

13. Organization and Management

A. Introduction

13.1 Export and Import Price Indices (XMPI) are used for many purposes by government, business, labor, universities, and other kinds of organizations, as well as by members of the general public. Accuracy and reliability are paramount for a statistic as important as XMPIs. Whether XMPIs are used as a deflator of national account values, an indicator of inflation, in escalation of contracts, in assessing developments in the global economy such as exchange rate fluctuations, or in other economic analyses, the process of producing XMPIs needs to be carefully planned and executed.

13.2 Individual circumstances vary to such an extent that this Manual cannot be too prescriptive about timetables or critical path analysis of all the steps involved. However, the description in this chapter provides an outline of the kinds of activities that should result from a detailed examination of the logistics of the whole periodic operation of compiling the index.

13.3 The following guidance seeks to present some options in the organization of data collection and estimation. The examples given are based on experience and provide an indication of goals a country may seek. In recognizing these options, this chapter, which talks about organization and management of XMPIs processes, covers the relationships between staff, who may be stationed at regional offices in large countries, and XMPI staff at the central office, covering the work carried out in the central office, the flow of information among each part of the organization, and related activities for coordinating collection and processing data. Because of the size, frequency, cost, or complexity of the collection of prices as the basis of the index, in some countries not all these operations and relationships will be appropriate. In some cases, countries may resort to using data already available such as Customs data or data from other price programs such as the PPI or CPI.

13.4 The complexity of the organizational structure is necessarily correlated with the scope of the effort, both in terms of resources as well as the volume of data collection. In particular, XMPI programs tend to be smaller than other price programs in any given country. Ideally a program would comprise a multifaceted staff with a variety of skills, including economists, statisticians, system analysts/programmers, field staff and clerical support. In the case of XMPIs, however, resource limitations often may require individuals to perform more than one task.

13.5 While the mission of XMPIs is singular—to produce a set of price indexes—the process for producing these data can be broken out into several discrete activities. These can be separated into five major phases: Sampling, Initiation, Repricing, Estimation (Compilation) and Publication. Each phase, however, may require a number of different technical skills as well as a separate but coordinated management structure.

13.6 As explained in Chapter 2, XMPIs may be based on unit value indices from Customs' data, establishment price surveys, or a hybrid mixture of the two, along with other source data. Organizational issues relating to sampling, initiation, and repricing are primarily the

concern of establishment price survey data, though issues in managing data quality and verification remain relevant.

13.7 Sampling is normally the first component of developing XMPs. This usually entails the selection of companies and products (or product areas) that will be in the market basket. This is also the stage where a determination is made on how much publication detail the sample can support. The initiation phase is the component whereby company cooperation is elicited and, if necessary, a final determination is made regarding the actual items that are to be repriced on a regular basis. The next phase is repricing. This is a recurring process whereby at a regular interval, usually monthly or quarterly, price data are collected from a respondent. Collection methods vary and a program may make use of more than one mode. Current modes include mail, fax, web collection and personal visits. This component would also include a review, manual and/or automated, of the data in order to ensure its compliance with economy theory. Estimation is the process whereby the detailed price information is aggregated together in order to produce a price index. Finally the data are ready for Publication, either as hard copy printouts, or more and more often released on the organization website. These stages will be considered in turn after a general consideration of organizational and management issues.

B. Organizational Structure and Resource Management

B.1 Structuring

13.8 In practice, most countries have devoted comparatively little, if any, resources to XMPs. While some agencies such as the U.S. Bureau of Labor Statistics, dedicate over 130 employees to the production of its export and import price data, the vast majority of countries make do with staff that have only a comparative handful of employee. This smaller staff resourcing is usually due to two reasons; first, a higher priority is usually given to the production of consumer and producer price indices (CPIs and PPIs); and second, the common practice of using readily available administrative data to construct unit value indexes. Consequently, organizations that construct XMPs may consist of a unit devoted solely to XMPs, or they are part of larger staff that also have responsibility for producing other series such as PPIs, or, in the case where XMPs are primarily or entirely constructed from administrative Customs' records, part of a unit responsible for publishing data on the value of exports and imports.

13.9 Like any data collection program, the organizational structure supporting XMPs can be either vertical or horizontal, with various possibilities in between. A fully vertical structure would be one where all of the staff on the program work in the same office and work only on XMPs. A fully horizontal structure would be one where no one in the program works solely on XMPs. For example, a unified field data collection staff may be responsible for collecting data for every program in the agency, while a single office of statisticians may similarly be responsible for developing samples for every survey in the agency.

13.10 The key determinants for assessing the organizational structure would be availability of resources, similarity of methodologies, complexity of program and efficiencies gained by combining or splitting functions. Usually there are advantages in combining resources

between programs. In general, the more alike a processing component is between two programs, the better it is to share resources. In the case of XMPIs this usually will lead to the program sharing resources with a PPI program, where many of the concepts and data sources are similar. Consequently, much of the organization and management conventions associated with XMPIs are similar to those found in the construction of PPIs.

