

3. The Price and Volume of International Trade: Background, Purpose, and Uses of Export and Import Price Indices

A. Background and Origins of Price Indices

3.1 Export and Import Price Indices (XMPIs) are used for a variety of different purposes (see Section E, below). There is a general public interest in knowing the extent to which the prices of goods and services have risen. Also, it has long been customary in many countries to adjust levels of wages, pensions, and payments in long-term contracts in proportion to changes in relevant prices, a procedure known as index linking or contract escalation. Price indices have a long history for this reason.

3.2 A very early example is a simple index compiled by William Fleetwood in 1707, which was intended to estimate the average change in the prices paid by Oxford University students over the previous two and half centuries. Another 18th century example is an index compiled by the legislature of Massachusetts in 1780 in order to index the pay of soldiers fighting in the Revolutionary War against England (see Diewert, 1993a, for an account of the early history of index numbers).

3.3 During the 19th century, interest in price indices gathered momentum. In 1823 Joseph Lowe published a study on agriculture, trade, and finance in which he developed the concept of a price index as the change in the monetary value of a selected set, or basket, of goods and services, an approach still used today. He also noted the various uses for a price index, such as the linking of wages and rents, and the calculation of real interest. Diewert (1993a) argues that Lowe can be considered “the father of the consumer price index.” Later in the 19th century further important contributions were made, including those of Laspeyres (1871) and Paasche (1874), whose names are associated with particular types of price indices that are still widely used. Marshall (1887) advocated the use of chain indices, in which indices measuring price movements from one year to the next are linked together to measure price movements over longer periods of time.

3.4 During the 1920s several important developments occurred. In 1922, Irving Fisher published his monumental work, *The Making of Index Numbers*. This was prompted by Fisher’s interest in inflation and his advocacy of the Quantity Theory of Money, in which changes in the money supply were held to lead to corresponding changes in the price level. A good measure of changes in the price level was needed—that is, a good price index—which led him into a systematic investigation of the properties of hundreds of different kinds of possible formulas for price indices.

3.5 Fisher’s preferred index, the geometric average of the indices advocated by Laspeyres and Paasche, is now known as the Fisher index. As summarized in Chapter 1 of this *Manual*, the Fisher index (or the closely related Törnqvist index) remains the preferred measures from a theoretical point of view for most purposes. From the perspective of the *economic approach to index number theory*, these indices have been shown in most circumstances to

provide an unbiased estimate of changes in the cost of living for consumers and for price changes for firms that maximize revenue and minimize costs. The full details of the economic approach to the XMPI are discussed in Chapters 18. The Fisher index number formula can also be justified from the perspective of averaging two equally plausible fixed-basket index number formulas (the Laspeyres and Paasche formulas) and this justification is presented in Chapter 16. The Fisher index also has a strong justification from the viewpoint of the *test approach to index number theory*, which is discussed in Chapter 17. The Törnqvist formula can also be justified from the viewpoint of the *stochastic approach to index number theory*, which is also discussed in Chapter 17.

3.6 In 1924, Konüs published a seminal paper laying down the foundations for the economic theory of the cost of living index, or COL index. A COL index is designed to measure the change in the cost of maintaining a given standard of living (or utility or welfare) as distinct from maintaining sufficient purchasing power to buy a fixed set of goods and services. In reality, consumers do not go on purchasing the same set of goods and services over time but adjust their expenditures to take account of changes in relative prices and other factors. The producer counterpart to the consumer's cost of living index is the *fixed-input output price index*. This *economic approach* to the theoretical foundations for the XMPI was not fully developed until the 1970s: see Fisher and Shell (1972), Samuelson and Swamy (1974), and Archibald (1977). This approach is pursued in Chapter 18.

3.7 In 1926, Divisia published a paper in which he proposed price and quantity indices that factor the change in the monetary value of some aggregate flow of goods and services over time continuously and instantaneously into its price and quantity components. While Divisia's approach to index number theory is not immediately applicable, since price and quantity data are not available on a continuous basis, the Divisia index is useful conceptually when one has to choose between fixed-base indices or chained indices. The Divisia index and its connection with the chain principle for constructing index numbers are discussed in Chapter 16, section E.

