimating Average Prices for Household Consumption Items of China

In China, ICP price surveys, conducted by the National Bureau of Statistics of China (NBS), for household consumption items covered the 11 municipalities of Beijing, Shanghai, Ningbo, Qingdao, Guangzhou, Xiamen, Dalian, Harbin, Wuhan, Chongqing, and Xi'an. Data were collected from outlets in both the cities proper and surrounding areas. However, the computation of purchasing power parity (PPP) data requires both average prices and GDP weights at the national level. The Asian Development Bank (ADB) convened an expert group[8] on June 19–20, 2006, to develop a procedure for extrapolating the data from the 11 municipalities to the national level. The expert group agreed on the following steps:

- Average prices for each of the 11 cities proper and, separately, the surrounding areas were computed at the product level by NBS and submitted to ADB. However, the national annual average prices are not official estimates of the NBS, but were computed by the ADB and the World Bank.
- Per capita household expenditures by nine expenditure categories[9] were derived from China urban and rural household income and expenditure surveys, and population data for urban and rural areas for all 31 provinces of China were taken from the *China Statistical Yearbook* (2007).
- A principal-components analysis of urban and rural per capita household expenditure structures of the 31 provinces in China was used to group them into four analytical clusters: Capitals, Coastal, Northeast, and Inner China. Each of the 11 municipalities is included in only one of the four analytical clusters.
- Weights for the eight expenditure categories from each of the urban and rural areas of the 31 provinces were allocated to the corresponding average price data collected from the 11 municipalities within the four analytical clusters.
- Using these weights, the average prices were estimated for each household consumption item. PPPs for the basic headings in household consumption were calculated using these average prices.
- For government consumption expenditure, NBS also provided data on compensation of government employees for the 11 cities. However, because the *China Statistical Yearbook* had national-level figures for government compensation, these figures were used in estimating PPPs for both individual and collective consumption.
- For gross fixed capital formation, prices for construction goods were collected for three cities only, and those for machinery and equipment were collected in 11 cities in which the type of equipment could be found that matched the specifications. This is consistent with methodology used in other economies and regions; thus, no extrapolation was required.

- The national accounts data for China as a whole (rather than for the 11 municipalities) were used as the starting point for allocating the expenditures on GDP to the 155 basic headings required for the ICP. These national data were disaggregated using detailed data sources such as national household income and expenditure surveys and government expenditure data. This exercise was carried out at NBS by a team of international experts on the recommendation of the expert group constituted by the regional office.

(For more information on the calculation of average prices for China, see appendix 1 of the Asian Development Bank's final report on the ICP program in Asia-Pacific [http://adb.org/Documents/Reports/ICP-Purchasing-Power-Expenditures/appendixes.pdf]).

8. The members of the expert group came from the Asian Development Bank, the Australian Bureau of Statistics, the National Bureau of Statistics of China, and the World Bank.

9. The nine categories are: food; clothing; household appliances and services; health care and medical services; transport and communication; education; cultural and recreation services; residence; and other goods and services

APPENDIX F

Comparison of Methodology Used between ICP and Eurostat-OECD Regions to Compute PPPs and Calibrate Them to the Global Level

Overview

The ICP is a complex statistical program that has been under way since 1968. Over this time span, a variety of methodologies have been developed to solve problems encountered in previous rounds and also to deal with the increasing scope of the comparison. The economies participating in the ICP were divided into five regions for the 2005 ICP. These plus the Eurostat-OECD PPP program included 146 economies in the global comparison. Each region and the Eurostat-OECD differ in the size and structure of their economies, as well as statistical capacity. Decisions were made during the developmental stages to ensure that the comparisons of economies within each region were as consistent as possible. As a result, methodologies differed between regions, which became a factor when the regional results were calibrated to the global level. The purpose of this appendix is to provide an overview of what was done in each region, how the regional results were combined at the global level, and the resulting impact on the final PPPs.

Table F1 provides a summary of the methodology used to estimate basic-heading PPPs for major aggregates of GDP by region. It also shows how the aggregate regional PPPs were linked for the global comparison. A brief review of issues for each aggregate will be provided. First, more details will be provided about how the Eurostat-OECD entered into the global comparison and then how the CIS region was linked.

Results for five regions (Africa, Asia-Pacific, South America, Western Asia, and Eurostat-OECD) were calibrated to the global level using prices from the ring comparison to compute between-region basic-heading PPPs, which were used as the linking factors at each level of aggregation. The United States was the numeraire country in the Eurostat-OECD, which was also the numeraire region when computing the linking factors.

Bringing the Eurostat-OECD and CIS into the Global Comparison

The Eurostat-OECD managed a separate comparison from the ICP. However, Eurostat-OECD participated in the ring comparison so that its results could be combined with the rest of the world. The CIS did not participate in the ring comparison; therefore, its regional results could not be calibrated to the globe using that methodology. Russia traditionally participates in the triennial OCED comparison. Russia priced the OECD list and was included in the

Table F1

Comparison of methods used to compute regional PPPs and the process to compute global linking factors

Aggregate	Africa	Asia-Pacific	Western Asia	South America	Eurostat-OECD *(including Russia)*	Combining regions *(excluding the CIS)*	CIS *(linked via Russia)*
Household consumption	CPD	CPD	CPD	CPRD	EKS*	CPD 18 ring countries	EKS*
	No representative indications	No representative indications	No representative indications	With representative indications	With representative indications	No representative indications	With representative indications
Housing	Imputed to per capita volume of consumption, excluding rents	Imputed to per capita volume of consumption, excluding rents	Quantity indicators plus rental prices	Quantity indicators	Rental prices plus quantity indicators	Quantity indicators for 106 economies	Quantity indicators
Compensation	Global list	Global list	Global list	Global list	Regional list	Wages for 75 ICP economies plus 5 from Eurostat	Regional list
	CPD productivity adjustment,	CPD productivity adjustment	CPD productivity adjustment	CPD	EKS Ring countries priced global list	No productivity adjustment	EKS
Equipment	Global list CPD, PPPs imputed for 17 economies	Global list CPD	Global list CPD	Global list CPD	Regional list EKS Ring countries priced global list	Global list CPD For ring countries	Regional list EKS
Construction	Basket of construction components CPD, PPPs with regional W2 weights imputed for 15 economies	Basket of construction components CPD, with regional W2 weights	Basket of construction components CPD, with regional W2	Basket of construction components CPD, with regional W2	Bill of quantity Ring countries priced basket of construction components	Basket of construction components CPD Ring countries No W2 weights[a]	CIS basket of construction components
NPISH	Expenditures allocated to other BHs	Expenditures allocated to other BHs	Expenditures allocated to other BHs	Expenditures allocated to other BHs	Reference PPPs for NPISHs	Expenditures allocated to other BHs	Reference PPPs for NPISHs
Aggregation to GDP	Iklé	EKS	EKS	EKS	EKS	EKS	EKS

Source: ICP Global Office.

a. In the Basket of Construction Component method, W2 weights are used to combine components into systems that represent the various stages in which construction projects are carried out.

Eurostat-OECD results, with fixity maintained from that point to the global report. Russia also participated in the CIS comparison. Therefore, the CIS was linked to the OECD using Russia as the link.

The linking for the Eurostat-OECD and CIS regions was done in the following stages: Eurostat computed basic-heading PPPs and expenditure weights for 37 economies: the 25 EU member states in 2005, the European Free Trade Association (EFTA) economies (Iceland, Norway, and Switzerland), Albania, Bosnia-Herzegovina, Bulgaria, Croatia, Macedonia, Montenegro, Romania, Serbia, and Turkey. The OECD combined these basic-heading PPPs and expenditure weights with those for nine other economies: its seven non-European member economies plus Russia and Israel. It then calculated the 2005 Eurostat-OECD comparison in stages to ensure that the final results at all levels of aggregation respect fixity for three blocs of economies: the 37 Eurostat economies, the 7 non-European OECD economies, plus Russia and Israel. This is basically the procedure that was followed in the previous 2002 Eurostat-OECD comparison.

The CIS economies were linked to the Eurostat-OECD comparison through Russia (that is, using Russia as a traditional bridge country because it participated in both the CIS and the Eurostat-OECD comparisons). This in effect links the CIS economies to other regions through the four ring countries chosen to link Eurostat-OECD economies with the rest of the world.

Household Consumption

Each region independently prepared lists of products consumed by households to be priced for the respective regional comparisons. A list of products was selected from a composite of these regional lists to be priced by a group of 18 countries comprising two or more countries representing each region. The prices from the ring list were used to compute between-region PPPs, which were used to link the regions.

The CPD method of aggregating price ratios to basic-heading PPPs was used in all regions except the Eurostat-OECD and CIS regions. The CPD method was also used to compute the between-region PPPs at the basic-heading level for the ring comparison.

The CPD method was chosen because it is more robust when the price matrix has missing data, and it provides estimates of standard errors. The residuals from the CPD regressions were used as a diagnostic tool in the Dikhanov tables.

The Eurostat-OECD and CIS regions used the EKS* method to compute basic-heading PPPs. The primary difference between countries using the CPD versus the EKS* method is that each country in the Eurostat-OECD and CIS regions assigned a code to each product to indicate whether the product was representative of its economy. It is assumed that representative products have lower prices than other products that, even though comparable, are not representative of the country's expenditure patterns. The representativity indicator was used as a form of stratification that, in effect, imposed implicit weights reflecting the number of representative products each country priced.

Economies in the Asia-Pacific, Africa, Western Asia, and South America regions that either had not participated in an international comparison for an extended period or had never participated had difficulty applying the representativity concept; therefore, it was not used in their intraregional comparisons. None of the regions nor the Eurostat-OECD applied the representativity concept to housing, government, equipment, or construction. Nor was it used for the ring comparison.