B.2 Managing the Process

13.11 When the unit responsible for producing XMPIs is small and wholly contained, managerial issues also tend to be small as one supervisor may be responsible for every aspect of the data collection and index estimation process. Even in a small program, however, it is important to have a staff large enough to allow for the development of individual expertise in selected area, especially in those aspects that demonstrate differences from PPI concepts and methodologies. For example, sources of data available for sampling and weighting tend to be unique in XMPIs. Also, the specialized need to handle pricing in intra-firm trade and exchange rates are unique or especially critical to these series. Finally, and perhaps most importantly, in addition to having general expertise in statistics, economics and computer programming, it needs to be emphasized that the organization should have as much specialized expertise by industry (or product category) as resources permit. One of the key difficulties in producing accurate and up-to-date price indexes is an awareness of product (and other trends) in the underlying economy. Experienced staff who specialize in sectors of the economy are best positioned to spot these trends and help make additions or adjustments in the data in order to keep the indexes current and relevant.

13.12 In a larger organization, often the organization has separate functional units in which staff are split by their skills or work assignments. In order to ensure that the individual unit work together, one option is to develop a matrix structure along with the traditional functional in which different areas of the program are managed by staff from different offices. In some cases the matrix structure might be delineated by processing component, in other examples matrices have been divided into research, development and production components. For example, in a horizontal structure staff may be categorized by their functional skills: sampling, initiation, data collection, verification, and estimation, and also by whether they are working primarily on XMPIs or PPIs. Matrices also tend to be more flexible, and can be more readily rearranged as circumstances warrant.

B.3 Staffing

13.13 The appropriate mix of skills in any given XMPI office may be a function how the statistical process is organized in a given country, as well as the approach of the nations' data collection effort (e.g. administrative versus economic). Nonetheless, certain disciplines and tasks are vital to ensuring that each component of the index process is properly and efficiently carried out, and that the published data are accurate, timely and relevant. A large organization may have the resources to hire separate staff for each of these disciplines. However, frequently XMPI offices may be quite small. Consequently, employees are likely to have multiple responsibilities (e.g. data collection, sampling and index review); statistical offices may need to employ more adaptable and more educated people, not only because they

will have to perform more than one task, but also because they are more likely to have to serve as backups to their colleagues.

13.14 Input from economists is necessary to the process for producing XMPIs. These indexes serve a multitude of uses and proper construction of these indexes requires economists who are familiar with their purposes and for ensuring that the construction of the indexes meets the needs of the key functions of the data. In addition to competence with some of the standard sub-disciplines in economics, micro and macro-economics as well as international economics, (both finance and trade) some staff economists should also be experts in price index number theory itself, a more specialized discipline in economics. Knowledge of specific industries and technical expertise can also be critical in order to properly understand the inputs and outputs as well as the industrial organization of a given sector of the economy. Statistical offices should organize and meet frequently with users committees.

13.15 Statisticians play a key role, both in the sampling process as well as the index estimation process. Since no establishment-based price program can afford to collect data on the entire set of items in the universe of goods and services being measured, the program requires a method for determining a subsample of both importers and exporters and individual products that should be included in the pricing market basket. This involves balancing a number of factors, such as the number of respondents that the program budget can support, the number of items necessary to sustain an accurate index, the need to trade off respondent burden with the need to include large traders in the market basket, the life of the market basket as well as the need to regularly update the mix of items in the basket, the variation in deterioration rates by industry and the need to only select items that are traded and repriceable on an ongoing basis. Due to the complexity of sampling, statisticians should have a good grounding in sampling theory and practice.

13.16 The past few decades have seen a growing role for computer specialists in the production of economic data. Even smaller countries rely more and more on computers for collecting and reviewing the data and calculating XMPIs indexes. And with the increasing need for producing more indexes more rapidly, this trend is expected to continue. With many series such as XMPIs collecting price data on thousands of items each month, the use of electronic data processing is central to a program's ability to produce outputs in a timely manner. The computer programmers should be skilled at evaluating user requirements and determining the proper database design and programming languages necessary to support the program. Particularly in smaller organizations, where a substantial part of the data collection and processing may be handled with comparatively simple software such as spreadsheets, it has become more common to hire technical staff who have very strong programming skills in addition to their subject expertise (usually economics or statistics).

13.17 Often the most difficult role to fill in a price index program, are those on the front lines, the data collectors who usually meet the respondents face-to-face. Many, if not most, price collection programs are voluntary. Thus, this staff must play many roles, including part economist, part salesperson, in the sense that they must convince establishments of the need for their providing data. Literature should be prepared in advance on the usefulness of XMPIs, confidentiality of responses, and need for continuity of price information from a

representative sample of establishments. Legislative backing is also useful. The major role for the data collector in XMPI programs is to initiate respondents into the program and often to collect the first set of data from the sampled respondent. This process can be quite complicated, particularly when soliciting a large company, and the data collector must be sufficiently trained to handle a multitude of different issues that may be raised by the respondent. The data collector is also frequently called upon to split-second decisions during an initiation session, where time may be extremely limited. Note that the ‘salesperson’ part of this job tends to be much more important in programs such as the PPI and XMPIs, where the respondents are usually responsible for supplying data both at initiation as well as periodic pricing. In contrast, in consumer price programs, the periodic pricing can normally be done by data collectors from the statistical office.