3.8 Thus, by 1930 the theoretical foundations (from all of the above perspectives) for the compilation of price indices, including XMPs, had been laid. While there have been many refinements to index number theory from both an economic and statistical viewpoint during the mid- and late-20th century, the essential elements were already in place early in the century. Developments in index number theory and practice over the past few decades are dealt with in detail in various chapters in this *Manual* and will not be summarised here, except to note that all of the above approaches lead to a very small number of index number formulas as being designated "best." In particular, the Fisher formula emerges as being "best" from the perspectives of the economic, test (axiomatic), and averaging of fixed-basket indices approaches, whereas the Törnqvist formula emerges as being "best" from the perspectives of the economic and stochastic approaches. The purpose of this brief historical survey has been to place the contents of this *Manual* in a longer-term perspective and to show that the measurement of price changes, or inflation, has long been recognized to be theoretically challenging as well as practically important.

B. Official Price Indices

3.9 As noted, there has always been considerable interest in, and demand for, price indices from the general public as well as governments. The 1780 index, referred to in the previous section, was specifically commissioned by a government agency in order to adjust the pay of soldiers in its employment. It is now generally acknowledged that governments have an obligation to provide the community and not merely themselves with information about price movements in the economy. A price index is a public good.

3.10 The practice of index-linking wages has a long history. Index linking means that the wage rate or material costs are adjusted in proportion to the change in some specified price index, the purpose being to maintain the real purchasing power of wages over the kinds of goods and services typically consumed by wage earners. As explained later in this chapter, a major use of the XMPI is to make adjustments in long-term contracts for changes in material costs. For such applications the specification of the index that is to be used can be a matter of some controversy. Whatever the exact formula used, index linking has important financial implications both for those making and receiving the payments in question. This in turn implies that there is a need for impartial, independent, objective, reliable, and credible price indices. The responsibility for compiling price indices must therefore be entrusted to a statistical agency that has both sufficient resources and the necessary independence from pressure groups of various kinds. This provides a second reason why governments find themselves under an obligation to compile and publish price indices, or at least to supervise and monitor whatever agency is entrusted with the responsibility.

3.11 In practice, the government agency that is given the responsibility to compile and publish XMPIs is usually the statistics office or bureau, the central bank, or the customs authority (for goods exports and imports only). The central bank may be entrusted with the task of compiling XMPIs because in open economies the export and import prices are important determinants of domestic inflation, which most central banks want to control using the instruments of monetary policy.

3.12 Price indices for industrial commodities also have a long history. In Canada a wholesale price index (WPI) of 89 commodities was compiled using an unweighted geometric mean for the period 1867–1890. After that the index was expanded to cover more commodities and to use a Laspeyres index. The first industrial commodities index in the United States was produced in 1902 (covering the period 1890–1901), using an unweighted average of price relatives for about 250 commodities. This index was developed in response to a U.S. Senate Finance Committee request for an investigation into the effects of tariff laws on prices of domestic and foreign agricultural and manufactured products. A system of weighting was first used in 1914. The original index was also referred to as the WPI because it covered commodity prices before they reached retail markets.

3.13 In Europe, the first WPI for the United Kingdom was prepared by the Board of Trade and presented to Parliament in 1903. The price reference year was 1871, and the series covered the years from 1871 to 1902. The prices were mainly derived from the trade accounts, with weights estimated from different commodities used, or consumed, in the country between 1881 and 1890. This index covered of 45 commodities, mainly basic

materials and foodstuffs. Following World War II, a number of countries also began collection of data on wholesale prices of commodities in an effort to measure price changes at an earlier level in the production process. Around 1970 Eurostat, the Statistical Office of the European Union (EU), began a systematic program to encourage members to collect industrial output prices in an effort to get information on prices as products left producers' factories. These price indices were thus called producer price indices—PPIs—because they attempted to measure the change in prices producers received at the factory gate. In the past 5–10 years, many national statistical agencies have been progressively extending coverage of their national PPIs to measure changes in service industry prices, which in many countries now account for nearly two-thirds of GDP.

3.14 PPIs usually are compiled monthly, although some countries compile them only quarterly. Countries also try to publish them as soon as possible after the end of the month to which they refer, sometime within two weeks of the reference month. Moreover, most countries prefer not to revise them once they have been published. In contrast to many other kinds of statistics, most of the required data, at least on prices, can be collected at the same time.

