Chapter Title: The International Data Base: An Introductory Overview

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Chapter URL: http://www.nber.org/chapters/c6123

Chapter pages in book: (p. 46 - 57)

3 The International Data Base: An Introductory Overview

James R. Lothian

The authors of most studies of foreign economic phenomena have adopted one or the other of two quite different approaches to the data. Foreign economists investigating experience in their own countries have usually gone directly to primary sources—bulletins of the central bank, publications of the government statistical office and the like—in compiling their data. In almost all respects, this is the preferred technique. On the other hand, economists who are not nationals of these countries as well as economists analyzing economic behavior in a group of countries have usually lacked the expertise necessary to compile data from the original sources. Accordingly, they generally have relied on secondary source material—publications of the IMF, the OECD, and other international agencies.

Given this situation, both comparison of existing studies and replication of experiments become more difficult than usual. Not only are the data themselves apt to differ substantially among studies but so also are the sample periods. The reason is that series given in primary sources generally cover longer periods and are accompanied by better explanatory material than those in secondary sources.

Problems of another sort arise, however, for researchers who try to extend data bases derived by other scholars from primary publication. Such data usually remain relatively inaccessible and lack the documentation necessary for them to be updated or backdated easily.

For these reasons we have made a major effort to construct a data base from primary sources for the United States and the seven foreign countries we are studying that is of reasonably long duration (1955I–76IV), is as homogenous as possible among countries, and is accompanied by sufficient documentation to be used by other scholars.[1]

1. The data used in the studies that are detailed in the subsequent chapters are available on the TROLL system.

The remainder of this chapter first outlines our basic approach. We then discuss some of the major problems encountered and our solutions to them—both the relatively successful and the relatively unsuccessful—in order to provide future users with the flavor of the data (section 3.2). We then consider the reliability of our data across countries and concepts and relative to the IMF data (section 3.3). The Data Appendix to this volume provides more complete documentation of the individual series along with the series themselves.

3.1   Basic Approach

For both economic and statistical reasons we chose to begin our series with the first quarter of 1955. For one thing, we wanted to have data for as long a period as possible, in particular, one that encompassed as many business cycles as possible. Beginning in 1955 and even allowing for lags we would have a sample that included the U.S. and foreign recessions of 1958. At the same time (1955 or thereabouts) sources for many important series became more readily available in the various countries. By that time, moreover, wartime price controls had been removed in all countries and international trade had begun to be liberalized.

At the outset we decided that wherever possible we would collect the data on a monthly, non–seasonally adjusted basis. We would then transform these underlying series to the quarterly seasonally adjusted series to be used in our subsequent statistical analyses, and we would make both the seasonally adjusted and the unadjusted quarterly data available to other researchers. Doing this seemed to us to have two advantages. It would allow future users of the data to obtain a homogeneous updated series more easily; they would not be constrained by lack of readily accessible published historical data in country sources when seasonal factors were reestimated. Furthermore, it would impose some regularity on the seasonal adjustment techniques among countries.[2]

Our starting point in the selection of series for the foreign countries was to find out which series other economists customarily used in their analyses of these countries. To do so, we consulted economists from abroad who then were undertaking or had recently completed statistical studies of their own countries that were similar to ours as well as economists engaged in commenting on current economic developments in these countries. Two groups provided extremely valuable assistance in this regard: the academic and government economists assembled by Karl Brunner and Allan Meltzer for a conference on inflation at the University of Rochester and colleagues of mine in the international section of the

2. We used the standard U.S. Census X11 procedure for these adjustments. When the data were consistently positive, we used the X11 multiplicative option; when a series took on nonpositive values, we used the additive adjustment option.

Economics Department at Citibank. In virtually all instances, the series used by the two groups corresponded. Where discrepancies arose, we chose the series we deemed appropriate, usually on the basis of our ability to obtain reasonably homogeneous past data.

After making these initial choices of data, we traced each series back in time in the individual country sources to see if the data were available on a completely comparable basis for the entire sample period on at least a quarterly and, preferable, a monthly basis. In a considerable number of instances they were not. Many series were discontinuous. Others simply contained missing observations, usually for the earlier part of the sample period and in the version of the series reported in the most recent editions of the country sources.