B.3.1 Outsourcing

13.18 One of the decisions facing any statistical agency carrying out a price collection program is whether to use in-house staff or tender the collection to an external organization. For example, another part of the agency, another government department that specializes in surveys, or a private market research company could perform this function.

13.19 The nature of the price collection and the distribution and profile of statistical staff may help determine whether the collection is suitable for contracting out to another agency or even the private sector. Where price collection is continuous, involves complicated decision making (such as quality adjustment), or is collected from a small number of businesses, it may be advantageous to keep the collection in-house. However, if the collection takes place over just a few days per month from a large number of businesses, is relatively straightforward, and involves only routine or simple decision making (perhaps selecting from a list of codes), then contracting out to another agency can be considered. For example, if the statistical office does not have a dedicated data collection staff, it could contract with other agencies such as commerce, industry, and agriculture to collect XMPI data. Another possibility could be a private research company, if there are market research companies with suitable skills existing in the country. The statistical office must also take confidentiality requirements into consideration when contracting with another agency to guarantee that there are no breaches in confidentiality. This may involve national statistical laws that address the issue of data collection by contractors and enforcement of penalties for breaking confidentiality requirements.

13.20 Contracting out price collection can lead to lower costs. When price collection is carried out using electronic methods such as computer-assisted telephone interviews (CATI) or computer-assisted personal interviews (CAPI), the responsibility for purchasing and maintaining of data-capture devices may also be transferred to the contractor. Contracting out may also allow statistical office staff to spend more time analyzing data rather than collecting it. By separating the role of data collector and data checker, statistical staff can feel more comfortable questioning the validity of price data the accuracy of collected data can be linked to the performance of the contractor through performance measures, which drive incentives payments (and penalties if targets are not achieved).

13.21 The same considerations may be used when deciding whether the survey division or XMPI staff should conduct the price collection. Usually, some mixed mode of operation will be in place. Staff from the survey division may handle straightforward and routine price collection; more complicated and specialized industries such as chemicals and semiconductors will require price collection by specialists, whether from XMPI staff or consultants of a statistical office.

B.3.2 Training

13.22 Effective training will motivate staff and equip them to deliver a good-quality index. At its simplest, training will give a background understanding of the nature and uses of the index and its compilation. Training and development take many different forms and may include

- Tutoring by the line manager or supervisor,
- Attending an induction course or reading a manual, and
- Accompanying an experienced price collector.

13.23 A written training plan can be useful in identifying training and development needs against the organization's goals and targets. It can also identify the resources required to deliver these needs and evaluate whether training has been delivered effectively and objectives have been met.

13.24 The statistical office should have a general training program for staff working on the price programs. There are six basic components of such a program.

- Fundamental (basic) training must provide general information on how to collect data, code data elements, review and edit basic price data, and compile collected data to produce indices. In addition, the training should impart to staff information on the purposes and uses of the collected prices.
- Price collectors need to be trained specifically in field procedures, including relations with businesses, a selection and definition of a valid price, special rules for certain individual price transactions (including seasonal price transactions), how to complete initiation forms, and, where appropriate, how to use computers. Compilers of the index will need to be trained specifically on the validation, consistency checking, and calculation of centrally collected indices; weighting procedures and how to aggregate prices; and treatment of seasonal price transactions and special procedures relating to some sections of the index.
- Training, especially for newer staff, may also entail a period of time of ongoing monitoring of performance.
- The program should highlight the need for continuous training of staff at all levels. Staff should provide feedback at all levels—from respondents to data collectors and

from supervisors to staff. There should be regularly scheduled meetings between staff and supervisors at all levels to assess the program and identify current and potential problems.

- Statistical offices also need to provide professional training for staff in computer technology, economics, statistics, and even psychology (for dealing effectively with respondents).
- Regularly scheduled meetings for all or selected staff members can be effective in discussing what have been the strengths and weakness of the program and in discussing plans/changes for the future. This is particularly true when the program undertakes major changes in index methods, such as rebasing with new weights and new sample designs.

B.4 Process Improvement

13.25 Developing, maintaining and updating clearly delineated Program goals are crucial to the ongoing success and utility of a well-run program. This process must take into account all stakeholders, both internal and external, and assume realistic estimates of resource availability.

13.26 With the rapid spread of the internet, the development of new electronic data gathering processes and the demand for new kinds of data (e.g. measuring intangibles) has made the job of data collectors has become more difficult. The need for systematic process reviews may be especially critical for XMPIs program to deal with as the rapid globalization of the world's economy and the attendant shifts in production and consumption have make measurement more difficult.

13.27 XMPIs program should have a well-understood process in place for reviewing and revising goals and should include a process for assessing changes in international trade patterns to ensure, outputs, methodology, and data processing methods and procedures are continually reviewed to meet changing needs.

13.28 Staff input is an essential part of continuous quality improvement. Staff may be invited to operational reviews where all team members have the opportunity to raise concerns and, where appropriate, tackle specific issues through individual or group efforts. In order to effect this, staff' schedules should include an appropriate amount of time for process improvement.

13.29 A process for improving XMPIs indexes can best take place in an environment where systematic quality assurance program is in place. This includes not only introducing and monitoring quality controls on the production process itself, but also effective interaction with the user community in order to ensure that their needs are being met—see Section E. for further discussion on quality management.