3.15 PPIs have two characteristics that users find important. They are published *frequently*, usually every month but sometimes every quarter. They are available *quickly*, usually about two weeks after the end of the month or quarter. PPIs tend to be closely monitored and attract a lot of publicity. In many countries the PPI is not revised once it is published, which is viewed as an advantage by many users.¹

3.16 The Export and Import Price Indices (XMPIs) usually are thought of in connection with customs records, because these have traditionally been the main source information. These records pertain only to goods in almost all countries, as well as the shipping and insurance services involved in the transport of imports. As such, they traditionally have been compiled for goods as indices of the *unit values* of detailed customs classes. As discussed in Chapters 2 and 5, detailed customs goods classes rarely contain only one product. Thus unit values will suffer from composition effects, wherein the product composition of the unit value for a given customs class varies from period to period. This can cause the unit value price relative from period to period to change even if the prices of the component products have not. Thus the unit value price index tends to be biased in unpredictable directions. Of course, bias in one direction of the unit value price implies bias in the opposite direction of the customs volume index. Comparisons with survey-based data illustrate the extremely volatile nature of unit value indices (see references in Chapter 2).

3.17 As a result, a number of countries have discontinued computing the price relatives for some or all of the detailed classes of their XMPIs as unit values. They instead directly survey establishments engaged in international trade to record the prices received by exporters and

¹In most countries both the XMPI and CPI are not subject to revision once published unless an error is discovered in price collection or compilation. In a number of countries, however, it is standard practice to revise the XMPI once more complete information is available. For example, in the United States the XMPI is revised with a three-month lag; that is, the most recent three months are preliminary (subject to revision), while the fourth month's data are final.

paid by importers to form the detailed price relatives and indices comprising their XMPIs.² Customs unit values and these surveys are the subject of Chapters 2 and 6.

C. International Standards for Price Indices

3.18 Once a statistic is accorded official status and given some prominence, the establishment of international standards usually follows. International standards are needed for several reasons—and not merely in order to compile internationally comparable statistics. The first international standards for XMPIs were promulgated in 1981 by the United Nations. The UN Statistical Commission at its 19th session requested the preparation of manuals on the practical aspects of collecting and compiling price and quantity statistics within the overall framework of the *Guidelines on Principles of a System of Price and Quantity Statistics*, which was issued in 1977. The UN Statistical Office released the *Manual on Producers' Price Indices for Industrial Goods* in 1979 to provide practical guidance on the preparation of industrial PPIs, and *Strategies for Price and Quantity Measurement in External Trade* was released in 1981 to provide guidance on XMPIs.

3.19 This *Manual* discusses revised and updated methods for XMPI compilation based on current practice and recent developments in price index number theory.

3.20 Some international statistical standards are developed primarily to enable internationally comparable data to be collected and published by international agencies such as the statistical offices of the UN, the ILO, the IMF, or the OECD. The publication of such data by an international agency is often seen as a guarantee that the data conform to internationally accepted standards even though this may not always be the case in practice. Although national statistical offices actually supply the data to the international agencies, their publication by the international agencies is often interpreted as a public endorsement of their reliability, which enhances their status and credibility even within their own country.

3.21 However, international standards are not developed simply to enable internationally comparable data to be compiled. Many countries choose to use them as norms or standards for their own statistics. In this way, small national offices with limited resources of their own benefit from the collective views and experience of experts from a wide range of countries on which the international standards are based.

C.1 Current revision

3.22 This *Manual* has been developed in response to several factors. A considerable amount of work on the methodology of price indices, covering both theoretical issues and optimal methods of calculation, was undertaken at an international level during the 1990s as a result of the formation of an international group of price experts. This group, the International Working Group on Price Statistics, established under the auspices of the United

² Among the countries that are exceptions to extensive use of customs unit values in trade price indices are Australia, Czech Republic (partially), Estonia, Latvia (non-homogenous goods), Mauritius (partially), Singapore, Sweden, United Kingdom (manufactured goods), and United States. These countries instead make substantial use of price surveys of narrowly defined products. See United Nations (2003).