Housing

Asia-Pacific and Africa found it difficult to carry out comparisons for rental and owner-occupied housing using rental surveys or direct comparisons of quality-adjusted quantities. (These are the methods recommended in the *ICP Operational Manual* and used by Eurostat-OECD and CIS.) Most of the comparisons in Eurostat were based on rental surveys. Quantity comparisons were carried out in the CIS and linked through a group of EU economies that did both. South America used the quantity approach, and Western Asia used a combination of rental survey data and the quantity approach.

Because the quantity approach did not produce consistent results across economies in their region, Asia-Pacific and Africa used the per capita volume of consumption (excluding rents) as an approximation of the volume of

rental services per capita. This makes rental services neutral because it does not disturb the per capita volumes for private household consumption and also assumes that the volumes of rental services rise in line with overall expenditures. The reference volume approach is rooted in the observations of the behavior of housing services for large groups of economies. Table F2 shows the real expenditures per capita by region, for both private consumption and housing, which were obtained using a uniform-quantity approach, with quality corrections based on 106 economies.

The other regions used either rental surveys or quantity comparisons (or a combination) to compare rental services; therefore, one problem was how to link housing across regions. The method adopted was to use quality-adjusted quantities across the regions, based on data from 106 economies (see Heston, *Multilateral Housing Comparisons*). This linking was independent of how the regional PPPs were derived. For example, other consumption basic headings were linked by deflating the ring prices by the within-region PPPs, then computing the between-region PPPs. The between-region housing PPPs were computed directly using the quantity-quality data from the 106 economies. The regional total real expenditures as determined by the quantity approach were distributed to countries within region to observe fixity. This is a somewhat different method from that used in earlier comparisons, which will hopefully be improved in the future. However, it does mean that users need to understand that this affects the comparability of rental services when comparing economies in Asia-Pacific and Africa with economies in other regions. Real expenditures for rental services could be underestimated in economies where both per capita rental services and household consumption are below the respective regional averages—and overestimated where both are above the average.

Table F2

Real Expenditures per Capita

	Real expenditures per capita (world = 100%)	
ICP regions	Housing, water, electricity, gas, and other fuels (percent)	Individual household consumption (percent)
Asia-Pacific	28.2	32.3
South America	83.3	90.8
Eurostat-OECD	325.5	317.5
Africa	26.8	24.8
Western Asia	44.7	60.4

Source: ICP global office.

Compensation: General Government

The services of civil servants and health and education employees are typically not priced; rather, the input cost approach was used. Reference PPPs were used for intermediate consumption and consumption of fixed capital. PPPs for compensation were derived from a detailed comparison of salaries for specific occupations. It was recognized that this procedure assumed equal productivity across economies for a given occupation, which was unlikely, given very different amounts of capital per worker. Further, very low-wage economies have less incentive to organize work to save labor, including those in administrative, health, and education services. In the 2005 benchmark, the range of economies was much greater than in previous rounds, and some consequences of the equal-productivity assumption loomed much larger. In Asia-Pacific, for example, salaries for the same occupation differ by a factor of 100 between Vietnam and Hong Kong (China). Similar differences existed between Yemen and Kuwait in the Western Asia comparison and between the richer and poorer countries in Africa. Without some adjustment for productivity, the resulting per capita volumes in Yemen or Vietnam would be greatly distorted compared with those of its richer neighbors. In contrast, salary differences in South America did not exceed a factor of three.

Asia-Pacific, Western Asia, and Africa adjusted the average salaries of each economy for productivity based on estimates of the capital-to-labor ratio in each economy. This poses a problem of comparability across regions and for

computing linking factors to estimate global PPPs, because Eurostat-OECD, CIS, and South America did not make similar adjustments. An important consideration is that Asia-Pacific, Africa, Western Asia, and South America used the same list of occupations for which average wages were obtained. The Eurostat-OECD ring economies also provided wages for these occupations. Therefore, it was not necessary to limit the estimation of between-region PPPs (linking factors) to data from only the ring countries.

CPD regressions based on compensation data for 75 economies representing all regions, including the Eurostat-OECD, were used to compute regional linking factors (see Heston, *Proposal for Linking Compensation*). Occupations were classified by skill level in the computations. The CPD included all economies from South America and Western Asia and a subset of economies from the other regions. A further adjustment was made to compensate for differences between economies included and not included in each region. This provided regional linking factors with no productivity adjustment. As with housing, the linking factors were computed independently of the regional PPPs.

Should the Between-Region PPPs for Linking Factors Also be Adjusted for Productivity?

In retrospect (or in the next round), the optimal solution would be to estimate within-region PPPs the same way across all regions so the question would not arise. Given the differing methods used in different regions, it seemed the better course not to make a further productivity adjustment to the between-region data. First, consider comparisons between economies across regions that did a productivity adjustment. The underlying capital-labor ratios are rough approximations, so making a productivity adjustment would not greatly improve or change the comparison between economies in different regions.

As for the regions that did not make productivity adjustments, the direction of the effect, at least for the OECD, would have been clearly to lower the relative volumes of government consumption of the other regions, simply because average capital per worker is higher in the OECD economies. However, this would not improve the comparisons between economies at a similar economic level in, for example, Asia-Pacific and the OECD, because the latter would not have undergone a productivity adjustment.

Therefore, linking factors were not adjusted for productivity.

The comparison of within-region results with and without productivity adjustments showed that the effect varied by economy. The overall effect of the productivity adjustment was to decrease the size of the economies that used it relative to the Eurostat-OECD.

Also of importance, however, is what the use of productivity adjustments means for comparing the 2005 results for previous benchmarks. Everything else remaining the same, the methods adopted for these sectors have the effect of producing in some regions a larger spread in real GDP per capita between rich and poor in 2005 than in previous benchmarks. The best way to fully understand the impact of the productivity adjustment on the comparison between regions (as well for previous benchmarks) is to produce results with and without productivity, using the same methods for all regions. To the extent that reliable data can be made available, additional studies will be conducted.

Equipment and Construction

Asia-Pacific, Africa, Western Asia, and South America priced a global set of equipment items and the basket of construction components; there were no separate ring lists. The four ring countries from the Eurostat-OECD region priced both their regional list and the global specifications. Several Africa economies and one Asia-Pacific economy were not able to price all of the basic headings for equipment and construction. To provide real GDP volumes for all economies, PPPs were imputed for basic headings that lacked data. All economies provided nominal expenditures from their national accounts for all basic headings, which were used as weights in combining basic headings to higher-level aggregates.

Imputation for Construction, Equipment, and Government Salaries in Africa

Construction. Thirty-five economies submitted complete data for construction, government salaries, and equipment. Four countries with data for construction lacked data

for either equipment or compensation. After eliminating another four with poor quality data, 27 countries with complete data remained. PLI data for these countries were used to estimate the following model by ordinary least squares regression, as in equation (F1):

$$\text{PLI}\ (Y) = a1\ \text{PLI}\ (X1) + a2\ \text{PLI}\ (X2), \qquad \text{(F1)}$$

where Y is construction, and

$X1$ and $X2$ are equipment and compensation.

No constant term was included, on the premise that the price of construction should go to zero as the prices of the input variables go to zero. Using the estimated regression coefficients (a_1 and a_2), the missing values of the construction PLIs were imputed using actual data on equipment and compensation, where available, or the imputed values, where necessary.

Equipment. Out of 48 participating economies in the Africa region, 32 submitted equipment prices; for the remaining 16, the exchange rate to the base country (South Africa) was used as a reference PPP on the grounds that most construction machinery and equipment are obtained through international purchases. No further adjustments were made to account for taxes, tariffs, and other charges because countries were not able to produce consistent data. In addition, some countries provide rebates for the taxes, which makes the relative prices close to exchange rates.

Salaries. Forty-one countries provided data on government compensation. For the seven missing countries, the PLI for government compensation was imputed from the nominal individual consumption ratio. (The nominal individual consumption ratio is the value of a country's individual consumption per capita [in U.S. dollars] divided by the same for the base country.) This procedure was adopted on the premise that the level of compensation determines, in large part, the level of individual consumption; hence, the level of nominal compensation should reflect that of consumption. The imputed PLIs were used in the imputation of the construction PLI for the five countries that lacked both construction and compensation data. The missing seven PPPs for government compensation were derived as the product of the individual consumption ratio and the exchange rate to the base country.

No data, except nominal expenditures from the national accounts, are shown for the equipment and construction aggregates for economies where results were imputed. The gross fixed capital formation (GFCF) aggregate is footnoted where the individual components were imputed.

Nonprofit Institutions Serving Households

Individual consumption expenditures by nonprofit institutions serving households (NPISHs) were combined into one basic heading in the ICP 2005 classification. However, participating economies were not able to consistently provide expenditures for this basic heading; therefore, NPISH expenditures in some regions could not be separated from the expenditures in other consumption categories, making it difficult to ensure that basic headings were being consistently defined.

Aggregation to GDP

Estimation of PPPs for higher-level aggregates of GDP in five regions and the ring were based on the EKS method. Africa alone used the Iklé method, which provides results with additivity. Even though the Iklé method's results can contain some Gerschenkron effect, the Africa Iklé results in general were quite close to the EKS. The region desired the additivity restriction because it is easier to explain to users how to construct aggregates and subaggregates of GDP volumes.

APPENDIX G

Comparisons of New 2005 PPPs with Those Estimated by Extrapolating from Previous Benchmark Surveys

The purpose of this appendix is to explain why the new PPPs differ from the previous estimates for 2005, based on extrapolations from the previous benchmark surveys as published by the World Bank in the *World Development Indicators* (WDI).