B.5 Processing Components

13.30 While the processing methods and data review used in constructing XMPIs are discussed in other chapters, especially chapters 6, 7, and 14, there are several organizational and management aspects of each of these processes that should also be touched upon.

13.31 One question that has become increasingly important in the development and maintenance of each of the processing components is how to take best advantage of the efficiencies that can be gained via more effective use of computers. Ideally, an XMPI organization would have its own systems staff to develop and maintain XMPIs' production system. In cases, where systems staff are shared with other programs, there should be sufficient flexibility to allow for systems staff to undertake specific XMPI developmental work. If staff are to be shared, then one essential ingredient is that the programs and programming languages should be standardized on an agreed upon.

13.32 As a general rule of thumb, the managers of XMPIs program would like to have as much programming under their direct authority as possible. If the best way to achieve this goal, is to use simple high level languages such as EXCEL or SAS (which can be programmed by economists, statisticians or others on the immediate staff), that may be an appropriate approach. XMPI compilation methods may need to be changed in the light of experience and new developments and it is essential that the XMPI unit has, or can call upon, the expertise to do so.

C. Sampling Process

13.33 Because many countries have detailed records on all export, and especially import, shipments, there is often very good and detailed data available on what companies have been shipping what products cross borders. This source of data may, or may not, be collected by the same organization that constructs XMPIs. In either case, however, it is valuable for XMPIs office to make use of these records in order to draw a sample of both respondents and products to initiate and reprise its item selection. Sampling methods were outlined in Chapter 6.

13.34 Whether the data are collected by the same organization or especially if they are collected by a different one, it is necessary to constantly monitor the quality of the data and to ensure that the data are as up to date as possible. While the level of data detail normally available in these records are often quite good, the quality of data being collected for administrative purposes such as duties, is often uneven. Thus the management process should include systematically working with the provider office in order to ensure the data used to construct the sampling frame is high-quality. In addition, it is also important that the staff working with developing the sample, have access to feedback from those staff who have had direct contact with respondents in during the data collection phase.

D. The Initiation Process

13.35 This process normally can be very labor intensive and normally involves XMPI staff either visiting or conducting a phone interview with individual sampled businesses to

establish cooperation, stress the importance of the index, and receive basic information, such as the exact goods and services produced by the business, relative importance of transactions with various clients, and individuals to contact on a recurrent basis. (see Chapter 7 for more details). During this initiation visit the respondent and XMPIs staff will normally identify the actual items that will be repriced on a regular basis. In some countries these operations may be conducted by telephone. The range and number of businesses visited and the types of goods and services priced will vary between countries (see Chapter 6).

13.36 Management of the initiation process may be very important as this is usually the process which is the greatest burden to respondents. Especially when a data collection program is voluntary, it is important to minimize the burden on the reporter. While the original sample universes may differ, frequently the PPI and XMPI market basket of respondents and items will overlap. This is true in part due to the tendency of companies engaged in foreign trade to be concentrated. Consequently, it may be appropriate to use and manage the same staff to initiate respondents in both programs. Not only might this minimize the duplication of technical knowledge, but it call also serve to minimize burden and more efficient scheduling of contacts with a individual reporter.

13.37 Note that in some cases, the data collectors responsible for initiating new respondents into the process, may also be responsible for repricing the data on a regular basis.

13.38 Although the precise method of current price collection will vary (see Chapter 7), each price collector may be responsible for the initiation and collection from a certain business or from certain types of businesses. This would enable the collector to specialize in certain subject areas of the index. In other cases, particularly in larger countries, price collectors may specialize by regions. While price collection is usually done monthly or quarterly, the frequency can change if the prices for certain transactions change at known intervals. Items that are only traded in certain seasons may only be collected in specified months. In other cases respondents may indicate that due to burden concerns, the data will need to be collected less frequently. Sometimes these prices may be collected directly by XMPI staff in the main office based on external information such as contact with other government offices or through the media. In any case, checks must be in place to ensure all price data are reported. (See Chapter 7, Section B, for information on timing and frequency of price collection.)

13.39 Quality is an important part of price collection; a high-quality price collection enables a statistical agency to have confidence in the index it produces and ensure that observed price changes are genuine and not the result of collector error. Procedures must be developed to ensure that a high standard of collection is maintained for every collection period. These procedures will form the basis of collector training and should be included in any training material developed for price collectors. Guidance should cover price index principles; organizational issues, and validation procedures. both technology and price collection methods.

13.40 *Transaction descriptions:* During the initiation phase of data collection, accurate price transaction descriptions are critical to ensuring price transaction continuity. Descriptions should be comprehensive to ensure that collectors or reporters can price the

same transaction in each collection period. Collectors must record all information, that uniquely defines the price transaction selected. So, for example, in price collection for production of clothes, color, size, and fabric composition must be specified to ensure that the same price transaction is priced each month (see Chapter 7 for details).

13.41 Accurate price transaction descriptions will assist the price collector, respondent, and XMPI staff in choosing a replacement for a price transaction that has been terminated and will also help to identify changes in quality. XMPI staff should be encouraged to spend some time, each collection period, going through reported descriptions to ensure that the correct price transactions are being priced. Collectors or respondents should also be encouraged to review their descriptions to ensure that they contain all the relevant information, and it may be useful to ask collectors occasionally to switch collections with another collector so that they understand the importance of comprehensive descriptions.