Nations Statistical Commission, met for the first time in Ottawa in 1994 (and is therefore called the “Ottawa Group”). It brought together leading experts on price indices from national statistical offices and universities from around the world. During the course of its seven meetings through 2002, well over a hundred papers on the theory and practice of price indices have been presented and discussed. This collective activity at the international level has inevitably lead to some rethinking about, and elaboration of, the previous international standards on CPIs, PPIs, and XMPIs as embodied in the *ILO Manual on Consumer Price Indices* (Turvey and others, 1989), the *Manual on Producers' Price Indices for Industrial Goods* (UN, 1979), and *Strategies for Price and Quantity Measurement in External Trade* (UN, 1981). The current XMPI manual also incorporates approaches to the measurement of prices of services exports and imports. [and, as such, has benefited from review by the International Working Group on Service Sector Statistics (the Voorburg Group). *To be done.*]

3.23 Another factor is the high priority accorded to the control of inflation as a policy objective in most countries, after the experience of high, or even hyper, inflation in the past three decades of the 20th century. The slowing of inflation in many parts of the world in the 1990s, compared with the 1970s and 1980s, far from reducing interest in its measurement, has stimulated a demand for more accurate and reliable measures of inflation. Whereas an error or bias of 1, or even 2, percentage points in the annual rate of inflation may not be considered so important when inflation is running at 10, 20, or more percent, it becomes very significant when the rate of inflation itself is estimated to be only 1 or 2 percent. Inflation may slow down to the point at which it is not even clear whether prices are rising or falling, on average.

3.24 Users of CPIs in some countries have become convinced that the indices are subject to an upward bias, mainly as a result of their failing to make proper allowance for improvements in the quality of many goods and services, especially newer goods, such as computers, that are subject to rapid technological progress. The treatment of changing quality has long been recognized as particularly difficult on both conceptual and practical grounds. This topic has been intensively investigated, with numerous new studies on the subject appearing in the 1990s.

3.25 It has also been realized that, because of the widespread use of price indices for the index linking of social benefits such as pensions and other government payments and as an escalator for price adjustments to long-term contracts, the cumulative effects of even small potential biases can have considerable financial consequences for government budgets and private industry purchases over the long term. This has lead to governments themselves scrutinizing the accuracy and reliability of price indices more intensively than in the past.

3.26 Within the EU, the convergence of inflation was deemed to be an important prerequisite for the formation of a monetary union. This requires precisely defined price indices that are comparable between countries. An intensive and prolonged review of all aspects of the compilation of CPIs was undertaken during the 1990s by all the national statistical offices of the member countries of the EU in collaboration with Eurostat. This work culminated in the elaboration of a new set of international standards for the 29 member and candidate countries of the EU and led to the development of the EU’s Harmonised

Indices of Consumer Prices, or HICPs. Work on the HICPs proceeded in parallel with that of the Ottawa Group, many of whose experts also participated in the development of the HICPs.

3.27 The need for revising the ILO manual to incorporate these new developments was one of the major recommendations at the 1997 joint UNECE/ILO Meeting on the CPI. Similarly, the IWGPS (Inter-Secretariat Working Group on Price Statistics) came to the conclusion that a new PPI manual was long overdue as well as a manual on XMPIs.

3.28 Significant developments have taken place in the practice of price index construction that now necessitate a revision of the 1981 UN manual. Among these are emergence of the economies in transition, increased inflation, reality that XMPIs may overstate inflation even when international standards are followed, the need for constructing and publishing more than one index to meet specific requirements (for example, XMPIs by destination country of export and source country of import), etc.

C.2 Responsibilities of the international agencies

3.29 The traditional practice of index-linking wages and contracts in many countries has meant that, at both a national and an international level, ministries or departments concerned with economic policies and statistics have taken responsibility for XMPIs. However, many government departments—especially ministries of finance, economics, industry and trade, and of course central banks—are concerned about inflation and have acquired an interest in a variety of XMPIs as key indicators of inflation.

