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The Measurement of Output
and Factors of Production
for the Business Sector
in OECD Countries (The
OECD Business Sector
Database)

**Mark Keese,
Gérard Salou,
Pete Richardson**

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DEPARTMENT
OF ECONOMICS AND STATISTICS

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(The OECD Business Sector Database)

May 1991

by

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

Paris 1991

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ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT

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This paper describes a Business Sector Data Base (BSDB) for OECD countries constructed in the context of recent work of the OECD Economics and Statistics Department. It discusses many of the problems of consistency between the usual sources of economic statistics for each of the concepts used and describes the choices made to construct a consistent data base. In two important areas where major problems arise, namely the treatment of capital stock and energy, it has been necessary to construct a number of new estimates. The resulting data base is available on PC diskette to the general public on a subscription basis.

Cet article décrit une base de données internationale relative au secteur des entreprises, la BSDB, construite dans le cadre des travaux récents du Département des affaires économiques et statistiques de l'OCDE. Les problèmes de cohérence entre les sources de données statistiques correspondant à chacun des concepts utilisés ainsi que les choix nécessaires à la construction d'une base de données cohérente sont décrits et discutés dans cet article. Dans deux importants domaines pour lesquels se posent des problèmes statistiques le stock de capital et l'énergie, il a été nécessaire de construire de nouvelles estimations. La base de données dérivée est mise à la disposition du public sur disquette pour micro-ordinateur sur abonnement.

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by

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The work described in this paper originally arose from the work programme of the Department's Growth Studies Division and its empirical studies of business sector supply issues in the OECD countries. Its form and content, therefore, owe much to the advice and contributions of their colleagues working in this area. Special thanks go to Jorgen Elmeskov, John Martin and Tim Simmons for comments on an earlier draft of this paper, as well as to Ellen Carlson, Portia Eltvedt, Catherine Lemoine and Jan Davies-Montel for their technical assistance.

The OECD Business Sector Database on PC Diskette

The Business Sector Data Base (BSDB) described in this Working Paper is now available on a regular subscription basis on PC diskettes.

The BSDB is ideally suited for a wide range of empirical analyses of production and supply relationships in OECD member countries on a comparative or time-series/cross section basis. It includes all the principle series for value added, capital stocks, investment, employment and factor prices for the business sectors of the 24 OECD Member country economies and the business sector energy-related series for the Major Seven economies, along with key aggregate and sub-component series used in their derivation. These time series cover the time period from 1960 to the present day (updated as available) and are stored in quarterly form.

The BSDB will be supplied on 5¼- or 3½-inch IBM PC-compatible diskettes on twice yearly basis (updated to take account of new information and data revisions) at an annual subscription rate of £260, US\$445, FF.2,500 or DM 800 (terms for multiple and time share data user contracts are also available on request).

If you are interested in subscribing to the BSDB or require more specific information then you are invited to complete the following questionnaire and return it to:

BSDB Project
Quantitative Analysis & Support Division
Economics & Statistics Department
OECD, 2 rue André-Pascal
75775 PARIS CEDEX 16
France

Name and Address:

Title/Function:

Organisation:

Principle Activity: Commercial/Educational/Government/Research/Other(*)

Type of Application: Statistical/Econometric/Economic Analysis/Other(*)

PC Type: IBM-compatible/other(*)

Applications Software:

*Please specify as appropriate

**The Measurement of Output and Factors of Production
for the Business Sector in the 24 OECD Member Countries**

(The OECD Business Sector Data Base)

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I. Introduction

Although the business sector is commonly referred to by economists and is the subject of a wide variety of economic studies and analyses, the basic concept is not at all well-defined statistically and does not exist in the standard international nomenclatures for National Accounts statistics, such as the standardised "System of National Accounts" (the SNA). As a result, many of the familiar economic concepts -- including value-added, output, employment and the capital stock -- are not easily identified for the business sector in the usual sources for macroeconomic statistics. This paper therefore describes recent work of the OECD Economics and Statistics Department to construct an international Business Sector Data Base (BSDB) for use in a wide variety of analyses of production and supply issues, in the context of the OECD's regular surveys and assessments, related empirical studies and international macroeconomic model, INTERLINK (1).