13.42 *Continuity*: is one of the most important principles of price collection. Because a price index measures price changes, the same price transaction must be priced every month to that a true picture of price changes is established. It is not possible to be prescriptive because the concept of equivalence will vary among countries, but for practical purposes a detailed description of the price transactions must be kept. Some guidelines may be drawn up by the statistical office's XMPI Head Office staff to cover different price transactions. All transaction specifications, and especially price determining characteristics, must be obtained and monitored.

13.43 *Feedback*: When price collectors are used, they should be encouraged to give feedback to XMPI Head Office staff on their experiences. Collectors are a valuable source of information and often give good early feedback on changes in the different industries. Collectors can often warn of size or product changes before XMPIs Head Office staff can derive this information from other sources, such as trade magazines or the business press. Collector feedback can form the basis of a collector newsletter and can support observed price movements and provide supplementary briefing material. Significant changes in price transactions within a business may require an additional visit by XMPI analysts to the business to update the price transaction descriptions.

13.44 *Auditing*: Since the routine of initiating respondents in the field may be the most critical and labor intensive component of the entire process, it , needs to be carefully planned and managed. Circumstances vary, and it is not appropriate to be too prescriptive. Some of the measures mentioned below may be irrelevant if XMPI analysts in the Head Office collect the prices centrally.. However, it is vitally important to check that the information sent in is accurate and complete.

13.45 One way to monitor the work of price collectors is to employ auditors to occasionally accompany collectors during field collection—whether data are collected by phone or personal visits—or to carry out a retrospective check on data that have been collected.

E. The Repricing Process

13.46 The repricing process for XMPI is the single most complex process in constructing price indexes as it consists of numerous steps. It includes a) determining the set of items to be collected in the current period; b) notifying respondents (or data collectors) of the data they need to supply; c) receiving the data from respondents; d) verifying the data; e) if data are incomplete, missing, or do not appear to be correct, taking remedial action; and f) preparing the data for estimation. Because of the increasing desire from policymakers for more timely economic data, this process may have to occur in a very short timeframe.

13.47 Data can be collected using a number of different methods, for example, 1) an online web collection application; 2) e-mail; 3) fax; 4) phoned in; or 5) mailed in. Given advances in computer technology over years, this may be an area where management may want to focus its data processing expertise.

13.48 While data collection via field staff is often necessary during the initiation phase, especially where a program is voluntary and a certain amount of convincing respondents to participate is needed, field collection via a personal visit is expensive and XMPI programs should try and avoid it during the periodic repricing.

13.49 In any voluntary data collection program, the single biggest issue facing management, is nonresponse. In cases where the organization must rely upon companies to supply the data, it is incumbent upon the program to ensure that they have in place a systematic process for collecting the data, and/or for following up when the information has not been received.

13.50 Offering respondents a variety of modes for collecting data are one aid to garnering respondent cooperation. Reminders using e-mail and other points of contact may also prove to be effective. Because phone contacts are the most labor intensive, it may be more efficient to use clerical staff to make phone calls in cases where a simple check-list or computer-assisted telephone interview process can be developed.

13.51 The key for management is to develop a systematic method for monitoring response rates on a regular basis. Often a sudden change in response rates may indicate a problem somewhere in the data collection process.

13.52 In addition, for any number of reasons, (such as volatility of trade, growing complexity of goods, and shorter product life cycle.) the data that *are* collected during repricing may also require some type of follow-up. Consequently, a key to successfully managing this process is to obtain the data as fast and as clean (accurate) as possible, and to ensure there is an effective method for recontacting the respondent and amending the data as appropriate.

13.53 Collectors or respondents should report prices at similar times within each collection period. This is particularly important when pricing volatile price transactions with sharp fluctuations.

E.1 Data Entry Queries

13.54 Once the price data have been entered in the system, a series of **validation checks** may be run. In deciding which checks should be carried out, take into account the validation checks carried out in the field, whether by price collectors in the regional office, survey division officials in the main office, or by XMPI analysts. When data entry is automated (e.g. collection via the web) then these checks can and should be built directly into the data collection application.

13.55 The range of tests carried out for all collection methods may include the following:

13.56 *Missing Data:* The most common check is for data completeness. Often, there are a number of price factors that are collected besides the price. This may include country of origin or destination, currency of invoicing, and discount structure. When a data element is missing, it should be flagged and reviewed.

13.57 In import and export price indexes, however, one of the major reasons for missing price data is attributable to the volatility of trade. Particularly in XMPIs which collect data monthly, respondents will often indicate that there was no trade in the reference month. Whereas in a PPI, the respondent may be able to estimate the price of his establishment's product, it is more difficult to do so for an importer. Consequently, it is very important for management to develop a consistent approach to handling data which are temporarily unavailable, as this can represent up to 20 percent or more of a given month's market basket (see Chapter 8 for the treatment of temporarily missing items).

13.58 *Specification Change:* For any number of reasons, an item may have had a change in its specification. It may be as simple as a change in color, or (as in the case of PCs, it may be significant, such as a more powerful microprocessor, or larger hard drive. Any time there is a change in the specification, it should be reviewed by a product specialist in order to ensure that the price change from the first period to the second period is appropriately adjusted for any change in the quality of the good.