3.30 Similarly, all the international agencies concerned with general economic policy now attach importance to XMPIs and their movements. In addition, the IMF, the World Bank, the regional UN Economic Commissions, the Commission of the EU, the World Trade Organization (WTO), and the UN Commission for Trade and Development (UNCTAD) all have a strong interest in XMPIs. Some of these agencies have provided technical assistance in the compilation of XMPIs to countries in transition as well as to developing countries. The agencies therefore agreed to pool their resources and collaborate in the present revision of the *Export and Import Price Index Manual (XMPI Manual)*, establishing an Inter-Secretariat Group to manage the process.

C.3 Links between the new CPI, PPI, and XMPI Manuals

3.31 One of the first decisions of the IWGPS was to produce a manual on XMPIs parallel to the one on CPIs. Movements in producer prices are clearly important for the measurement of inflation and the analysis of the process of inflation within an economy. XMPIs have been comparatively neglected, however. Whereas there has been an international manual on CPIs for over 70 years, there has only been a manual on the XMPI covering industrial output for about 25 years.

3.32 This new *Export and Import Price Index Manual* was based, wherever appropriate, on the *Consumer Price Index Manual* (ILO and others, 2004) and *Producer Price Index Manual* (ILO and others, 2004). XMPIs and PPIs especially have a lot of methodology in common and this *Manual* draws heavily from the *PPI Manual*. Both draw on the same theoretical literature pertaining to index numbers. Whereas CPIs also draw on the economic theory of

consumer behavior, both PPIs and XMPIs draw on the economic theory of production and the short-term rigidities in the production process.³ The economic theory of all of these indices leads to the same kinds of conclusions with regard to index number compilation. It was therefore decided that the IWGPS *Manuals* should be similar in form and as consistent as possible, sharing common text when appropriate.

C.4 Inter-Secretariat Working Group and the Technical Expert Groups

3.33 Responsibility for the production of the *CPI*, the *PPI*, and the *XMPI Manuals* rested with the same Inter-Secretariat Group consisting of staff from the statistical offices, departments, or divisions of the ILO, the IMF, the World Bank, the UN, the OECD and the EU. Expert advice on the contents of the three *Manuals* was provided by three parallel technical expert groups consisting of invited experts on CPIs, PPIs, or XMPIs from national statistical offices and universities together with experts from the international agencies themselves. To ensure consistency, there was overlap of membership among the expert groups.

3.34 Most members of the technical expert groups also participated in meetings of the Ottawa Group, which supported the decision to revise the *CPI Manual* and to produce a new *PPI Manual*. The *Manuals* draw on the contents and conclusions of the papers presented at meetings of the Ottawa Group and the Voorburg Group, thus providing the outlets through which the conclusions of the Groups can exert an influence on the actual compilation of price indices. In addition, the *XMPI Manual* has been drafted with notification to and comment from the *Interagency Task Force on Trade Statistics*, comprising the WTO, UN Statistics Division (UNSD), UNCTAD, the World Customs Organization (WCO), the UN Regional Economic Commissions, the Commission of the EU, and other agencies.

D. Purpose of Export and Import Price Indices

D.1 Background

3.35 The XMPIs are a weighted average of the price changes in groups of products between one time period and another. The average price change over time cannot be directly

³ This is not strictly true as there usually is at least a small portion of expenditure on imports and receipts from exports that accrue directly to households as final consumption. A good example is “cross-border shopping,” which may be important in some countries. In this case, households may import by visiting a neighboring country where they buy goods and services and carry the goods or the result of the services back with them to their home countries. Exports can occur when the item purchased is a transportable durable good, such as an automobile. In this case, the transaction should be recorded as an import by the country of the purchasing household and as an export by the country of the selling household. If the durable is second-hand, since consumer durables are recorded in consumption on a net acquisitions basis, the import adds to the consumption expenditure of the importing country and subtracts equally from the consumption expenditure of the exporting country, leaving expenditure on gross domestic product (GDP) unchanged in both countries when the export and import effects are taken into account. If the durable is new, the export is subtracted from capital formation (change in inventories) if purchased from stock. Only if the durable is new and delivered directly to the buyer by the nonresident producer in the period it was produced will there be no offsetting negative final expenditure for the exporting country. See Chapter 15 for further discussion of the effects of international trade on final consumption expenditure.

observed and must be estimated by measuring actual prices at different points in time. Price index numbers are compiled from the collected price observations through time; their significance lies in a series of index numbers referencing the comparison prices between a particular period and a reference base. For an index to provide information on price changes, at least two index numbers from the same series need to be available, and these index numbers must relate to the same basket of goods.