In each of these instances, we made a considerable effort to identify the cause of the problem. We turned first to earlier editions of the country data source. In most cases, these contained at least a cursory description of the problem along with an earlier version of the series in question for some overlap period. In some cases, however, no such data were given in the sources. When that happened or if we had prior knowledge of the problem, we searched for alternative data for the earlier period that were reasonably comparable to the data for the later period.

Depending upon the length of the period of overlap, we then used one or the other of a variety of interpolation techniques.[3] Where the period was exceedingly short—one or only a few months or quarters of overlapping observations—we used the mean of the ratios of the new to the old series during the period to adjust the old series to the new basis. Where we had several years of monthly or quarterly observations for both series, we used ordinary least squares regression of the new on the old series as a method of interpolation. In both instances we worked in logarithmic terms when the series appeared to be trended, in arithmetic terms otherwise.

Missing observations were also dealt with in a variety of ways. When there was a single observation missing, we used linear interpolation, again, depending on the nature of the series, either of the logarithmic or of the arithmetic values of the adjacent observations to estimate the intervening one. When there were a number of observations missing, due usually to a change in the periodicity of the data, we tried to take account of other information to improve on the simple linear interpolation or interpolation by a single related series.[4]

When these various data problems were specific to components of an aggregate series, such as the currency component of $M1$, we disaggre-

3. The basic guide in our interpolation procedures was Milton Friedman's (1962) monograph on the subject. Friedman and Schwartz (1970) contains a concise restatement of these principles together with numerous examples of their practical application.

4. These included articles on various aspects of international data, series compiled by international agencies and past statistical studies utilizing the series in question.

gated the data, adjusted the component in question separately, and then reaggregated. Insofar as possible, we tried to work with seasonally adjusted data when we were performing the interpolation.[5] Often, however, this was impossible. In many instances a series contained so many breaks that the resulting subseries were of too short a duration for us to obtain estimates of seasonal factors. In these cases we constructed a non–seasonally adjusted series for the full period and seasonally adjusted it.

3.2   Data Problems and Their Resolution

To illustrate some of the problems we encountered in compiling the data as well as in obtaining our solutions to them, we think it would be useful to discuss several examples. The three we have chosen are the narrow money supply ($M1$) in the United Kingdom, the official settlements balance in the United States, and consumer prices in France. We view the first two as successful and relatively important contributions. In both instances there were no official published series for earlier parts of our sample period. Using other data, we were able to derive series for these earlier periods that appear to be reasonably homogeneous with the later.

In the third case, the French data, we were again successful, but in retrospect the overall contribution seems to us to have been relatively minor. A simpler approach than ours would likely have produced nearly identical results.

3.2.1   British M1

Officially published British money data for years prior to 1963 are available only on an annual basis. The end-of-quarter series begin with the observation for the first quarter of 1963; the mid-month series begin in late 1971. Both sets of data moreover contain a considerable number of breaks. However, for observations prior to 1963 there are monthly data for some of the major components of M1 and M2: currency held by the public and some bank deposits. The latter consist of data on both current accounts (demand deposits) and deposit accounts (time deposits) in three major classes of domestic banks (London Clearing, Scottish, and Northern Irish). Since these data ended before the official mid-month series began, we worked with the official quarterly series, extending it back in time.

As a first step, we derived monthly figures for current account deposits adjusted for float for all three categories of banks for the period 1955I to 1969 IV. To estimate float for the London Clearing banks, we used the

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5. In the instances in which we used seasonally adjusted component series in our compilation of the final series, we did not reconstruct an unadjusted final series.

estimate implicit in the official figures for total deposits of this set of banks; i.e. adjusted current accounts equal gross current accounts less the difference between total gross deposits and total net (adjusted) deposits. For the Scottish Banks similar estimates of float are available only from October 1960 on; for the Northern Irish there are no net figures. Hence, to estimate float for the period prior to October 1960 for the Scottish banks, we assumed that the ratio of float to current accounts was the same for Scottish and London Clearing Banks; for the Northern Irish we assumed that the ratio was the same throughout as for the Scottish.

To the sum of the monthly adjusted current accounts of all three classes of banks we added the official monthly estimates of currency. We then took quarterly averages of the seasonally adjusted monthly figures centered in the last month of each quarter to arrive at a proxy series for M1. We then regressed the official on the proxy M1 series over the period of overlap 1963I to 1969IV. Using this relation and the proxy series, we extended the official series back to 1955.