The previous PPP estimates for 2005 for economies in the OECD and CIS, which participate in the periodic Eurostat comparison, were based on the most recent benchmark exercise in 2002 (OECD) and for 1999 (CIS). Their PPPs were extrapolated to 2005 using GDP deflators. The PPPs for the remaining economies came from two sources. In 1993, about 70 economies from Africa, Asia-Pacific, Latin America, and Western Asia participated in the ICP price collection. Their PPPs have been extrapolated from that benchmark to 2005, also using GDP deflators. PPPs for the remaining economies, except China, were imputed by regression (as described in the section on imputing for nonbenchmark economies in this report). PPPs for China were based on a research study using 1986 data, which provides a bilateral comparison with the United States. India last participated in the ICP in 1985, so the regression was used to estimate the 2005 number. Taken together, this set of extrapolated estimates are referred to as the "WDI 2005 estimates," because they appeared in the *World Development Indicators 2007* and in the *WDI* database.

Table G1 provides a summary by economy of the data from the new benchmark, compared with extrapolated estimates from earlier data. The footnote indicates an economy not in the 1993 comparison, whose estimates were imputed using the regression model described in part II, Estimation of PPPs for Non-Benchmark Countries. The table shows total GDP and GDP per capita in PPP and U.S. dollars for the ICP 2005 and *WDI 2005* sources. Note that the differences for exporting economies are mostly positive. The final two columns show the GDP in U.S. dollars as used in the ICP compared with the *WDI* database. The global ICP report used values for GDP and its components submitted by the economies to their regional coordinators, which, in some cases, differ from those in the *WDI*. The economies went to considerable effort to improve their national accounts, but not all have been included in the *WDI* because of the lack of consistent time series or other discrepancies with values in the *WDI* database.

Once the estimations are obtained for the benchmark year, PPPs and the associated PPP-adjusted GDP per capita estimates for both benchmark and nonbenchmark economies are extrapolated backward and forward to create time series. For PPPs, this is done using the local rate of inflation (measured by the GDP deflator) relative to the United States, while real GDP and real GDP per capita

are extrapolated using growth rates derived from constant price national data.

Readers are advised that PPP estimates of one benchmark year, when extrapolated by rates of inflation in an economy relative to the base country, will not necessarily be consistent with the estimates obtained for a new benchmark year. For instance, the 1993 PPP-based per capita GDP of Jordan expressed in Omani rials, if extrapolated to 2005 by the relative rate of inflation in Jordan and Oman, are not equal to the 2005 benchmark PPP-based per capita GDP of Jordan, also expressed in Omani rials. This is the result of several factors:

- The treatment of problematic areas such as housing and nonmarket services may be different in successive ICP rounds. In general, we can assume that better methods are introduced in each successive round. For example, productivity adjustments were made to government salaries in the Africa, Western Asia, and Asia-Pacific regions.
- The extrapolation is done at the macro or GDP level, instead of at the individual product or basic-heading level. This assumes that each economy has a similar economic structure to that of the numeraire country and that the economies of both are evolving in a similar way.
- The products priced in successive rounds of the ICP may be different, and the ICP product list will also be different from those used in calculating national rates of inflation.
- The magnitude of sampling and nonsampling errors in the two surveys may be different.
- Different aggregation methods may have been used.
- The number of economies participating in the ICP rounds is different. For example, the 1993 comparison in Asia-Pacific included 14 economies. Two of these were Japan and Korea, which are now included in the Eurostat-OECD comparison, but not in the Asia-Pacific comparison. The 2005 Asia-Pacific comparison added 11 more economies, including China and India. The PPPs are the result of a multilateral estimating process, which means that the relationship between any two economies is affected by indirect parities with all other economies in the region.
- Ad hoc methods were used in ICP 1993 to link Africa to the OECD, with similar problems experienced using Japan to link Asia-Pacific to the OECD.
- *SNA93* was the basis for the 2005 expenditures and weights. SNA68 was the basis for the previous round.

Even if the general methodologies, the aggregation procedures, and the group of economies in the two surveys were the same, the extrapolated values would not necessarily equal new benchmark values. The reason for this is that ICP surveys work with current-year estimates so that successive benchmark estimates reflect changes from one year to another, not only in quantities but also in prices. Extrapolating one benchmark year value to another benchmark year by relative rates of inflation will yield changes in the aggregate quantity only and will fail to capture any changes in the composition of the quantity, which may result from changes in relative prices and interplay of supply and demand of complementary and substitute products.

For economies with large external trade volumes, extrapolations are more problematic because of changes in the terms of trade. For example, if the physical quantity of exports of an economy remains the same but the price decreases, extrapolated exports will be unchanged, but output measured in current prices will have decreased. A similar effect will occur if import prices increase; namely, extrapolated GDP will exceed currently measured GDP. The opposite will occur for increases in export prices and decreases in import prices, everything else the same.

The changes in methodology, scope, and content of the 2005 ICP compared with previous results need to be considered when making comparisons across time. For example, it may be misleading to use Gini coefficients or other dispersion measures from previous benchmarks and compare them with 2005 to measure trends in income inequality across countries.

Table G1

Comparison of ICP 2005 global results with WDI

	GDP per capita, PPP			GDP per capita, US$			GDP, PPP (bln)			GDP, US$ (bln)		
	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.
Angola[a]	39,591	3,729	–5%	1,945	1,903	2%	55.0	60.0	–8%	30.3	30.6	–1%
Benin	1,390	1,213	15%	579	505	15%	10.5	10.3	2%	4.4	4.3	3%
Botswana	12,057	12,010	0%	5,712	5,689	0%	20.5	22.0	–7%	9.7	10.4	–7%
Burkina Faso[a]	1,140	1,061	7%	433	403	8%	14.6	14.8	–1%	5.5	5.6	–2%
Burundi[a]	…	319	..	…	101	..	…	2.5	..	…	0.8	..
Cameroon	1,995	1,993	0%	950	948	0%	35.0	35.5	–1%	16.6	16.9	–2%
Cape Verde[a]	2,831	2,521	12%	2,215	1,972	12%	1.4	1.3	10%	1.1	1.0	10%
Central African Republic[a]	675	654	3%	338	327	3%	2.7	2.7	–2%	1.4	1.4	2%
Chad[a]	1,749	1,471	19%	690	580	19%	14.9	14.9	0%	5.9	5.9	0%
Comoros[a]	1,063	1,127	–6%	611	645	–5%	0.6	0.7	–11%	0.4	0.4	3%
Congo, Dem. Rep.[a]	264	267	–1%	120	121	–1%	15.7	15.7	0%	7.1	7.1	0%
Congo, Rep.	3,621	3,246	12%	1,845	1,654	12%	12.0	11.7	2%	6.1	6.0	2%
Côte d'Ivoire	1,575	1,614	–2%	858	879	–2%	30.1	30.0	0%	16.4	16.3	0%
Djibouti[a]	1,964	1,850	6%	936	881	6%	1.5	1.5	1%	0.7	0.7	–1%
Egypt, Arab Rep.	5,049	4,574	10%	1,412	1,231	15%	353.4	333.2	6%	98.8	89.7	10%
Equatorial Guinea[a]	11,999	28,536	–58%	6,538	15,550	–58%	12.2	13.8	–12%	6.6	7.5	–12%
Ethiopia[a]	591	581	2%	154	151	2%	42.5	43.7	–3%	11.1	11.4	–2%
Gabon	12,742	13,821	–8%	6,190	6,714	–8%	17.8	17.8	0%	8.7	8.7	0%
Gambia, The[a]	726	1,078	–33%	192	285	–33%	1.1	1.7	–37%	0.3	0.5	–35%
Ghana[a]	1,225	1,160	6%	502	476	6%	26.1	26.1	0%	10.7	10.7	0%
Guinea	946	1,105	–14%	317	370	–14%	8.8	9.9	–12%	2.9	3.3	–13%
Guinea-Bissau[a]	569	458	24%	234	189	24%	0.8	0.7	9%	0.3	0.3	0%
Kenya	1,359	1,375	–1%	531	537	–1%	47.9	49.0	–2%	18.7	19.1	–2%
Lesotho[a]	1,415	1,311	8%	777	720	8%	2.6	2.6	0%	1.4	1.4	–2%
Liberia	383	312	0%	188	154	22%	1.2	1.1	0%	0.6	0.5	13%
Madagascar	988	834	19%	320	270	18%	16.8	15.5	8%	5.5	5.0	9%
Malawi	691	648	7%	230	216	7%	8.6	8.6	0%	2.9	2.9	2%
Mali	1,027	1,004	2%	468	457	2%	12.1	11.7	4%	5.5	5.3	4%
Mauritania[a]	1,691	1,684	0%	631	620	2%	4.8	5.0	–4%	1.8	1.8	–2%
Mauritius	10,155	9,975	2%	5,053	5,059	0%	12.6	12.4	2%	6.3	6.3	0%
Morocco	3,547	3,554	0%	1,952	1,956	0%	107.1	107.1	0%	59.0	59.0	0%
Mozambique[a]	743	677	10%	347	320	8%	14.4	13.9	4%	6.7	6.6	2%
Namibia[a]	4,547	4,599	–1%	3,049	3,085	–1%	9.3	9.3	0%	6.2	6.2	0%
Niger[a]	613	602	2%	264	259	2%	7.7	8.0	–4%	3.3	3.4	–4%
Nigeria	1,892	1,520	24%	868	697	24%	247.3	214.8	15%	113.5	98.6	15%
Rwanda	813	696	17%	271	232	17%	7.2	6.4	12%	2.4	2.1	12%
São Tomé and Principe	1,460	1,401	0%	769	738	4%	0.2	0.2	–6%	0.1	0.1	–11%
Senegal	1,676	1,541	9%	800	735	9%	18.1	18.1	0%	8.7	8.7	1%
Sierra Leone	790	584	35%	293	217	35%	4.0	3.3	23%	1.5	1.2	24%
South Africa[a]	8,477	8,478	0%	5,162	5,162	0%	397.5	397.5	0%	242.0	242.1	0%
Sudan	2,249	1,711	31%	994	756	31%	79.6	63.1	26%	35.2	27.9	26%