3.36 The XMPIs do not attempt to measure the actual level of prices but are limited to the measurement of the average change in prices from one period to another. The XMPIs do not measure the value of international trade in goods and services, but they can be used to measure either the change in export or import prices owing to changes in the basic prices received by suppliers or, alternatively, the change in prices paid by the users of imported or exported goods and services.

3.37 There are several different pricing concepts that are used in price index measures and in foreign trade statistics. Among these are the basic prices received by producers vs. the purchasers' price paid and prices reported as free on board vs. inclusion of cost, insurance, and freight. Valuation differences in the observed prices will arise depending on which of these pricing concepts are applied. For example, the national accounts view exports and imports from a nonresident's point of view that reflect free on board prices at the country of origin. National statistical offices producing export and import price indices use a resident's point of view and may value exports at basic prices (factory gate) and imports at prices including cost, insurance, and freight. Differences in valuation are discussed in more detail in Chapter 3, section B.

3.38 There is no unique set of XMPIs (although, conceptually and practically, the scope for variations is not wide) since the prices of different combinations of goods and services do not all change at the same rate. Relative prices are changing all the time, with some prices rising and others falling. Because price changes can vary considerably from product to product, the value of the price index will be dependent on the precise set of goods and services it covers. It will also depend on the weights attached to the different kinds of products within the set.

3.39

3.40 The goods and services coverage of the XMPI varies across the world, but almost all cover goods in international trade, as well as the shipping and insurance services supplied on imports. Other internationally traded services, such as business, information, and financial services, also are in scope for the XMPI. Compilers are including them in XMPIs as well as PPIs and CPIs as international consensus forms on how to measure their prices and output.

D.2 Sources of inflationary pressure and price change

3.41 The MPI serves as one indicator of the economy's total supply of goods and services, the other being the PPI, which covers supply from domestic production. The XPI serves as one indicator of the economy's total demand for goods and services, the other demand price

indicators being the individual consumption deflator (built substantially from CPI components) and the capital formation deflator (built substantially from PPI components). The economy's final demand for goods and services is total demand less intermediate consumption. Finally, Gross Domestic Product, the premier indicator of economic performance, is final demand less imports. Thus the export price index influences the GDP price index directly, while the import price index influences the GDP price index inversely.

3.42 The MPI also often is used to analyze the contribution to intermediate consumption and capital formation price change arising from imported supplies of inputs. As such, it is an indicator of cost push inflation pressures of considerable interest to the central banks of open economies in executing monetary policy.

E. Uses of Foreign Trade Indices

3.43 Foreign trade indices, both in value and in volume, have many uses. The most important of these are the use in government economic policy, analysis of competitiveness, conclusion of trade contracts, measurement and forecasting of inflation, analysis of exchange rate, and the compilation of national accounts.

E.1 Government economic policy

3.44 Foreign trade indices are critical for government economic policy for several reasons. They enable the projection of budget figures and the forecasting of economic trends; second, they are essential for preparing negotiations with countries providing capital; and they help to conduct market surveys of strategic products.

3.45 Governments make regular projections in their budgets to determine the amount of additional revenue needed to finance current spending and investment programs. As a major component of government revenue, customs revenue is forecasted based on past trends in exports and imports values (quantity times price) that make up the tax base. Forecasts of revenue can be made for individual product groups based on the principal duty rates. Government budget and public spending program forecasts are in principle always part of a macroeconomic framework representing the economic performance projections for different sectors (such as agriculture, industry, and services) to ensure that budget and public spending program forecasts are consistent with the economic activities in question.

3.46 Customs revenue is often central in the negotiations between governments and foreign capital providers. International agencies often extend loans on the condition that national authorities successfully meet macroeconomic targets, such as the size of the government deficit to GDP. Accurate information regarding international targets is thus essential, both to the lender as well as to the authorities of the borrowing government. Accordingly, customs duties and foreign trade (prices and volumes), are closely monitored to ensure that the specified conditions on the flow of international finance are effectively met.