13.59 *Price Change:* The price entered may be compared with the price for the same defined transaction in the same business in the previous month and queries raised where this is outside preset percentage limits. The latter may vary depending on the price transaction or group of price transactions and may be determined by looking at historical evidence of price variation. If there is no valid price for the previous month, for example, because the produced good was not traded that month, the check can be made against the price two or three months ago. The price may also be compared with other transactions conducted by the same business in the current month. Checks may also be put in place to reveal instances where prices have not been changed for an inordinate amount of time, as this may sometimes indicate instances where the data are not being properly updated.

13.60 *Maximum/Minimum Prices:* A query may be raised if the price entered exceeds a maximum or is below a minimum price for group of goods or services of which the particular product is representative. The range may be derived from the validated maximum and

minimum values observed for that price transaction in the previous month expanded by a standard scaling factor. This factor may vary between price transactions.

13.61 If computer-assisted techniques are used, these tests can be easily implemented to take place at the time of collection; otherwise, they will need to be conducted by XMPI Head Office staff as soon as possible after collection and before prices are processed on the main system. If a price given by a respondent fails the computer-assisted test, this should not result in collectors being unable to price the price transaction, but it should prompt them to check and confirm their entries and prompt for an explanatory comment.

13.62 Queries raised may be dealt with either by staff analysts at XMPIs Head Office or by the price collector or respondent contacted for resolution. For example, scrutiny of a form might show that a big price difference has arisen because the transaction priced was a new product replacing one that had been discontinued. In this case, there may be no need to raise a query with the price collector unless there is evidence to suggest that labeling the transaction as a “new product” is incorrect.

13.63 One noticeable difference between collecting data for a PPI versus collecting data for XMPIs, is the role of transfer prices (transactions between related parties). Often, transfer prices are valued at cost instead of an arms-length market price. Sometimes transfer prices may remain unchanged for what appears to be an inordinate length of time, while in other instances they may fluctuate wildly and for no apparent reason. Consequently, XMPI programs should track these data and take special measures in handling them (see Chapter 19).

E.2 Quality Control

13.64 As in the initiation process, regular quality checking of the ongoing repricing data is critical to the ability to publish accurate price indexes. While the concepts associated with the quality control of repricing data are similar with those pertaining to the earlier initiation process, the specific type of audits and controls may differ. For example, whereas the initiation process usually entails a staff member from the collection organization to be involved in the documenting and verifying of the initial data, the reporting of the ongoing repricing data would normally be done by an employee of the importer or exporter. Regardless of how these data are reported the information must be subject to a rigorous review. This would include such steps as,

- Ensuring that the price reports are sent in when they are due. If not, it is necessary to find out the reason and take appropriate action;
- Confirming that the reports contain what they are supposed to contain—that is, that required fields have not been left blank, that numeric fields contain numbers, and that nonnumeric fields do not;
- Reviewing and editing each return. Substitutions may have to be made centrally or those made by the collectors may have to be approved. Unusual (or simply large)

price changes may need to be queried. Transactions priced in multiple units or varying weights may have to be converted to price per standard unit. Missing prices must be dealt with according to standard rules relating to the cause; and

- Identifying and Correcting errors introduced when keying the numbers into the computer or transcribing them onto worksheets.

13.65 As stated above, logical checks conducted in the field by an automated process can reduce the amount of checks and errors handled by XMPI Head Office staff.

13.66 Some of these tasks can be done by computer, others, manually. Therefore, no general suggestion can be made about the sequence of the work or about its division into different parts. Procedures should be in place to check that all documents, messages, or files are returned from the field so that price collectors can be contacted about missing returns. Initial checks should then be carried out to ensure that data are complete and correct. If any prices fail these checks a query should be raised with the price collector for clarification. Since some of the checking may require reference back to the price collectors (or to their supervisors or respondents when direct mail questionnaires are used), the timetable for producing the index must allow for this communication to take place.

13.67 Following the price data checks, a series of validation checks may be run. In deciding which checks should be carried out, account should be taken of the validation checks carried out in the field. For example, computers will increase the potential for validation at the time of price collection and reduce the need for detailed scrutiny at XMPIs Head Office. In addition, it would not be productive or cost effective to repeat all the tests already carried out, except as a secondary audit or random check.

13.68 *Reports* (on paper or computer) should be generated routinely for most representative price transactions. Reports help the analyst pick out particular prices that are as different from those reported for similar firms elsewhere or that lie outside certain specified limits. A computer printout can list all cases that either fall well outside the range of prices obtained earlier for that representative price transaction or that shows a marked percentage change from last time for the same price transaction in the same business. The limits used will vary from price transaction to price transaction and can be amended. The analyst can study the printout, first ascertaining whether there has been a keying error, then examining whether the explanation furnished by the collector adequately explains the divergent price behavior, and finally determining whether a query should be sent back to the supervisor or collector. The timetable should allow for this step, and anomalous observations should be discarded where an acceptable explanation or correction cannot be obtained in time. (Also see Chapter 10, Section D on editing data).