The BSDB contains data for each of the 24 OECD Member countries related to value-added, employment, investment, factor prices, and capital stock, in both current and constant prices where appropriate. For the major seven economies, estimates are also included for business energy use and related price deflators. The BSDB also includes many of the original component series at both the sectoral and aggregate levels which are used to derive the business sector series. The major part of the time-series covers the period from 1960 on. The data are stored in a convenient quarterly form and are updated and revised on a regular basis as part of the OECD's larger Analytical Data Base [ADB].

At the same time, tape and PC diskette versions of the data base will be made available for analytical use on a subscription basis. Details on these diskettes are given on page iii of this paper, along with a corresponding questionnaire for interested readers.

The broad outline of the paper is as follows. Section II describes the definition and derivation of business sector series for output, investment, employment and factor prices. The problems of consistency between the usual sources of economic statistics for each of these concepts and the choices made in constructing the BSDB are also discussed. In two important areas where major problems arise, namely the measurement of the capital stock for all OECD countries and of energy for the seven major economies, it has been necessary to construct a number of new estimates which are an important feature of the BSDB. Sections III and IV respectively go on to provide a more comprehensive description of the construction of the capital stock and energy data respectively. Annex A provides more detailed technical notes on energy estimates whilst details of the sources of the basic data on a country-by-country basis for each of the 24 OECD Member countries included in the data base are given in Annex B.

II. The Identification and Definitions of Business Sector Indicators

A. The general framework

For the purpose of the BSDB, the business sector is defined as the institutional sector whose primary role is the production and sale of goods and services. This sector consequently corresponds to the aggregation of the corporate, quasi-corporate and unincorporated enterprises including public enterprises (detailed definitions of those institutional sectors are given in OECD, 1990a). To meet the basic requirements of policy analysis, business sector indicators have been defined for the following specific concepts:

- output (i.e. value added) at current and constant prices;
- employment;
- investment at current and constant prices;
- capital stocks at constant prices;
- energy inputs (for the major seven OECD economies);
- associated factor prices.

In the current version of the SNA, income flows are available from the appropriation accounts by institutional sector, while value added in current prices and factors of production are only available by type of activity or industrial classification. These two forms of SNA classifications are for the most part incompatible; activities are classified according to product type, while institutional sectors are classified according to function. From a practical point of view, the compilation of a fully consistent data set for the analysis of production and supply for institutional sectors is, therefore, impossible. For this reason and others, building the BSDB is not just a straightforward collection of existing SNA data series.

The framework used by the Economics and Statistics Department for its macroeconomic forecasting and policy analyses, which is also mirrored in the structure of individual country models of INTERLINK, incorporates the regular SNA breakdown of institutional sectors for income flows. For analytical and consistency purposes it is useful, therefore, to define the business sector within the same overall context, with the other main sectors being general government, households and the foreign sector. For those data which are regularly available on the basis of SNA institutional sectors, business sector indicators can often be derived by subtracting the government sector from total economy data. For all other data, corresponding business sector indicators have to be devised individually, often on the basis of a choice between one or more estimation methods.

The following sections provide descriptions of the individual business sector variables in the BSDB, outlining the principle problems involved in their measurement and the specific solutions adopted. In setting out the basic algebra of the system, standard ADB mnemonics have been used throughout, as described in the glossary at the end of the paper. Throughout this section constant price magnitudes are indicated by the insertion of the letter "V" at the end of the mnemonic, whereas price deflator mnemonics generally start with the letter "P". More detailed comments on individual country variables and sources are given in Annex B.

B. Value added

Output in the SNA is classified by type of activity and not by institution. Therefore, business sector output cannot be identified directly. Instead, it has been estimated using a "top-down" approach, by taking total economy GDP at factor cost less an estimate of output in the general government sector. Ideally, the imputed rent of owner-occupiers of dwellings in the household sector should also be deducted, but such data are not generally available for the majority of OECD countries. Exclusion of this adjustment therefore implies some imprecision in the measure (2).