Prior to interpolating via regression, we adjusted the official series for the breaks in it after 1963: in 1967 IV, 1972I, and 1973I due to inclusion of additional banks and in 1971IV and 1975II due to changes in reporting techniques. In each instance the official sources contained figures compiled on both the old and new basis for each quarter in which a break occurred. We used the ratio of the new to the old figures during these quarters to adjust earlier data for the various discontinuities.

3.2.2   United States Balance of Payments

The components of the American official settlements balance are only available from the Department of Commerce beginning in 1960. Prior to 1960, there are data on net transactions in U.S. official reserve assets but no data on other U.S. government liabilities to foreign official agencies.

The Treasury Department, however, does publish data for total (government and nongovernment) liquid liabilities to foreign official agencies as reported by commercial banks. Therefore, for 1955–59, we estimated the official portion of liquid liabilities by first regressing U.S. liquid liabilities to foreign official agencies on bank-reported short-term liabilities to foreign official agencies for the period 1960I to 1975IV. We then estimated the official portion of U.S liquid liabilities on the basis of the bank-reported data reported by banks for 1955I to 1959IV.

The only quarterly data for nonliquid liabilities to foreign official agencies that were available for the years 1955–59 were for a component of that total. Annual data, however, indicated that the total itself was only a small fraction of the official settlements balance during this period. Accordingly, we used the subseries without further adjustment as a proxy for the full series. We then added these estimates to our estimates of

liquid liabilities and to net transactions in U.S. official reserve assets to obtain the official settlements balance for 1955–59.

3.2.3   French Consumer Prices

Before 1962, published data for consumer prices for France as a whole exist only on an annual basis. Throughout our sample period, however, there are monthly data for a Paris CPI. For the period 1957–61, there are end-of-quarter data for an urban provincial CPI, and yearly data are available for both prior to 1957. Using a variety of interpolation techniques, we were able to obtain monthly CPI data for the whole of France for the full sample period. Doing so involved the following three steps.

To construct a monthly index for the period through 1957, we estimated the relation between the yearly provincial and Parisian indexes for the years 1949–56 and used this relation, together with the monthly Parisian index, to obtain a monthly provincial index.

For the period 1957–63, we estimated the relation between the quarter provincial index and the Parisian index for the last month of the quarter and used it, together with the monthly Parisian index, to estimate the monthly provincial index.

Using equal weights, we combined the monthly Parisian and estimated monthly provincial index for each period. That gave us two separate national indexes: a 1949-based series for the period through 1957 and a 1956/58-based index for the period 1957–63. We linked these indexes and the two published indexes for all of France, the 1962-based index for 1962–70 and the 1970-based index for 1970–76, by multiplying by the means of the ratios of overlapping observations in the relevant overlapping year. The result was a continuous 1970-based monthly series, which we then converted to a quarterly.

Examining these data graphically and comparing the behavior of French inflation with inflation in other countries has, however, raised doubts in our minds about the accuracy of the underlying data. The relatively smooth pattern of French inflation throughout most of the sample period—even the part in which we made no adjustments—suggests that either interpolation played a major role in the generation of the original data or they are based largely upon (controlled) list prices rather than actual transactions prices.

3.3   Reliability of the Data

The experience with the French CPI data is not unique. In a number of instances—French monetary aggregates, Canadian currency, French industrial production, the balance of payments for a number of countries—we made a considerable effort to ascertain the nature of the data deficien-

cies, the cause of breaks, for instance, or to collect more suitable series than commonly used. Many of these attempts resulted in "dry holes." In some cases data did not exist in any usable form. In others, simpler methods of adjustment, such as linking the totals by the ratio of overlapping observation rather than adjusting individual components separately on the basis of related data, probably would have led to few appreciable differences in the final product. Hindsight in these instances, however, is better than foresight, or, to return to the earlier metaphor, one cannot simply eliminate the dry holes and be left with the gushers.

Two additional sets of data problems are worth some discussion: the homogeneity of particular series, or groups of series, among countries, and the accuracy of one country's data relative to those of other countries. Let us consider these two issues in order.

Prior experience in working with some of the foreign data, as well as a perusal of the literature comparing particular types of data internationally, convinced us that in most instances about the best we could do would be to obtain data that were consistent over time for each country but that differed to varying and, in most instances, somewhat unknown degrees among countries.