continued

Table G1

Continued

	GDP per capita, PPP			GDP per capita, US$			GDP, PPP (bln)			GDP, US$ (bln)		
	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.
Swaziland	4,384	4,461	–2%	2,270	2,310	–2%	4.9	5.0	–3%	2.6	2.6	0%
Tanzania	1,018	933	9%	360	327	10%	35.9	35.9	0%	12.7	12.6	1%
Togo	888	742	20%	405	338	20%	4.6	4.6	–1%	2.1	2.1	0%
Tunisia	6,461	6,382	1%	2,896	2,860	1%	64.8	64.0	1%	29.0	28.7	1%
Uganda[a]	991	848	17%	345	302	14%	26.3	24.5	7%	9.1	8.8	4%
Zambia	1,175	1,171	0%	636	633	0%	13.4	13.4	0%	7.3	7.3	0%
Zimbabwe	538	0	0%	0	261	–100%	6.2	..	0%	0.0	3.4	–100%
Africa	**2,330**	**2,074**	**12%**	**942**	**843**	**12%**	**1,180.6**	**1,104.9**	**7%**	**477.2**	**449.0**	**6%**
Bangladesh	1,268	1,068	19%	446	392	14%	173.8	163.7	6%	61.2	60.0	2%
Bhutan	3,694	3,649	1%	1,318	1,302	1%	2.3	2.3	–1%	0.8	0.8	–4%
Brunei Darussalam	47,465	46,991	0%	25,754	25,497	1%	17.6	17.6	0%	9.5	9.5	0%
Cambodia[a]	1,453	1,440	1%	454	449	1%	20.1	20.1	0%	6.3	6.3	0%
China	4,091	4,088	0%	1,721	1,720	0%	5,333.2	5,333.2	0%	2,243.8	2,243.9	0%
Hong Kong, China	35,680	35,690	0%	26,094	26,101	0%	243.1	243.2	0%	177.8	177.8	0%
Macao, China	37,256	36,869	1%	24,507	24,324	1%	17.6	17.4	1%	11.6	11.5	1%
Taiwan, China[a]	26,069	26,057	0%	15,674	15,661	0%	590.5	592.3	0%	355.1	356.0	0%
Fiji	4,209	4,282	–2%	3,558	3,620	–2%	3.5	3.5	–1%	3.0	3.0	0%
India[a]	2,126	2,222	–4%	707	736	–4%	2,341.0	2,431.9	–4%	778.7	805.7	–3%
Indonesia	3,234	3,209	1%	1,311	1,301	1%	707.9	707.9	0%	287.0	287.0	0%
Iran, Islamic Rep.	10,692	9,314	15%	3,190	2,779	15%	734.6	643.5	14%	219.2	192.0	14%
Lao PDR	1,811	1,814	0%	508	510	0%	10.2	10.3	–1%	2.9	2.9	0%
Malaysia	11,466	11,678	–2%	5,250	5,329	–1%	299.6	299.6	0%	137.2	136.7	0%
Maldives[a]	4,017	3,995	0%	2,552	2,539	1%	1.2	1.2	2%	0.7	0.7	–7%
Mongolia	2,643	2,609	1%	915	903	1%	6.7	6.7	1%	2.3	2.3	0%
Nepal	1,081	960	13%	343	302	14%	27.4	26.0	5%	8.7	8.2	6%
Pakistan	2,396	2,184	10%	769	703	9%	368.9	340.3	8%	118.4	109.5	8%
Philippines	2,932	2,956	–1%	1,158	1,167	–1%	250.0	250.0	0%	98.7	98.7	0%
Singapore	41,479	41,479	0%	26,879	26,877	0%	180.1	180.1	0%	116.7	116.7	0%
Sri Lanka	3,481	3,420	2%	1,218	1,197	2%	68.5	67.3	2%	24.0	23.5	2%
Thailand	6,869	7,061	–3%	2,721	2,797	–3%	444.9	444.9	0%	176.2	176.2	0%
Vietnam	2,142	2,143	0%	637	639	0%	178.1	178.1	0%	52.9	53.1	0%
Asia/Pacific	**4,107**	**4,011**	**2%**	**1,699**	**1,667**	**2%**	**9,068.0**	**8,935.4**	**1%**	**3,751.9**	**3,713.4**	**1%**
Armenia	3,903	4,162	–6%	1,523	1,624	–6%	12.6	12.6	0%	4.9	4.9	0%
Azerbaijan	4,648	4,575	2%	1,604	1,578	2%	38.4	38.4	0%	13.3	13.2	0%
Belarus	8,541	8,541	0%	3,090	3,090	0%	83.5	83.5	0%	30.2	30.2	0%
Georgia	3,505	3,520	0%	1,427	1,433	0%	15.3	15.7	–3%	6.2	6.4	–3%
Kazakhstan	8,699	8,699	0%	3,771	3,771	0%	131.8	131.8	0%	57.1	57.1	0%
Kyrgyz Republic	1,728	1,728	0%	478	478	0%	8.9	8.9	0%	2.5	2.5	2%
Moldova	2,362	2,190	8%	831	771	8%	8.5	8.5	0%	3.0	3.0	0%

Table G1

Continued

	GDP per capita, PPP			GDP per capita, US$			GDP, PPP (bln)			GDP, US$ (bln)		
	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.
Russian Federation	11,861	11,858	0%	5,341	5,341	0%	1,697.5	1,697.5	0%	764.4	764.5	0%
Tajikistan	1,413	1,478	–4%	338	353	–4%	9.7	9.7	0%	2.3	2.3	–1%
Ukraine	5,583	5,583	0%	1,829	1,829	0%	263.0	263.0	0%	86.1	86.1	0%
CIS	**9,203**	**9,202**	**0%**	**3,934**	**3,934**	**0%**	**2,269.2**	**2,269.6**	**0%**	**970.0**	**970.3**	**0%**
Albania	5,369	5,465	–2%	2,587	2,657	–3%	16.8	17.2	–3%	8.1	8.4	–3%
Australia	32,798	34,106	–4%	34,774	36,174	–4%	671.5	695.8	–3%	712.0	737.9	–4%
Austria	34,108	34,075	0%	37,056	37,022	0%	280.8	280.6	0%	305.1	304.8	0%
Belgium	32,077	31,699	1%	35,852	35,431	1%	336.0	332.2	1%	375.5	371.3	1%
Bosnia and Herzegovina	6,506	5,949	0%	3,007	2,749	9%	25.0	23.3	0%	11.6	10.8	8%
Bulgaria	9,353	9,328	0%	3,525	3,513	0%	72.2	72.2	0%	27.2	27.2	0%
Canada	35,078	34,972	0%	35,133	35,025	0%	1,133.0	1,130.0	0%	1,134.8	1,131.7	0%
Croatia	13,232	13,231	0%	8,749	8,752	0%	58.8	58.8	0%	38.9	38.9	0%
Cyprus	24,473	24,534	0%	22,359	22,428	0%	18.6	18.6	0%	16.9	17.0	–1%
Czech Republic	20,281	20,280	0%	12,190	12,186	0%	207.6	207.6	0%	124.8	124.7	0%
Denmark	33,626	33,645	0%	47,793	47,783	0%	182.2	182.2	0%	259.0	258.8	0%
Estonia	16,654	16,456	1%	10,341	10,213	1%	22.4	22.2	1%	13.9	13.7	1%
Finland	30,469	30,462	0%	37,262	37,256	0%	159.8	159.8	0%	195.4	195.5	0%
France	29,644	30,591	–3%	34,008	35,097	–3%	1,862.2	1,862.2	0%	2,136.3	2,136.5	0%
Germany	30,496	30,445	0%	33,849	33,794	0%	2,514.8	2,510.7	0%	2,791.3	2,787.0	0%
Greece	25,520	29,261	–13%	22,285	25,553	–13%	282.8	324.9	–13%	247.0	283.7	–13%
Hungary	17,014	17,014	0%	10,962	10,955	0%	171.6	171.6	0%	110.6	110.5	0%
Iceland	35,630	35,465	0%	54,975	54,656	1%	10.5	10.5	0%	16.3	16.2	0%
Ireland	38,058	37,886	0%	48,405	48,190	0%	157.9	157.6	0%	200.8	200.4	0%
Israel	23,845	22,627	5%	19,749	18,739	5%	156.7	156.7	0%	129.8	129.7	0%
Italy	27,750	27,750	0%	30,195	30,197	0%	1,626.3	1,626.3	0%	1,769.6	1,769.7	0%
Japan	30,290	30,290	0%	35,604	35,603	0%	3,870.3	3,870.3	0%	4,549.2	4,549.1	0%
Korea, Rep.	21,342	21,273	0%	16,441	16,388	0%	1,027.4	1,027.4	0%	791.4	791.4	0%
Latvia	13,218	13,215	0%	7,035	6,973	1%	30.4	30.4	0%	16.2	16.0	1%
Lithuania	14,085	14,084	0%	7,530	7,532	0%	48.1	48.1	0%	25.7	25.7	0%
Luxembourg	70,014	69,776	0%	80,315	80,047	0%	32.6	31.9	2%	37.3	36.6	2%
Macedonia, FYR	7,393	7,394	0%	2,858	2,859	0%	15.0	15.0	0%	5.8	5.8	0%
Malta	20,410	20,483	0%	14,605	14,645	0%	8.2	8.3	–1%	5.9	5.9	0%
Mexico	11,317	11,387	–1%	7,401	7,447	–1%	1,175.0	1,173.9	0%	768.4	767.7	0%
Montenegro	7,833	7,450	0%	3,564	3,395	5%	4.9	4.5	0%	2.2	2.1	7%
Netherlands	34,724	34,492	1%	38,789	38,532	1%	566.6	562.9	1%	632.9	628.8	1%
New Zealand	24,554	24,566	0%	26,538	26,550	0%	100.7	101.6	–1%	108.8	109.8	–1%
Norway	47,551	47,538	0%	65,267	65,229	0%	219.8	219.8	0%	301.7	301.6	0%
Poland	13,573	13,535	0%	7,965	7,943	0%	518.0	516.6	0%	304.0	303.2	0%
Portugal	20,006	19,956	0%	17,599	17,556	0%	211.0	210.5	0%	185.7	185.2	0%
Romania	9,374	9,368	0%	4,575	4,569	0%	202.7	202.7	0%	98.9	98.8	0%