Using SNA concepts and data, business sector output at current prices can be constructed as follows:

$$GDPB = GDP - (TIND-TSUB) - (CGW + CFKG)$$

where

- GDP is Gross Domestic Product (3);
- (TIND - TSUB) represents net indirect taxes, defined as total indirect taxes less total subsidies;
- CGW+CFKG represents output in the general government sector defined as general government compensation of employees plus general government capital depreciation.

At constant prices, the elements to be subtracted from total GDP are not generally identified individually in the national accounts and necessary adjustments are therefore made on the basis of suitably deflated estimates of net indirect taxes, the government wage bill and government consumption of fixed capital.

The corresponding constant price output identity is as follows:

$$GDPBV = GDPV - NITV - (CGW/PCGW + CFKG/PIG)$$

where:

- GDPV is Gross Domestic Product at constant prices;
- NITV represents the net indirect taxes at constant prices. Since very few countries supply data for this concept, estimates have been

constructed by applying the implicit aggregate net indirect tax rate in the national accounts base year to the constant price series for the overall tax base, defined as $GDPV - CGW / PCGW$;

- PCGW represents the deflator of general government compensation of employees. Where no national source data exist, an index of the implicit wage rate in the general government sector is used as a proxy (4);
- PIG is the implicit deflator for general government investment and, in general, is readily available from national sources.

C. Employment data

In principle, employment in the business sector (ETB) is readily identified as total economy employment (ET) less general government employment (EG). The numbers of self-employed (ES) are then deducted to give the number of business sector employees (EEP). However, in practice, a number of problems arise as a result of the co-existence of employment statistics based on different surveys and different classification schemes.

In the SNA, total employment and numbers of employees are typically classified by kind of activities and not by institutional sectors. An added complication is that employment data are often used for both production analysis and labour market analysis. For the latter type of analysis, labour market experts commonly recommend the use of household survey data, for reasons of international comparability. However, SNA employment statistics are often based on data from establishment surveys. For some countries, the discrepancy between the estimates of employment from these two sources is very important. Moreover, data from both types of survey are often required in order to estimate business sector employment. Whereas employment statistics for the general government sector and for producers of government services are not available from household surveys, the total labour force cannot be identified from establishment surveys.

A further problem linked to the incompatibility of sources concerns the units of measurement involved. Whereas individuals are counted only once in household surveys, they may be counted more than once and in different subcategories in establishment surveys, for example, where more than one job is held.

Within the BSDB, the choice of sources has been made taking account of data availability and the advice of country experts. In a number of cases, it has been possible to simplify the problem by identifying two separate definitions of the total employment series, one for labour market analysis and the other for production analysis.

D. Investment and capital stocks

Business sector gross fixed capital formation (IBBV) is defined to be equal to total gross fixed capital formation (ITV) less general government

investment (IGV) and investment in dwellings by households and non-profit organisations (IHV).

$$IBBV = ITV - IGV - IHV$$

As such, investment by public enterprises is included within the definition of the business sector used by the BSDB (5). Each of these elements is generally well defined in the national accounts of OECD countries.

Corresponding to business sector investment is the gross real stock of business fixed capital (KBV) which represents the cumulated sum of current and past investment flows at constant prices, suitably adjusted for net sales and scrapping. The latter can be defined as the difference between gross investment in a period and the subsequent increase in the gross capital stock. The implicit rate of scrapping in yearly terms (RSCRB) is, therefore, constructed as:

$$RSCRB = (1 - (KBV - IBBV(-1))/KBV(-1)) * 100.$$

Not all countries publish official capital stock series and so, to obtain complete coverage of OECD countries, the BSDB incorporates a number of original estimates using a perpetual inventory method. In addition, adjustments to official estimates have been made to ensure conformity between the capital stock series and the BSDB investment series. Details of the methods and sources used to derive these capital stock estimates are given in the next section.

E. Labour costs

Compensation per employee in the business sector (WSSE) is constructed by deducting the general government wage bill (CGW) from total compensation of employees, (WSSS) and dividing through by business sector employment less self employment, i.e.:

$$WSSE = (WSSS - CGW) / (ETB - ES)$$

Data for total compensation of employees are taken from SNA household appropriation accounts.