13.69 *The quote report* consists of a range of information on a price transaction that the index dispersion report has highlighted as warranting further investigation. Information listed may include current price, recent previous prices, and base price, together with similar quotes from other reporting businesses. The report can be used to identify the quotes that require further investigation and also to investigate rejected prices.

13.70 *Algorithms* can be created that identify and invalidate price movements that differ significantly from the norm for a price transaction. For some seasonal price transactions for which price movements are erratic, it may be more appropriate to construct an algorithm to look at price level rather than price change.

13.71 Although algorithms can be an efficient way to highlight problematical data, a word of caution should be expressed about using them. Analysts will want to assure themselves that their use does not result in systematic bias in the index. This issue may also need to be addressed in any editing routines (as presented in Chapter 10, Section D), although it is less likely to be problematical in the context of manual editing.

F. The Estimation Process

13.72 The estimation process is the component where all of the data comes together to produce program outputs. While the index calculation process is usually highly automated, the index review process can be quite labor intensive, albeit with a number of automated summary outputs which facilitate a quick review. One approach to take during the index review process is to have it looked at both by someone who is knowledgeable about the specific product area covered by the index and also by someone who is looking more broadly to ensure consistency across indexes. The latter review, for example, may be appropriate if there is a widespread ‘shock’ to the economy such as a dramatic devaluation or revaluation of the home country’s currency.

13.73 Usually the calculation of price indexes is handled by a computer program, either one customized by the agency, or one using off-the-shelf software. In the latter case, this software can range from using simple spreadsheets, such as Excel, to a powerful statistical program such as SAS (which originally stood for Statistical Analysis Software).

13.74 Because the algorithm used in the construction of the index can be fairly complex, it is vital that statisticians and economists play a major role in developing the formula and also in verifying that the formula has been properly converted into the appropriate calculation module.

13.75 While data collection agencies may have different rules for when to publish and when not to publish data (due to confidentiality or index quality constraints) it is important that indexes be reviewed every time they are calculated in order to ensure they meet some standards for publication. These rules can be as complex as use of variance estimates, to something as simple as verifying the index is constructed using a minimum number of respondents and items. Part of management’s responsibility is to ensure that these rules are consistently applied, and that they dovetail with publication rules in similar programs. It is important, however, to keep in mind that these rules need to be flexible enough to allow for the fact that commodity areas may manifest very different pricing traits. For example, price trends in fuels tend to be very uniform, while price trends for individual miscellaneous electronic components can vary dramatically. Another approach is to look for similar data such as PPIs or CPIs that can be used to verify price trends.

G. The Publication and Documentation Process

G.1 Publication

13.76 In recent years the publication process appears to have drawn closer attention for two reasons: first, with the rise of the internet, there is greater concern with the security of data; and two, published economic data appears to be playing a larger role in the movement of prices in the stock market. Consequently, management should now giving greater scrutiny to publication process, the subject of Chapter 13. This has proven to be an area where good documentation has become especially important. There is usually a set amount of time between the time the indexes are finalized, and the time they are published. Frequently, there are a number of steps during the interim, including writing any appropriate text, and possibly transmitting the data into a publication database.

13.77 In addition to tightening up documentation, agencies have also had to expend significant resources to ensure the security of their external and internal websites. Rules and procedures covering the electronic handling of sensitive data are usually established by the agency producing the data. However, the individual office that produce the data may have responsibility for making these procedures operational. While XMPIS have traditionally not received the attention given to other price indexes, an organization cannot afford to make the mistake of prematurely releasing any of its data.

13.78 Depending on the structure of the organization, successively higher levels of management, and any other affected office as appropriate, may need to be made aware of any impending news release. Often an agency may have a separate publication office responsible for coordinating agency outputs. If so, it is also a good practice to work closely with this office in order to ascertain the types of questions that they may receive from users of the data.

13.79 Because of the similarity of XMPIS and PPIs, an organization may choose to release these data simultaneously. In such instances, it may be ideal to have the same staff produce the release and be prepared to answer questions from the media and other users.

13.80 Compilers of the index also may wish to visit the field occasionally and participate in or observe the price collection. This will provide them with a better appreciation of the practical problems associated with price collection, a better feel for data and index quality, and the skills required to help with price collection in the event of an emergency. In XMPIS, this may be of great importance, especially when collecting price transaction data in more complicated economic branches.

G.2 Documentation

13.81 The larger an organization, the more critical is good documentation. Staff, especially junior staff, should not have to rely on their memory when faced with a question of how to handle a specific issue.

13.82 Smaller organization, too, need good documentation. Because a smaller organization may not have a large enough staff to have sufficient overlap of staff as new employees start

and old ways leave, there may be a lack of what is called ‘institutional memory,’ used to orally pass on data collection practices.

13.83 Offices with large systematized computer programming staff usually produce adequate system documentation. However, in small programs where any automated data processing may be handled by a statistician or economist, special care must be taken to ensure good documentation, as the training in those disciplines are less likely to include the appropriate type of documentation skills.