The major exception is the monetary data—M1, M2, and especially high-powered money. The components necessary to derive these three totals are available for most countries. Moreover, there appears to be at least a broad consensus among economists on which subtotals to use for each country. Accordingly, we view these data as the most homogeneous, at least from an accounting standpoint.[6]

Next best, we suspect, are the series on interest rates. These data differ somewhat with respect to the maturity of the instruments within each of the two categories and also with respect to the issuer—government versus private sector. Neither set of differences, however, seems likely to create major difficulties. The one problem that may be of some importance is the tendency of some countries more than others to exercise direct control over rates during some part of our sample period.[7]

Most of the remaining data—income, price and industrial production indexes, balance-of-payments statistics, and government accounts—suffer from well-known difficulties such as differences in samples among countries, (e.g. price indexes), differences in concept (e.g. GNP as opposed to GDP or the French *produit intérieur brut*), and differences in

6. Differences in financial development as well as in the legal restrictions imposed upon banks—reserve requirements, interest ceilings, and the like—conceivably could cause the deposit data to differ in economic meaning among countries, as Friedman and Schwartz (1970, pp. 137–46) and Lothian (1976) point out.

7. In Japan, for instance, this appears to be a problem up until at least the early 1970s. In Italy, there are no quarterly data for short-term rates prior to that time. The major reason appears to be a desire by banks to avoid involvement with the regulatory authorities.

types of data available (e.g. national income versus other methods of reporting government expenditures).[8]

How severe these problems are and what magnitude of measurement error they induce in the data for the various countries is, however, mostly a matter of conjecture. One rough cross-country index is the amount of effort we had to expend deriving the series for each country. By this criterion, France, Italy, and the U.K. would score lowest in terms of data reliability. Japan and the Netherlands would come next. Canada, Germany, and the U.S. would rank highest. The obvious problems with using that index, however, is that it suggests that our own adjustments to the data of some countries made after the fact are inferior to the adjustments made beforehand by government statistical offices of others.

An alternative index of data reliability, which is not without its own faults but that does not suffer from this problem, is differences among countries in the goodness of fit of some of the behavioral equations reported elsewhere in this volume. One such set of equations is the real income equations reported by Darby in chapter 9. Darby, in fact, cites measurement errors for the poorer performance of the equations in some countries than in others. He demonstrates that the existence of such errors is consistent with the pattern of coefficients estimated for several foreign countries. Grouping the countries on the basis of Darby's results, we would rank France, Italy, and Japan as having the least reliable data; Canada, Germany, and the Netherlands would be given the middle ground. The United Kingdom and the United States we would judge to be the best.

The exact ranking based on several other equations we have examined would be different. However, a broad pattern of differences among countries in data quality is evident. The simple nominal income equations in the next section of this chapter, for example, perform relatively poorly for the United Kingdom, France, and Italy—high standard errors as a percentage of the mean of the dependent variable—while those for the United States perform relatively well. The results for Canada, Japan, Germany, and the Netherlands lie in between.

The one reasonably firm inference that can be drawn from all of this is that France and the United States very likely occupy the two extremes in data quality. In addition, Italy—and perhaps Japan and the United Kingdom—seems to be on the low side of the mean while Canada, Germany, and the Netherlands seem to be on the high side.

8. International agencies such as the United Nations Statistical Office, the IMF, and the OECD attempt to reconstruct some of these series on a common basis. For the most part, however, the resultant data are unavailable on a quarterly basis for anything other than exceedingly short periods. See, for example, the discussion of balance-of-payments data by Erwin Veil (1975) and of consumer price data by Charlotte Vannereau (1975) in the OECD's *Occasional Studies*.

3.3.1   Comparison with the IMF Data

Publications of the International Monetary Fund, in particular its *International Financial Statistics* and their companion tapes, have been a standard source for a wide variety of international data. For that reason we thought it would be useful to compare our data with comparable series available from the IMF.

Table 3.1 provides summary data on relative temporal coverage. The individual entries in the table are means of the ratios of the number of quarters spanned by the IMF series to the number of quarters spanned by our series. We calculate these two ways: as the mean across all eight countries for each of the series and as the mean across all series for each of the eight countries. This comparison is for fourteen of the basic eighteen series available for each country in our data bank. We have omitted population and unemployment altogether, and only listed the official settlements balance or a proxy thereof instead of its separate current account and capital account components.