3.47 The breakdown of relative change over time of the value of exports and imports into price and volume components is needed to conduct economic analysis that supports the

development of macroeconomic and international trade policy, and to disseminate information needed for effective decision making.

E.2 Analysis of country competitiveness

3.48 An industry remains competitive only if its prices are kept in line with the market. Exporters have a critical interest in knowing the evolution of prices for products similar to their own from suppliers in other countries. On the other side of the market, importers also need to know about the evolution of the prices of the products they purchase to secure the least cost source among supplying countries.

3.49 Studies of competitiveness involve analyzing the evolution of prices, not only in the domestic currency, but also in the currencies of the country's main trading partners. For example, a country's stable export price index may mask a devaluation leading to higher competitiveness of the products that the country exports.⁴

E.3 Drawing up trade contracts

3.50 Businessmen and potential investors may conduct market surveys on a particular product, in which they analyze corresponding supply and demand, so as to identify whether the product could be profitable for production or export purposes. To increase the accuracy of such an analysis, it requires more detailed information about the product, such as existing world sources of supply relative to potential demand, price, and identification of the main exporters and main national trading partners.

3.51 Import and export prices are used for contract escalation to ensure that the payment for some output or input is equal in real terms to what was agreed upon when the contract was signed. Appropriate import price indices can be used as an escalator for a long-term contract signed by a manufacturing firm to purchase production inputs from abroad. Likewise, appropriate price indices can be used as an escalator for a long-term contract signed by an exporter to deliver a product to a foreign buyer.

E.4 Measuring inflation, forecasting future price trends

3.52 Foreign trade indices are also a critical factor explaining the evolution of domestic inflation. Import prices affect the level of domestic inflation in several ways. Decreasing import prices of final goods directly affect the overall level of prices in the economy. Import prices can also be a good indicator of future inflation in a country where many inputs to domestic production are imported. Declining prices of imported inputs to manufactured goods have an indirect impact on the level of output prices by lowering the cost of

⁴In a country with the schilling as the national currency, exporting coffee to the United States, for example, the export price index in schillings (S) for coffee shows zero inflation because the price of a kilogram is constant at S 100 in successive years, whereas the export price index in dollars (\$) shows a decline of 1.5 [(100/10)/(100/15)]. This is because the exchange rate (S/\$) increases (devaluation of the schilling) from \$1 = S 10 in the first year to \$1 = S 15 in the next.

production. More directly, if import prices for a product are falling, national producers of that product will have to lower their prices to preserve their competitiveness. Any seasonal or trend information embedded in the time series of import prices would contribute to the knowledge about future price levels.

E.5 Exchange rate analysis

3.53 To anticipate the effects of exchange rate adjustments, it is important to know the fraction of exchange rate movements that is passed on to the prices of exports and imports. The answer to this question depends on the extent to which the “law of one price” holds as well as pass-through rates.⁵ Pass-through rates measure the percentage of exchange rate changes that are passed through to the prices of imports and exports. If a local currency appreciates against foreign currencies, import prices will no doubt fall while export prices should rise. A depreciation of the local currency would have the opposite effect. Pass-through rates are usually between zero and 100 but can be negative if a change in the exchange rate has the opposite effect on export or import price indices; these rates can exceed 100 if the export or import price index changes by a greater magnitude than the exchange rate.⁶

E.6 Compilation of national accounts

3.54 Import and export data are very important in the compilation of national accounts constant price estimates. This applies, in particular, if this compilation of national accounts is based on expenditure components or on product balances. Imports are among the sources of supply of products to the economy; while exports are among the uses of products. The XMPIs used as deflators and the value aggregates for exports and imports must have prices valued on the same basis.

F. Family of XMPI's

3.55 As noted in Chapter 4, this *Manual* takes the position that there is only one economic valuation and timing basis for international goods and services trade flows: the change of ownership basis of the *1993 SNA* and the *BPM*. By implication, the buyer becomes liable for the cost of the good or service at its transaction value on the date of change of ownership. Any tariffs or other taxes levied in the course of the item's passage from source to destination, or any transport and distribution services, accrue on the date the importer or exporter becomes liable for the cost of them. The accrual dates for these services could differ from the change of ownership date of the good, and, if different, generally would be later than that date. This is less important in domestic statistics than for international trade, because some commodities can lie in entrepot inventory for a considerable period before a final destination is set for them. XMPIs constructed on these principles are the definitive set.