III. Gross Capital Stock: Sources and Methods

A. Introduction

The BSDB includes for each country a series for the business sector gross capital stock (KBV) which is fully consistent in coverage with the series for business sector investment (IBBV). For ten OECD countries, the gross

Table 1. National sources for gross capital stock series

Country	Source	Comments and BSDB adjustments
Belgium, Finland	OECD (1)	No adjustments made to the national estimates. The national series for Sweden ends in 1983 and has been extrapolated from 1984 onwards (see Annex I for extrapolation method).
Germany, Sweden	OECD (1)	
United States	OECD (1)	
Japan	OECD (1)	The BSDB estimates include own estimates of the gross capital stock of public enterprises as national source estimates are available for the private sector only (see Tables 3-5).
Australia	ABS (5)	Taken from Tables 6 and 7. As for the BSDB definition of IBBV, private dwellings and real estate transfer expenses are excluded. Historical estimates of the capital stock back to 1960 have been supplied directly by the ABS.
Canada	CAN-SIM (4)	Constructed as the total economy-wide gross capital stock (except dwellings) less the capital stocks of federal, provincial and municipal administrations and schools, universities and hospitals. As a result of important differences in the valuation of investment, an adjustment is made to preserve the implicit CANSIM estimate of the rate of scrapping. Starting in 1954, the capital stock is adjusted by the proportional difference between the (national accounts based) BSDB estimate of business investment and the capital stock based estimate. Estimates for subsequent years are built up using the implicit CANSIM rate of scrapping series and the BSDB investment series.
France	INSEE (2)	Provided directly for the period 1970 onwards, adjusted to include estimates of the stock of business dwellings.
	OECD (1)	For the period 1960-70 at 1970 prices. The INSEE series at 1980 prices are spliced onto this series at 1970.
United Kingdom	CSO (3)	Provided directly. Minor adjustments are made for asset transfers from general government to public enterprises in 1961 and 1974.
1.	See OECD(f) (1990). The gross capital stock for the business sector is obtained by summing "Agriculture", "Industry" and "Services excluding dwellings".	
2.	Institut National de la Statistique et des Etudes Economiques, Paris, France.	
3.	Central Statistical Office, London, United Kingdom.	
4.	Statistics Canada's direct-line access database. See also Statistics Canada (1990).	
5.	See Australian Bureau of Statistics (1990).	

capital stock estimates are largely built up from national sources. For the remaining fourteen countries, there are currently no published national estimates which are consistent with BSDB definitions. Therefore, estimates for these countries are constructed using a perpetual inventory method, similar to that underlying most national estimates. The sources and methods for both the national and BSDB estimates are more fully described in the following sections. The plausibility of the BSDB capital stock estimates is then examined and a cross-country comparison is presented of the resulting capital-output ratios. The methods used to extrapolate and interpolate the end-year estimates are described in the explanatory notes to Annex B.

B. National source estimates

Table 1 lists those countries for which the BSDB gross capital stock estimates are obtained directly from national sources (6). All of these countries use a perpetual inventory method (see below), with the majority using some form of bell-shaped distribution of service lives (7).

However, as Table 2 shows, the average service life assumptions underlying these estimates differ widely across countries (8). Sweden and the United Kingdom show the longest average service lives, while Japan has the shortest (9). Service lives for structures in Germany also tend to be long. Compositional changes in a number of countries have affected these averages over time although the declines in Australia, Canada and the United Kingdom can be largely explained by the explicit assumption made in these countries of trend declines in average service lives for all capital goods.

C. BSDB estimates

For those countries where it is currently not possible to derive appropriate capital stock estimates from national sources, BSDB estimates are constructed as a weighted sum of past investment flows. This is the standard perpetual inventory method and can be written as:

$$K_t = \sum_{n=t-L+1}^t I_n w_{t-n+1} \quad (0 \leq w_{i+1} \leq w_i \leq 1 \text{ for all } i \text{ and } \sum_{i=1}^L w_i = 1)$$

where K_t represents the constant-price, gross capital stock at the end of the period t . I_n is the constant-price investment in period n , w_{t-n+1} the weight applied to investment in year n , and L is the maximum life of the capital good. The weights in this formulation of the perpetual inventory method represent the probability, as a function of age, of a capital good still being in operation at a given point in time (10). As is the case with most national estimates of the gross capital stock, it has been implicitly assumed that there is no loss in productive efficiency over the lifetime of a capital good (11). The function generating these weights is commonly referred to as the "survival" function.