Table G1

Continued

	GDP per capita, PPP			GDP per capita, US$			GDP, PPP (bln)			GDP, US$ (bln)		
	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.	ICP '05	WDI '05	Diff.
Russian Federation	11,861	11,858	0%	5,341	5,341	0%	1,697.5	1,697.5	0%	764.4	764.5	0%
Serbia	8,609	8,644	0%	3,564	3,525	1%	64.1	64.3	0%	26.5	26.2	1%
Slovak Republic	15,881	15,881	0%	8,798	8,803	0%	85.6	85.6	0%	47.4	47.4	0%
Slovenia	23,004	22,506	2%	17,558	17,173	2%	46.0	45.0	2%	35.1	34.4	2%
Spain	27,270	27,180	0%	26,031	25,947	0%	1,183.5	1,179.6	0%	1,129.7	1,126.0	0%
Sweden	31,995	32,016	0%	39,621	39,600	0%	288.9	288.9	0%	357.8	357.4	0%
Switzerland	35,520	35,182	1%	49,675	49,197	1%	266.3	261.7	2%	372.4	365.9	2%
Turkey	7,786	7,786	0%	5,013	5,042	–1%	561.1	561.1	0%	361.3	363.4	–1%
United Kingdom	31,580	31,371	1%	37,266	37,058	1%	1,901.7	1,889.4	1%	2,244.1	2,231.9	1%
United States	41,674	41,813	0%	41,674	41,813	0%	12,376.1	12,397.9	0%	12,376.1	12,397.9	0%
OECD–Eurostat	**26,404**	**26,487**	**0%**	**26,191**	**26,270**	**0%**	**36,469.0**	**36,515.6**	**0%**	**36,173.8**	**36,217.1**	**0%**
Argentina	11,063	10,815	2%	4,836	4,728	2%	419.0	419.0	0%	183.2	183.2	0%
Bolivia	3,618	3,715	–3%	1,001	1,028	–3%	34.1	34.1	0%	9.4	9.4	0%
Brazil	8,596	8,474	1%	4,791	4,723	1%	1,583.2	1,583.2	0%	882.5	882.5	0%
Chile	12,262	12,248	0%	7,305	7,297	0%	199.6	199.6	0%	118.9	118.9	0%
Colombia[a]	6,306	5,867	7%	2,940	2,973	–1%	263.7	263.7	0%	122.9	133.6	–8%
Ecuador	6,533	6,737	–3%	2,761	2,847	–3%	86.3	88.0	–2%	36.5	37.2	–2%
Paraguay[a]	3,900	3,824	2%	1,267	1,242	2%	23.0	22.6	2%	7.5	7.3	2%
Peru	6,466	6,452	0%	2,916	2,910	0%	176.0	176.0	0%	79.4	79.4	0%
Uruguay	9,266	9,266	0%	5,026	5,026	0%	30.6	30.6	0%	16.6	16.6	0%
Venezuela, RB	9,876	9,877	0%	5,449	5,449	0%	262.5	262.5	0%	144.8	144.8	0%
South America	**8,775**	**8,694**	**1%**	**4,625**	**4,582**	**1%**	**2,791.3**	**2,793.0**	**0%**	**1,471.3**	**1,472.0**	**0%**
Bahrain	27,236	33,451	–19%	18,019	22,132	–19%	20.2	24.2	–17%	13.4	16.0	–16%
Egypt, Arab Rep.	5,049	4,574	10%	1,412	1,231	15%	353.4	333.2	6%	98.8	89.7	10%
Iraq	3,200	..	..	1,214	..	..	89.5	..	..	33.9	..	..
Jordan	4,294	4,342	–1%	2,304	2,330	–1%	23.5	23.5	0%	12.6	12.6	0%
Kuwait[a]	44,947	43,551	3%	32,882	31,861	3%	110.4	110.4	0%	80.8	80.8	0%
Lebanon	10,212	9,545	7%	5,741	5,366	7%	38.3	38.3	0%	21.6	21.5	0%
Oman[a]	20,334	20,350	0%	12,289	12,299	0%	51.0	51.0	0%	30.8	30.8	0%
Qatar	68,696	70,716	–3%	51,809	53,333	–3%	55.8	56.3	–1%	42.1	42.5	–1%
Saudi Arabia[a]	21,220	21,220	0%	13,640	13,650	0%	490.6	490.6	0%	315.3	315.6	0%
Syrian Arab Republic	4,059	4,002	1%	1,535	1,493	3%	75.0	75.6	–1%	28.4	28.2	1%
Yemen, Rep.	2,276	2,188	4%	826	794	4%	46.2	46.2	0%	16.8	16.7	0%
West Asia	**5,123**	**4,825**	**6%**	**1,955**	**1,836**	**6%**	**612.4**	**597.3**	**3%**	**233.7**	**227.3**	**3%**

a. Country estimates for WDI 2005 were based on regression estimates for 1993–96 extrapolated forward to 2005. Regional totals and averages do not take into account regression numbers or countries that don't have WDI estimate.

Sources: 2005 ICP Final Results, WDI database (April 2008).

APPENDIX H

Estimation of Between-Region Linking Factors

Linking Regions: A Step-by-Step Numerical Example

A very important feature of the 2005 ICP was that PPPs were first computed separately for each region and the Eurostat-OECD using methodology most suited to its economic situation and capabilities. The need to calibrate the regional PPPs to a common world currency led to the development of the ring methodology that was used to link the regions. The following paragraphs provide an example showing the steps taken using ring prices to calibrate the regional PPPs to a common currency. The example shows how the ring prices for each region are converted to a common regional currency using regional PPPs from which regional PPPs are computed.

Steps 1 and 2. This table shows ring prices for a basic heading with 10 products for the ring countries in regions I, II, and III. The ring prices for each country are in its national currency. The bottom line of the table shows the within-region basic-heading PPP for each country relative to the base country. (Note that countries A and E are the numeraire countries in regions I and II, respectively.)

Step 3. The ring prices for each country are divided by its regional PPP. This converts the ring prices in national currencies to the currency of the numeraire country for the region. Note that the prices for the numeraire countries remain the same.

Step 4. This table shows the results of the CPD regression on the three sets of prices shown in step 3. Region I was the numeraire for the CPD regression. For this basic heading, the PPP of region II to region I is 10.56.

Step 5. This shows the linking factors by country by region. Note that the linking factor for region I is 1.0. The linking factor for this basic heading in region II is 10.56. This is used for all countries in the region, not just the ring countries.

Step 6. The global PPP for each country is its within-region PPP times the regional PPP or linking factor.

An important feature is that the calibration of the regional PPPs to the global level is essentially a scalar adjustment. This preserves the relative relationships of the countries within region; thus it meets the fixity requirement.

FIGURE H1 LINKING FACTORS: NUMERICAL EXAMPLE

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Ring Prices—BH	Region I				Region II			Region III
Product	A	B	C	D	E	F	G	H
1	2	100		25	20	600		etc.
2	5		12			900	450	
3	6	270	15			1,000	400	
4		320	70		180	5,000		
5	8	280		120	120	2,000	500	
6		210	60		100		350	
7			50	140				
8		120	12	100	80	800		
9	2			10	25	1,500	150	
10					40		260	

2

PPPs (within region)	1	30	5	13	1	30	6	

3

Deflated prices	Region I				Region II			Region III
Product	A	B	C	D	E	F	G	H
1	2	100		25	20	600		etc.
2	5		12			900	450	
3	6	270	15			1,000	400	
4		320	70		180	5,000		
5	8	280		120	120	2,000	500	
6		210	60		100		350	
7			50	140				
8		120	12	100	80	800		
9	2			10	25	1,500	150	
10					40		260	

5

Regional coefficients (PPPs)			
Method	I	II	III
CPD	1	10.56	etc.

5 **6**

Country	Region	PPPs (within region)	Linking Factors	Global PPP
A	I	1	1	1
B	I	30	1	30
C	I	5	1	5
D	I	13	1	13
E	II	1	10.56	10.56
F	II	30	10.56	316.80
G	II	6	10.56	63.36
H	III	etc.	etc.	etc.

Base country for region I for the ICP: United States

Base region for the ICP: OECD

Source: 2005 ICP.

APPENDIX I

ICP Software

An important innovation introduced in the 2005 ICP by the World Bank is a suite of well-integrated and specialized software tools to support the collection, storage, validation, and processing of price data to produce PPPs at various levels of aggregation. Underlying these tools is a database in which individual and average prices of products can be stored in a secure manner. The database also stores the GDP expenditure weights (at the basic-heading level), spatial weights, exchange rates, and population data.