⁵The assumption of one price states that the price of an item, adjusted for tariffs and transport costs, is the same in all countries. Exchange rates account for differing price levels.

⁶The pass-through rate for imports is the ratio of the import price index deflated by the average exchange rate index.

3.56 The main recording system for trade in goods is customs documentation, typically tariff schedules, which captures the cost-insurance-freight value of goods when they cross the frontier of the importing country. Customs records exports via declaration forms at the time they embark toward a foreign destination, or international waters. Customs documents usually also record a quantity relevant to customs administration (and also relevant to determining shipping costs), typically in units, weight, and/or cubic volume displaced in shipment. As such, the customs basis for recording represents an alternative set of value, price, and volume statistics for international trade to the economic basis of the international statistical standards such as the *1993 SNA* and the *BPM*. For many types of goods, it may be qualitatively and quantitatively close to the standard. Compilers often use the customs basis estimates as a proxy for the economic concepts in the international standards, as noted in Chapters 2 and 4.

3.57 When there are measured differences between the economic basis and customs basis statistics, however, the economic basis for volume must prevail, as there is no competing theory of trade volume. Thus, price indices for customs-basis exports and imports necessarily are the economic price indices applicable to the balance of payments and national accounts, adjusted for the relative change in the ratio of the customs export or import aggregate with the economic export or import aggregate. We would note here that the typical customs quantity measures can be relevant for indexing the volume of shipping, insurance, and distribution services in international trade, but generally are not strictly relevant to determining the transactions volume of the goods being transported themselves. Again, they may serve as reasonable proxies for transactions volume in some cases.

F.1 Industry aggregation

3.58 Breakdowns of the XMPIs by the industries of the reporting establishments assist us in gauging the impact of world price movements by domestic industry, and facilitate constructing price indices for intermediate consumption in the national accounts.

F.2 Macroeconomic aggregations

3.59 High-level aggregations of the XMPIs, such as total exports and imports contribute to the price index for GDP by accounting for the price change in net exports. Their direction of trade statistics—exports and imports by destination or source country, respectively—may also contribute to our understanding of how exchange rates and bilateral trading conditions affect the rates of change in export and import prices.

F.3 Commodity analysis

3.60 Analysis of MPIs by commodity reveals the sources of inflationary pressure from imports, which may be priced in international markets and thus outside the control of domestic agencies. A particularly important example is the price change of crude oil. Aggregations of commodities can also be constructed to show the total impact of commodity price change on the economy. Analysis of the XPI by commodity contributes to our understanding of demand pull price pressures on domestic production capacity. When the terms of trade are viewed as the relative rate of change in the prices of a country's package of

exports with its package of imports, commodity breakdowns allow us to see how world commodity price movements contribute to movements in the terms of trade for a given country.

F.4 Stage of Production

3.61 A further method for analysis is to aggregate by stage of production, in which each commodity is allocated to the stage in which it is used. This differs from stage of processing because a product is included in each stage to which it contributes and not assigned solely to one stage. The classification of products to the different stages is usually achieved by reference to input/output (I/O) tables in order to avoid multiple counting of the stages that are not aggregated. There is a growing interest in this type of analysis—for example, these types of indices are already compiled on a regular basis in Australia.⁷ EUROSTAT requires member states to supply export price indices (and where appropriate import price indices) by stage of production. This topic is also considered in Chapter 15. The XMPIs may be broken down with the same product stage of processing classification as the PPI.

F.5 Final Expenditure Price Index

3.62 A further variant is the final expenditure price index (FEPI). This measures prices paid by consumers, businesses, and government for final purchases of goods and services. Intermediate purchases are excluded. XMPIs are used as proxies for the final prices paid for investment goods by businesses and government in the FEPI model used in Australia. This is because most XMPIs reflect changes in basic prices or producers' prices (not purchasers' prices). This topic is further considered in Chapter 6.

⁷See, for example, Australian Bureau of Statistics (2001b), *Information Paper: Price Index of Domestic Final Purchases*, No. 6428.0, July 17, 2001.