Let us consider the country means first. Here the distribution is bimodal. For four of the countries, Canada, France, Italy and the Netherlands, the ratio of the IMF coverage to ours is approximately 0.75. For the remaining four, it is roughly 10 percentage points higher.

The series by series breakdown reveals a somewhat different distribution. Approximately half the series on the IMF tapes cover 80% or more of the quarters covered by our series. The coverage of the remainder, however, is widely dispersed, ranging from roughly 43% for the overall

Table 3.1   **Temporal Coverage of the IMF as a**
                      Percentage of the NBER Quarterly Data

a) Country Means			
Canada	.765	Japan	.851
France	.761	Netherlands	.728
Germany	.854	U.K.	.849
Italy	.741	U.S.	.832
b) Series Means			
M1	.910	Real GNP/GDP	.688
M2	.865	Industrial production	.889
High-powered money	.910	CPI/cost of living	.910
Official reserves	.910	Exchange rate	.910
Short-term interest rate	.813	Balance of payments	.428
Long-term interest rate	.848	Government expenditures	.738
Nominal GNP/GDP	.551	Government deficit	.800
c) Grand Mean = .798			

balance of payments to approximately 74% for government expenditures. In no instance, moreover, do the IMF data cover our full sample period.

Not only are the IMF data available only for shorter periods, but they also appear to contain a sizable number of breaks of one sort or another. On the tapes themselves, these breaks usually are not indicated. The *International Financial Statistics Yearbook*, though, currently provides annual data for a twenty-nine-year period. A cross-check of the *1980 Yearbook* reveals an average of 3.7 breaks per country. No country has fewer than two breaks, and three, Germany, Japan, and the U.K., each has four or more. Since the difficulties involved in compiling quarterly figures for some of the series are liable to be greater than the difficulties in compiling the yearly, these figures are likely to provide lower limits on the number of breaks in the quarterly data.

To get some indication of the relative accuracy of our data and those available on the IMF tapes for the seven foreign countries, we ran a series of simple nominal income and price equations of the form

$$(3.1) \qquad \Delta \log X_t = a + \sum_{i=0}^{n} b_i \, \Delta \log \mathrm{M1}_{t-i},$$

where X was nominal income (or a proxy thereof) in one set of equations, the consumer price index in the other; M1 was the narrowly defined money supply; and n took the alternative values of 4 and 8. For the countries lacking nominal income data on the IMF tapes, we used the same proxy other researchers have used: the algebraic sum of the changes in the logarithms of the CPI and industrial production. In the comparisons of nominal income equations, the sample period that we used was determined by the availability of the IMF data. In the comparisons of price equations, we faced no such data constraint; hence we used the same sample period for all countries (1959II to 1976IV). In general the regressions with the longer lag fitted better in both instances. Judging these on the basis of either R^2 or standard error of the estimate, we found that for four of the seven foreign countries the nominal income results were clearly superior with our data, the results for two were approximately the same regardless of the data used, and the results for one, France, were in both instances too poor to be considered for comparison.

The price equations on the whole were less satisfactory than the nominal income equations in terms of goodness of fit. Our data did, however, tend to perform marginally better. Viewed in terms of R^2, three of the foreign countries were superior with our data, three with the IMF; viewed in terms of standard error of estimates, five were superior with our data, one was the same with both. Again, France was equally poor with both data sets.

3.4 Conclusions

As we see it, our construction of an international data base from an original source has two major benefits. Data of tolerable comparability among countries and substantial homogeneity over time are now readily available for a longer time period than previously. In addition, the pedigree of these data—both their merits and their limitations—is well enough documented that future researchers need not themselves go through the same arduous process that we have. As data for new time periods become available, they can in most instances simply be linked to our series.

The data nevertheless are still far from ideal. The dubious quality of some series is one problem. We doubt, however, that it can be greatly mitigated by additional manipulation of the underlying data by private researchers. Government statistical offices and central banks will have to take the lead. Intercountry heterogeneity of certain other series is a second problem. Its resolution unfortunately is far from simple. In each instance a cooperative effort by official agencies in all of the various countries would be necessary.

How fruitful our efforts have been can perhaps be best judged in terms of the studies to which these data have given rise. The wide range of successful empirical investigations reported in this volume provides the best check on the data in general just as the research underlying their construction has provided a check in detail.

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