This set of software tools is called the ICP "ToolPack," which provides an end-to-end solution for the ICP process and introduces methodological rigor and best practices, as well as transparency in the computations. The ToolPack covers activities such as product list preparation for pricing, using structured product description; survey preparation; user and product outlet specification; price data collection and data entry; data validation at the country level; and data processing and data exchange between the regional coordinators and national coordinators. At the regional level, the ToolPack has a number of data validation tools for cross-country analysis across regions or subregions. Finally, the ToolPack has several innovative features for reporting on the price data aggregation to produce PPPs using a variety of statistical methods.

In the 2005 ICP round, several software components were developed. The following highlights some of the features and the ToolPack components that support them:

- **Product list preparation, using a structured product description (SPD) method.** This component helps in creating detailed product specifications for all categories of products used in the ICP. This supports a dialogue between global, regional, and national ICP coordinators and assists coordinators in comparing different products.
- **Price survey and data collection for household consumption items.** The price collection module (PCM) is designed for countries to collect price data on consumption items based on a product list and a survey framework created using another module of the ToolPack, the data processing module (DPM). The PCM has basic data validation features to correct data-entry errors and also has some data-auditing functions.
- **Data collection for government and gross fixed capital formation items.** Besides the household consumption item prices, which are collected using the PCM, the other major GDP categories of expenditure—construction, equipment, and compensation—

are not readily amenable for data collection using the PCM. Therefore, the data collection forms (DCF) module is now available, which is well integrated with the DPM for price data aggregation and index computation.

- **Data processing.** The ToolPack's DPM component is the main data-processing engine that can be used both by the national and regional coordinators. Depending on the user, the software presents the tools for validation needed at the national or the regional levels. For example, a national coordinator can use it for the initial checking of the individual price observations for each product in his or her country. Once he or she is satisfied with the individual price data, the national coordinator can then use the system to calculate the average prices for each product for which prices were collected in the country concerned. The countries have a choice in providing either individual prices or only the average product prices. The ToolPack accepts submissions from the countries in either form for further processing.
- **Country diagnostic reports.** These reports are produced in the DPM from country submissions and are reviewed by the region and communicated back to the national coordinator if there are issues with individual prices. The reports pinpoint the observation under question and the probable causes of the data errors, thereby making the dialog between regions and countries much more efficient.
- **Quaranta tables.** After the preliminary data cleaning is completed, the ToolPack provides a more broadly based set of editing processes. One of the main diagnostic tools used at this stage is the Quaranta table, named after Vincenzo Quaranta from the Italian national statistical office (ISTAT), who developed it as an editing tool for the Eurostat-OECD PPP program. The Quaranta table shows details of the product, the reference period, the mean, the highest and lowest observations, PPP, PLI, exchange rate, weight, and coefficient of variation (the standard deviation divided by the arithmetic mean) for each product within a basic heading, for each country.
- **Dikhanov tables.** Another important innovation introduced to assist in the editing phase of the 2005 ICP is the Dikhanov table, named after Yuri Dikhanov of the World Bank, who developed the methodology. It shows the relationships between product prices across the whole range of products up to the level of GDP for each country in a region, using the CPD model as the basis for aggregating and analyzing the prices data. For example, a particular feature of the Dikhanov table is a measure of the distribution of the prices actually provided by a country compared with the estimated (or predicted) prices generated by the CPD model. A positive residual means that the observed average price is greater than that estimated by the model, while a negative residual means that the estimated price is greater than the observed one. The residuals show by how much the data diverge from the mean estimates of the model. Large residuals indicate significant departures from the expected prices and can identify either unexpected variations in the product prices between countries or large variations in the prices for products within a country (or both). Any significant variation in one or the other of these variables can indicate an underlying problem with the price data or signal that a country may not be pricing the same item that the other countries did. The ToolPack implementation of the Dikhanov tables provides many options for comparing data anomalies at different levels of aggregation, from major GDP categories downward to the basic-heading level. Further, the ToolPack allows drilling down below the basic-heading level to the average product prices to be able to trace the cause for the deviations.
- **Equipment, construction, and compensation (ECC) data validation.** The data validation module (DVM) is yet another innovation of the ICP 2005 round for validating the average prices of construction components and the "construction systems" (that is, the equipment and compensation prices). This module compares the components of a price observation to better understand the differences in prices for the

same components across countries and to determine the causes of data anomalies. This module is also well integrated with the DVM so that after the data validation is done, the data can be processed further with the other expenditure categories.

- **Expenditure weights diagnostic module (WDM).** GDP expenditure weights are essential to the final index computations. The WDM gives the regions a tool to compare the GDP expenditures across all countries at the basic-heading or higher levels and to identify problem areas by computing statistical deviations across countries. The deviations work on the shares of expenditures at each level as a percentage of the total GDP.

Glossary

Actual individual consumption. Actual individual consumption is measured by the total value of household final consumption expenditure, nonprofit institutions (such as NGOs and charities) serving households' final consumption expenditure, and government expenditure on individual consumption of goods and services (such as education or health).

Additivity. The values of the national accounts aggregates of countries participating in a comparison are equal to the sum of the values of their components when both aggregates and components are valued at current national prices. Additivity requires this identity to be preserved when the values of the aggregates and their components are valued at international prices. An aggregation method is additive if, for each country being compared, it provides real values for basic headings that sum to the real values of the aggregates of which they are components. An additive aggregation method provides volumes that satisfy the average test for volumes, but are subject to the Gerschenkron effect (see below).

Aggregate. The sum of a set of transactions relating to a specified flow of goods and services in a given period, such as the total purchases made by resident households on consumer goods and services, the total expenditure by government on collective services, or the total value of gross fixed capital formation. The term "aggregate" is also used to mean the value of the specified set of transactions.

Aggregation. The procedure of computing PPPs above the basic-heading level. The process of weighting, summing, and averaging basic-heading PPPs to obtain PPPs for each level of aggregation up to and including GDP.

Alcoholic beverages and tobacco. Alcoholic beverages purchased for consumption at home; includes low or nonalcoholic beverages that are generally alcoholic, such as nonalcoholic beer; excludes alcoholic beverages sold for immediate consumption away from the home by hotels, restaurants, cafés, bars, kiosks, street vendors, automatic vending machines, and so forth. All purchases of tobacco by households, including purchases of tobacco in cafés, bars, restaurants, service stations, and so forth.

Balance of exports and imports. The free on board (f.o.b.) value of exports of goods and services, less the f.o.b. value of imports of goods and services. When no distinction between goods and services is required, it may be defined as the f.o.b. value of exports of goods and services, less the cost, insurance, and freight (c.i.f.) value of imports of goods and services.

Basic heading. The lowest level of aggregation of items in the GDP breakdown for which parities are calculated. In theory, a basic heading is defined as a group of similar well-defined goods or services. In practice, it is defined by the lowest level of final expenditure for which explicit expenditure weights can be estimated. Thus, an actual basic heading can cover a broader range of products than is theoretically desirable. Basic headings are the building blocks of a comparison. It is at the level of the basic heading that expenditures are defined, products selected, prices collected, prices edited, and PPPs first calculated and averaged.

Basket. A term often used for the common list of well-defined goods and services from which countries participating in a comparison make a selection of products to price for the purpose of compiling PPPs. Also referred to as "product list" or "item list."

Bias. A systematic error in a PPP or volume index. Bias can arise for a number of reasons, including failure to respect either representativity, comparability, or consistency; the price collection and measurement procedures followed; or the calculation and aggregation formula employed.

Bilateral comparison. See "binary comparison."

Binary comparison. A price or volume comparison between two countries that draws upon data only for those two countries. Also referred to as a "bilateral comparison."

Binary PPP. A PPP between two countries calculated using only the prices and weights for those two countries.

Bridge country. A country that provides the link or bridge between two separate comparisons involving different groups of countries. The bridge country participates in both comparisons and, by doing so, enables the countries in one comparison to be compared with the countries in the other comparison and vice versa.

Changes in inventories and valuables. Changes in inventories and valuables (including work in progress) consist of changes in (a) stocks of outputs that are still held by the units that produced them before their being further processed, sold, delivered to other units, or used in other ways and (b) stocks of products acquired from other units that are intended to be used for intermediate consumption or for resale without further processing; they are measured by the value of the entries into inventories, less the value of withdrawals and the value of any recurrent losses of goods held in inventories. PPPs are not estimated directly; instead, they are imputed using PPPs for consumer goods equipment.

Characteristics. The physical and economic attributes of a product that serve to identify it and enable it to be located under some heading of a product classification; the technical parameters and price-determining properties of a product listed in a product specification.

Clothing and footwear. Includes expenditures on clothing materials; garments for men, women, and children; other articles of clothing and clothing accessories; cleaning, repair, and hire of clothing; all footwear for men, women, and children; and repair and hire of footwear.

COFOG (classification of the functions of government). Classifies transactions by general government—including outlays on final consumption expenditure, intermediate consumption, gross fixed capital formation, and capital and current transfers—by function or purpose. A major use of COFOG is to identify which final consumption expenditures of general government benefit households individually and which benefit households collectively.

COICOP (classification of individual consumption according to purpose). Classifies the individual consumption expenditures of three institutional sectors—households, NPISHs, and general government—by the ends that they wish to achieve through these expenditures. Individual consumption expenditures are those that are made for the benefit of individual households. All final consumption expenditures by households and NPISHs are defined as individual, but only the final consumption expenditures by general government on individual services are treated as individual.

Collective consumption expenditure by government. Expenditures incurred by general and local governments for collective consumption services such as defense, jus-

tice, general administration, and the protection of the environment.