For the purposes of the BSDB estimates, a symmetrical Winfrey "S3" bell-shaped function (Winfrey (1935)) has been chosen as it is relatively easy to work with and is used by a number of national authorities (including

Table 2. Implicit average service lives used in national estimates (1)

Country	Structures			Plant and Equipment		
	1960s	1970s	1980s	1960s	1970s	1980s
United States	33	32	30	15	14	14
Japan (2)	30	30	30	10	10	10
Germany	56	52	50	15	14	14
France	n.a.	33	32	n.a.	12	13
United Kingdom	68	63	57	23	22	21
Canada	36	33	31	15	14	12
Australia	45	44	44	17	16	15
Belgium	40	40	40	14	14	14
Finland	41	41	40	14	15	15
Sweden (2)	72	72	72	24	24	24

1. Averages of the service lives (in years) have been calculated for each major type of capital good by dividing the gross stock of capital by depreciation. All series are at constant prices and have been taken from OECD (1990f).
2. Calculated by taking service lives by industry from Blades (1983) weighted by the share of each industry's capital stock in the total. The estimates for plant and equipment exclude transportation equipment.

Australia, Sweden and the United States). Such a function implies that approximately three quarters of assets are retired within 30 per cent of their mean average service lives. Given that BSDB estimates cover broad classes of capital goods which comprise a range of average service lives, the true retirement function is likely to be skewed to the left.

Where possible, capital stocks were estimated for three broad classes of capital goods:

- (i) non-dwelling construction;
- (ii) transport equipment; and
- (iii) other plant and equipment.

For most countries, the corresponding investment series used to build up these capital stocks are only available at the total economy level, so that it is necessary to subtract off an estimate of the general government sector capital stock. The average service lives used to construct this set of capital stock estimates are reported in Table 3.

For some countries (Austria, Iceland, Italy and Norway), these asset life assumptions are based on information contained in Blades (1983). For the remaining countries, estimates are based on average service lines for similar economies. Where separate estimates are made for the general government's gross capital stock, it is assumed that the average service life is a weighted average of those for non-dwelling construction and plant and equipment (with weights 0.85 and 0.15, respectively).

To obtain estimates of capital stocks from 1960 onwards, historical constant price series of investment are required which begin in 1960-L, where L is the effective maximum life of each type of capital good. Using a Winfrey distribution of service lives, the maximum age for a capital asset within a class of capital goods is twice the average service life for that class as a whole. However, for computational and practical purposes, the effective maximum life is somewhat less than this. For example, for those capital goods with an average service life of 20 years, the proportion still in operation after 35 years will be close to zero. Nevertheless, quite long historical series of investment are required, particularly for non-dwelling structures. Typically, these series are only readily available from 1960 onwards and so a number of different sources are used to extend the data back to 1950 or further. These are reported by country in Table 4 together with the period for which the series are extended.

Earlier estimates of investment, where not available directly, are obtained by assuming that investment grew, on average, in line with growth in real GDP for the periods pre-1938, 1938 to 1950 and 1951 to 1960. These growth rates are reported in Table 5 as well as estimates of war damage as a per cent of the business capital stock. These latter estimates are very approximative but are necessary to avoid including assets in the capital stock estimates which were destroyed during the Second World War.

Table 3. Average service lives by major type or sector used in constructing BSDB estimates of gross capital stocks (1)

Country	Structures	Machinery and Equipment			General Government	Other
		Plant	Transport	Total		
New Zealand	40 (2)			16 (2)		40 (3)
Austria	35	18	12	[17]	32	
Denmark	60 (4)			20 (4)		
Greece	80	26	14	[23]	70	80 (5)
Iceland	50	18	22	[19]	60	
Ireland (6)	60	20	12	[17]	75	
Italy	40			18	37	
Japan						17 (3)
Luxembourg	37			15	34	
Netherlands (7)	30	15	12	[14]	28	15 (8)
Norway	[57]	[25]	[18]	[19]		
Portugal	34	17	12	[15]	30	
Spain	33	17	12	[15]	30	
Switzerland	40			18	35	
Turkey	40			20	36	

1. Figures in brackets represent weighted averages.
2. Private sector only.
3. Public enterprises.
4. Business sector only.
5. Public enterprise dwellings.
6. See Henry (1989).
7. See Central Bureau of Statistics (1989).
8. Transfer expenses on used assets.