13.84 Good documentation should also include production schedules. Each aspect of the processing environment should have its own production schedule that needs to be integrated with each of the other schedules. This is true even though the production schedules may be on very different cycles. While much of the ongoing data collection and index calculation schedules are usually monthly (or quarterly) the production or initiation of a sample of respondents may take a year or more. A process should be documented and in place which facilitates the overall development of an integrated schedule. Often unforeseen circumstances, such as weather, computer downtime, may force a change in the schedule. By having one process for scheduling changes, it ensures that the overall impact of any change can be effectively synchronized.

13.85 Manuals and other documents such as desk instructions may serve for initial training and later on should enable the collectors and compilers to remind themselves of all the relevant XMPI rules and procedures. Documents should be well organized and well indexed so that answers to problems can quickly be found.

13.86 All concerned should check the documentation and update it regularly; the pile of paper containing amendments should never grow large and should be replaced by a new consolidated version. One way of achieving this, for hard copies, is to have a loose-leaf manual so that individual pages can be replaced whenever necessary.

13.87 However, of increasing practice is the use of a centralized electronic, storage of documentation. This facilitates a systematic and controlled method for maintaining documentation. A variety of available software can help the statistical office. The benefits of using standard electronic software for documentation are threefold:

- More efficient production of documentation, because software as it helps with initial compilation and reduces the need to print and circulate paper copies;
- Better informed staff, because they have immediate electronic access to the latest documentation, including desk instructions with search facility by subject and author; and
- Better quality control, since authors can readily amend and date stamp updates, and access is restricted to “read only” nonauthors.

13.88 In a more sophisticated technological environment, documentation can be centrally maintained, with updates automatically promulgated to PCs or other electronic devices, thus obviating the need for manual updating.

13.89 Documentation not only includes price collectors' and compilers' manuals. It includes details of the many routines used in collection and compilation including features of product markets that have given rise to a particular method for use when there are missing values or a need for quality adjustments—such meta data is outlined in Chapter 9. It further includes meta data for users that should be posted on the statistical authority's web site.: There should be a short user-friendly account for lay-users along with frequently-asked-questions (FAQ) and answers, and a more detailed technical manual along with technical articles on issues such as rebasing and, of course, data.

H. Quality Assurance

13.90 The chapter touched on some specific quality control techniques in the earlier data collection sections, there are a number of more general quality management areas and approaches one may also want to investigate. Statistical offices are faced with the continuous challenge of providing a wide range of outputs and services to meet user, that is, customer, needs. Thus, a key element of quality is customer focus and the effective dissemination of relevant, accurate, and timely statistics. In addition, a quality program should include effective customer education on the use of such statistics. In these terms, success can be measured by the achievement of a high level of satisfaction among well-informed users. The IMF has developed the Dissemination Standards Bulletin Board (dsbb@imf.org) that provides dissemination standards and a data quality reference site.

13.91 For the quality management of XMPs, it can be argued that the priority area is quality control of the production process itself. For most statistical offices, this will be an area that represents a high risk, given the complexity of the process and the financial implications of an error in the index. If the principles of organizing and managing the collection of data, and subsequent processing of information to produce XMPs, are to be adopted, then it is vital that a quality management system is in place. This will ensure the data obtained, the processes involved in achieving the specified outputs, and the formulation of policies and strategies that drive them are managed in an effective, consistent manner. The data systems should, wherever possible, be open to verification and mechanisms put in place to ensure outputs meet requirements—in other words, customer satisfaction.

13.92 There are a number of examples and case studies of quality systems in practice that illustrate how different models may be applied. Some models may be more suitable than others, depending on the exact mode of XMPI operations in different countries:

13.93 *Total Quality Management*, or TQM, is most closely identified with a management philosophy rather than a highly specified and structured system. The characteristics associated with TQM and an effective quality culture in an organization includes *benchmarking*, a process of comparing with, and learning from, others about what you do and how well you do it, with the aim of creating improvements. The Australian Bureau of Statistics (ABS) has been particularly active in this area, and undertook an exercise in 1998—

2000 in partnership with the United Kingdom Benchmarking projects have also been undertaken in New Zealand, the United States, and Scandinavian countries.

13.94 *The European Foundation for Quality Management (EFQM) Excellence Model* is a self-assessment diagnostic tool that is becoming widely used by government organizations across Europe to improve quality and performance. It may be described as a tool that drives the philosophy of TQM. It focuses on general business areas and assesses performance against five criteria covering what the business area does (the enablers: leadership; people; policy/strategy, partnership/resources, process) and four criteria on what the business area achieves (the results: people results, customer results, society results, key performance results). Evidence based on feedback from focus groups, questionnaires, and personal interviews is used to score performance, and a resulting action plan for improvement is introduced, which is then included in the business plan.

13.95 *ISO 9000* is the International Standards Organization (ISO) international quality standard for management systems.. The quality system is a commonsense, well-documented business management system that is applicable to all business sectors and that helps to ensure consistency and improvement of working practices, including the products and services produced. The ISO standards have been fully revised to match current philosophies of quality management and, to provide the structures needed to ensure continuous improvement is maintained.

13.96 *An independent Advisory Board* is a common approach to addressing quality issues. Depending on membership, a board (or boards) can serve a multitude of purposes. Some boards may consist of technical experts who can provide advice on specific techniques used in the construction of price indexes, while others may serve as more of a forum for users who want to ensure that the indexes meet their needs. Boards can also serve as a method for helping to public new outputs to the community at large.