Communication. Includes expenditures on postal services and on telephone and telefax equipment and services.

Comparability requires participating countries to price products that are identical or, if not identical, equivalent. Pricing comparable products ensures that differences in prices between countries for a product reflect actual price differences and are not influenced by differences in quality. Two or more products are said to be comparable if either

- Their physical and economic characteristics are identical or
- They are sufficiently similar that consumers are generally indifferent between them.

Compensation of employees. All payments in cash and in kind made by employers to employees in return for work done by them during the accounting period. These payments comprise gross wages and salaries in cash and in kind, employers' actual social contributions, and imputed social contributions.

Component. A subset of goods and/or services that make up some defined aggregate.

Consistency. The requirement that the prices collected by countries are consistent with the prices underlying their estimates of final expenditure on GDP. In most cases, this means that they should be national annual purchasers' prices. At the basis of a comparison is the identity—expenditure = price multiplied by volume—and volumes are obtained by dividing expenditures by prices. Using prices that do not correspond to those used to derive the expenditures will result in the volumes being either underestimated or overestimated.

Construction. Includes the construction of new structures and the renovation of existing structures. Structures include residential buildings, nonresidential buildings, and civil engineering works.

Consumer durables. Durable goods acquired by households for final consumption (that is, those that are not used by households as stores of value or by unincorporated enterprises owned by households for purposes of production); they may be used for purposes of consumption repeatedly or continuously over a period of a year or more.

Consumption of fixed capital. The reduction in the value of the fixed assets used in production during the accounting period, resulting from physical deterioration, normal obsolescence, or normal accidental damage.

CPD method (country-product-dummy method). The multilateral method used by the ICP to obtain transitive PPPs at the basic-heading level through regression analysis. It treats the calculation of PPPs as a matter of statistical inference, an estimation problem rather than an index number problem. The underlying hypothesis is that, apart from random disturbance, the PPPs for individual products within a basic heading are all constant between any given pair of countries. In other words, it is assumed that the pattern of relative prices of the different products within a given basic heading is the same in all countries. It is also assumed that each country has its own overall price level for the basic heading and that it is that which fixes the levels of absolute prices of the products in the basic heading for the country. By treating the prices observed in the countries for the basic heading as random samples, the PPPs between each pair of countries and the common pattern of relative prices can be estimated using classical least-square methods. The method allows sampling errors to be estimated for the PPPs.

Deflation. The division of the current value of some aggregate by a price index—described as a "deflator"—to value its quantities at the prices of the price reference period.

ECP (European Comparison Program). The ICP regional program for Europe carried out under the auspices of the United Nations Economic Commission for Europe. It is organized by Eurostat, the OECD, the Interstate Statistical Committee of the Commonwealth of Independent States, and the State Committee of the Russian Federation on Statistics.

Education. Includes expenditures by households on preprimary, primary, secondary, postsecondary, and tertiary education; also includes expenditures by government on education benefits and reimbursements and on production of education services.

EKS method (Éltetö-Köves-Szulc method). The method used to aggregate basic-heading PPPs to obtain PPPs for each level of aggregation up to and including GDP. Strictly speaking, the EKS method is a procedure whereby any set of intransitive binary index numbers are made transitive. The procedure is independent of the method used to calculate the basic-heading intransitive binary indexes. The method used to obtain the intransitive binary PPPs for a basic heading or aggregate involves calculating first a matrix of Laspeyres-type PPPs, then a matrix of Paasche-type PPPs, and finally, by taking the geometric mean of the two, a matrix of Fisher-type PPPs. The Fisher-type PPPs are made transitive and multilateral by applying the EKS procedure, which involves replacing the Fisher-type PPP between each pair of countries by the geometric mean of itself squared and all the corresponding indirect Fisher-type PPPs between the pair obtained using the other countries as bridges. The resulting EKS PPPs provide real final expenditures that are not additive nor subject to the Gerschenkron effect. EKS results are considered to be better suited to comparisons across countries of the price and volume levels of individual aggregates.

Error. The difference between the observed value of a PPP or volume index and its "true" value. Errors may be random or systematic. Random errors are generally referred to as "errors." Systematic errors are called "biases."

Expenditure categories. The level of aggregation between main aggregates and expenditure groups.

Expenditure weights. The shares of expenditure components in current-price GDP.

Exports of goods and services. The value (f.o.b.) of exports of goods and services.

Final consumption consists of goods and services used up by individual households or the community to satisfy their individual or collective needs or wants.

Final expenditure consists of final consumption expenditure and gross fixed capital formation.

Fisher-type PPP. The PPP for a basic heading or an aggregate between two countries that is defined as the geometric mean of the Laspeyres-type PPP and the Paasche-type PPP for the basic heading or the aggregate. See also "Laspeyres-type PPP" and "Paasche-type PPP," because their formulation depends on whether they are being used to calculate basic-heading PPPs or to aggregate basic-heading PPPs.

Fixity. The convention whereby the price and volume relativities between a group of countries that were established in a comparison covering just that group of countries remain unchanged, or fixed, when the countries of the group are included in comparisons with a wider group of countries. For example, the price and volume relativities of the ICP regions and Eurostat-OECD remain unchanged in the global comparison.

Food and nonalcoholic beverages. Food products and nonalcoholic beverages purchased for consumption at home. Excluded are food products and beverages sold for immediate consumption away from the home by hotels, restaurants, cafés, bars, kiosks, street vendors, automatic vending machines, and so forth; cooked dishes prepared by restaurants for consumption off their premises; cooked dishes prepared by catering contractors, whether collected by the customer or delivered to the customer's home; and products sold specifically as pet foods.

Furnishings, household equipment, and household maintenance. Includes expenditures on furniture and furnishings; carpets and other floor coverings; household textiles; household appliances; glassware, tableware, and household utensils; tools and equipment for house and garden; and goods and services for routine household maintenance.

GDP. Gross domestic product, expenditure-based, is total final expenditures at purchasers' prices, including the f.o.b. value of exports of goods and services, less the f.o.b. value of imports of goods and services.

General government. The institutional sector that consists of central, regional, state, and local government units, together with social security funds imposed and controlled by those units. It includes nonprofit institutions engaged

in nonmarket production that are controlled and mainly financed by government units or social security funds. Also referred to as "government."

Gerschenkron effect. Applicable only to aggregation methods that use either a reference price structure (that is, each country's quantities are valued by a uniform set of prices) or a reference volume structure (that is, each country's prices are used to value a uniform set of quantities) to compare countries. For methods employing a reference price structure, a country's share of total GDP (that is, the total for the group of countries being compared) will rise as the reference price structure becomes less characteristic of its own price structure. For methods employing a reference volume structure, a country's share of total GDP will fall as the reference volume structure becomes less characteristic of its own volume structure. The Gerschenkron effect arises because of the negative correlation between prices and volumes.

GK method (Geary-Khamis method). An average-price method to compute PPPs and real final expenditures above the basic heading. It entails valuing a matrix of quantities, using a vector of international prices. The vector is obtained by averaging national prices across participating countries after they have been converted to a common currency with PPPs and weighted by quantities. The PPPs are obtained by averaging within participating countries the ratios of national and international prices weighted by expenditure. The international prices and the PPPs are defined by a system of interrelated linear equations that require solving simultaneously. The GK method produces PPPs that are transitive and real final expenditures that are additive. It has a number of disadvantages. One is that a change in the composition of the group can change significantly the international prices, as well as the relationships between countries. Another is that the real final expenditures are subject to the Gerschenkron effect, which can be large. GK results are considered to be better suited to the analysis of price and volume structures across countries.

Goods. Physical objects for which a demand exists, over which ownership rights can be established, and whose ownership can be transferred from one institutional unit to another by engaging in transactions on the market. They are in demand because they may be used to satisfy the needs or wants of households or the community or used to produce other goods or services.

Government final consumption expenditure. Expenditure, including imputed expenditure, incurred by general government on both individual consumption goods and services and collective consumption services.

Gross fixed capital formation. Measured by the total value of a producer's acquisitions, less disposals, of fixed assets during the accounting period, plus certain additions to the value of nonproduced assets (such as subsoil assets or major improvements in the quantity, quality, or productivity of land) realized by the productive activity of institutional units.

Health. Includes expenditures by households on medical products, appliances and equipment, outpatient services, and hospital services; also includes expenditures by government on health benefits and reimbursements and on production of health services.

Household. A small group of persons who share the same living accommodation; who pool some, or all, of their income and wealth; and who consume certain types of goods and services collectively, mainly food and housing. A household can consist of only one person.

Household final consumption expenditure. Expenditure, including imputed expenditure, incurred by resident households on individual consumption goods and services, including those sold at prices that are not economically significant.

Housing, water, electricity, gas, and other fuels. Includes expenditures on actual and imputed rentals for housing; maintenance and repair of the dwellings; water supply and services related to the dwellings; and electricity, gas, and other fuels.

ICP (International Comparison Program). Started as a research project in the 1960s with the ultimate goal of

establishing a regular program of worldwide PPP comparisons of GDP. Comparisons were organized for 1970, 1973, 1975, 1980, 1985, and 1993. They covered 10, 16, 34, 60, 64, and 83 countries, respectively. Responsibility for these comparisons was shared by the United Nations Statistics Division and the University of Pennsylvania. The World Bank is the current global coordinator of the ICP.

Ikle method. An average-price method to compute PPPs and real final expenditures above the basic heading. It entails valuing a matrix of quantities, using a vector of international prices. The vector is obtained by averaging national prices across participating countries after they have been converted to a common currency with PPPs. The Ikle weighting scheme is based on real expenditure structures. The PPPs are obtained by averaging within participating countries the ratios of national and international prices weighted by expenditure. The international prices and the PPPs are defined by a system of interrelated linear equations that require solving simultaneously. The Ikle method produces PPPs that are transitive and real final expenditures that are additive. Compared to the GK, the Ikle minimizes the Gerschenkron effect. Ikle results are considered to be better suited to the analysis of price and volume structures across countries.

Imports of goods and services. The value (c.i.f.) on imports of goods and services.

Indirect comparison. A price or volume comparison between two countries made through a third country. For example, in the case of countries A, B, and C, the PPP between A and C is obtained by dividing the PPP between A and B by the PPP between C and B as follows: PPPA/C = PPPA/B / PPPC/B.

Individual consumption expenditure by government. The actual and imputed final consumption expenditure incurred by general government on individual goods and services.

Individual consumption expenditure by households. The actual and imputed final consumption expenditure incurred by households on individual goods and services; also includes expenditure on individual goods and services sold at prices that are not economically significant. By definition, all final consumption expenditures of households are for the benefit of individual households and are individual. Also referred to as "final consumption expenditure of households" and "household final consumption expenditure."

Individual consumption expenditure by NPISHs. The actual and imputed final consumption expenditure incurred by nonprofit institutions serving households (NPISHs) on individual goods and services. In practice, most final consumption expenditures of NPISHs are individual in nature, and so, for simplicity, all final consumption expenditures of NPISHs are treated by convention as individual. Also referred to as "final consumption expenditure of NPISHs" and "social transfers in kind."

Intermediate consumption. The value of the goods and services, other than fixed assets, that are used or consumed as inputs by a process of production.

International dollars. The purchasing power parities at the global level for each economy are computed with the United States = 1.00, making it the numeraire currency. These PPP conversion factors transform GDP and aggregates in national currency into a common world currency referred to as "real expenditures in the international dollar." To remove the effect of the U.S. exchange rate, indexes of real expenditure per capita at the world = 100 reflect the ratio of national real expenditures per capita to the world average real expenditures per capita.

Item. A good or service precisely defined for use in price observation. A good or service defined by an item specification and included on an item list. Countries select the items they price from among the items included on the item list. Also referred to as "product."

Machinery and equipment. Includes fabricated metal products, general purpose machinery, special purpose machinery, electrical and optical equipment, transport equipment, and other manufactured goods.

Miscellaneous goods and services. Includes expenditures on personal care, personal effects, social protection, insurance, and financial and other services.

Multilateral comparison. A price or volume comparison of more than two countries simultaneously that produces consistent relations among all pairs of countries (that is, one that satisfies the transitivity requirement).

Net exports are the difference in value between the total exports and total imports of an economy during a specific period of time.

Net purchases from abroad. Purchases by resident households outside the economic territory of the country, less purchases by nonresident households in the economic territory of the country.

NPISHs (nonprofit institutions serving households). Nonprofit institutions that are not predominantly financed and controlled by government, whose main resources are voluntary contributions by households, and that provide goods or services to households free or at prices that are not economically significant.

Numeraire currency. The term used for the currency unit selected to be the common currency in which PPPs and final expenditures on GDP (nominal and volumes) are expressed. The numeraire is usually an actual currency (such as the U.S. dollar), but it can be an artificial currency unit developed for the purposes of PPP comparisons.

Other products. Products of agriculture, forestry, fisheries, and aquaculture, as well as software products.

Per capita volumes. Standardized measures of volume, which indicate the relative levels of the product groups or aggregates being compared, after adjusting for differences in the size of populations between countries. At the level of GDP, they are often used to compare the economic well-being of populations. They may be presented either in relation to a particular currency or as an index number.

PLI (price level index) for a basic heading is the ratio of the basic-heading PPP to the exchange rate. It is expressed as an index on a base of 100. A PLI that is greater than 100 means that, when the national average prices are converted at exchange rates, the resulting prices within the basic heading tend to be higher, on average, than prices in the base country (or countries) of the region (and vice versa). At the level of GDP, they provide a measure of the differences in the general price levels of countries. PLIs are also referred to as "comparative price levels (CPLs)."

Product specification. A description or list of the characteristics that can be used to identify a product selected for pricing. Its purpose is to ensure that countries price comparable items. A product specification can be either brand- and model-specific (that is, a specification in which a particular brand and model or a cluster of comparable brands [and possibly models] is stipulated) or generic (that is, a specification where only the relevant price-determining and technical characteristics are given and no brand or cluster of brands is designated.

Productivity adjustment. An adjustment made to the prices paid by nonmarket producers for labor, capital, and intermediate inputs so that they correspond to a common level of multifactor productivity; in practice, an adjustment made to the prices (compensation of employees) paid by nonmarket producers for labor so that they represent the same level of labor productivity.

Products. Goods and services that are the result of production. They are exchanged and used for various purposes: as inputs in the production of other goods and services, as final consumption, or for investment. Also referred to as "goods and services," "commodities," or "items."

Purchaser's price. Amount paid by the purchaser, excluding any deductible VAT or similar deductible tax, to take delivery of a unit of a good or service at the time and place required by the purchaser; the purchaser's price of a good includes any transport charges paid separately by the purchaser to take delivery at the required time and place.

PPP (purchasing power parity) between two countries, A and B, is a price ratio that measures the number of units of country A's currency that are needed in country A to purchase the same quantity of an individual good or service as one unit of country B's currency will purchase in country B.

Real final expenditures. National final expenditures on GDP that have been converted to a common currency and valued at a uniform price level with PPPs. Expenditures so converted reflect only volume differences between countries. Also referred to as "real values."

Recreation and culture. Includes expenditures on audiovisual, photographic, and information-processing equipment; other major durables for recreation and culture; other recreational items and equipment; gardens and pets; recreational and cultural services; newspapers, books, and stationery; and package holidays.

Reference PPPs are PPPs that are used for basic headings for which no prices are collected; they are based on prices collected for other basic headings.

Representative product is one that accounts for a significant share of the expenditures within a basic heading in the country in question.

Representativity. A concept that relates to individual products within the same basic heading and to the product list for a basic heading.

Representativity of a product within a basic heading is defined in terms of a specific country. A product is either representative or unrepresentative of the price level in country A for a given basic heading, irrespective of the relative importance of the basic heading with respect to other basic headings. It is representative if, in country A, the price level of the product is close to the average for all products within the basic heading. Usually, though not necessarily, the purchases of the product will account for a significant proportion of the total purchases of all products covered by the basic heading. If not, the product will be sold in at least sufficient quantities for its price level to be typical for the basic heading.

Restaurants and hotels. Includes food products and beverages sold for immediate consumption away from the home by hotels, restaurants, cafés, bars, kiosks, street vendors, automatic vending machines, and so forth; cooked dishes prepared by restaurants for consumption off their premises; cooked dishes prepared by catering contractors, whether collected by the customer or delivered to the customer's home. Also includes expenditures on accommodation services provided by hotels and similar establishments.

Seasonal products. Products for which both prices and the quantities sold vary significantly throughout the year. Typically, the patterns of variation are repeated from one year to the next. Seasonal products vary from country to country.

Services. Outputs produced to order that cannot be traded separately from their production. Ownership rights cannot be established over services and, by the time their production is completed, they must have been provided to the consumers. An exception to this rule is a group of industries, generally classified as service industries, some of whose outputs have characteristics of goods. These industries are those concerned with the provision, storage, communication, and dissemination of information, advice, and entertainment in the broadest sense of those terms. The products of these industries, where ownership rights can be established, may be classified either as goods or services, depending on the medium by which these outputs are supplied.

SNA93 (System of National Accounts, 1993). A coherent, consistent, and integrated set of macroeconomic accounts, balance sheets, and tables based on a set of internationally agreed-upon concepts, definitions, classifications, and accounting rules.

Stocks—changes in inventories (including work in progress) consist of changes in

- Stocks of outputs that are still held by the units that produced them before their being further processed, sold, delivered to other units, or used in other ways and
- Stocks of products acquired from other units that are intended to be used for intermediate consumption or for resale without further processing; they are measured by the value of the entries into inventories, less the value of withdrawals and the value of any recurrent losses of goods held in inventories. PPPs are not estimated directly; instead, they are imputed using PPPs for consumer goods equipment.

Taxes on production. Taxes on the goods and services produced as outputs by resident enterprises that become pay-

able as a result of the production of these goods or services (that is, taxes payable per unit of good or service produced, such as excise duties and nondeductible VAT), plus taxes that resident enterprises may pay as a consequence of engaging in production (taxes such as payroll taxes and taxes on motor vehicles). The former are called "taxes on products," and the latter are called "other taxes on production."

Transitivity. The property whereby the direct PPP between any two countries (or regions) yields the same result as an indirect comparison via a third country (or region). It is sometimes referred to as "circularity."

Transport. Includes expenditures on purchase of vehicles, operation of personal transport equipment, and transport services.

Valuables. Produced assets that are not used primarily for production or consumption, that are expected to appreciate (or at least not decline in real value), that do not deteriorate over time in normal conditions, and that are acquired and held primarily as stores of values.

VAT (value added tax). A tax on products collected in stages by enterprises. It is a wide-ranging tax usually designed to cover most or all goods and services. Producers are obliged to pay to government only the difference between the VAT on their sales and the VAT on their purchases for intermediate consumption or capital formation. VAT is not usually levied on exports.

Volume measures are obtained by using PPPs to convert final expenditures on product groups, major aggregates, and GDP of different countries into a common currency, valuing them at a uniform price level. They are the spatial equivalent of a time series of GDP for a single country expressed at constant prices. They provide a measure of the relative magnitudes of the product groups or aggregates being compared. At the level of GDP, they are used to compare the economic size of countries. They may be presented either in relation to a particular currency or as an index number.

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