Table 4. Sources for historical series of investment

Country	Period of Extrapolation	Principal Sources
New Zealand	1959/60-1969/70	Estimates of the Reserve Bank of New Zealand
Austria	1950-1959	National Accounts 1950-1968, OECD
Denmark	1948-1959	Provided directly by national authorities
Greece	1948-1959	Greek National Accounts 1958-1975
Iceland	1950-1959	National Accounts 1950-1968, OECD
Ireland	1950-1959	Tables 6.1, 6.2 and 6.3 from Henry (1989)
Italy	1926-1959	National Accounts 1950-1968, OECD and Statistiche Storiche dell'Italia 1861-1975, Istituto Centrale di Statistica, Rome, 1976
Luxembourg	1949-1959	Statistics of National Product and Expenditure, No.2, 1938 and 1947 to 1955 Organisation for European Economic Co-operation (OEEC) and National Accounts 1950-1961, OECD
Netherlands	1921-1959	Dutch National Accounts 1989 and National Accounts 1950-1968, OECD
Norway	1949-1959	Norwegian National Accounts 1988
Portugal	1952-1959	Portuguese National Accounts 1958-71 and National Accounts 1950-1961, OECD
Spain	1901-1963	Carreras (1985) and National Accounts 1950-1968, OECD
Switzerland	1948-1959	Provided directly by national authorities
Turkey	1950-1959	National Accounts 1950-1968, OECD and National Accounts 1950-1978, Vol. 1, OECD

Table 5. War damage and historical growth in real GDP

Country	War Damage (%)	Growth in Real GDP (annual % change)			Principal Sources
		Pre-1938	1938-50	1950-60	
Japan	26	2.9	-0.7	9.0	Maddison (1987)
New Zealand	0	2.9	3.2	3.9	National Accounts, OECD
Austria	15	1.6	0.6	6.0	Maddison (1982) and National Accounts, OECD
Denmark	0	2.6	2.4	3.2	Maddison (1982) and National Accounts, OECD
Greece	20	1.8	-1.6	6.1	Mitchell (1975) and Greek National Accounts
Iceland	0	2.4	9.2	4.7	Handbook of Statistics, Central Bank of Iceland and National Accounts, OECD
Ireland	0	0.3	1.5	1.7	National Accounts, OECD
Italy	8	2.9	1.5	4.6	See Table 4
Luxembourg	0	1.4	1.6	2.1	See Table 4
Netherlands	15	2.1	2.5	4.4	Maddison (1982) and National Accounts, OECD
Norway	0	2.4	2.8	3.8	National Accounts, Norway and Maddison (1982)
Portugal	0	1.6	2.7	3.7	See Table 4
Spain	10	1.0	1.6	5.6	See Table 4
Switzerland	0	2.0	2.1	4.6	Maddison (1982) and National Accounts, OECD
Turkey	0	2.0	1.9	6.3	National Accounts, OECD

D. Plausibility of the BSDB estimates

An overall gauge of the plausibility of the BSDB method for generating capital stock estimates can be obtained by using the same method to generate estimates for those countries for which national series already exist. For this purpose, alternative estimates for Australia, Belgium, France, the United Kingdom and the United States have been constructed and are compared with the national estimates in Table 6.

In terms of growth rates, the correspondence between the alternative estimates based on "BSDB" methods and the national estimates is relatively good, with differences in average growth rates at the aggregate level of no more than plus or minus 0.3 percentage points. The difference is slightly larger at the more disaggregated level, but nevertheless the same patterns of deceleration and acceleration in the growth of the capital stock can be observed in both sets of estimates.

When levels are compared, the difference between the alternative estimates and the national estimates is more pronounced. In particular, the former show significantly lower estimates for the stock of non-dwelling structures in the United States in the 1960s and higher estimates afterwards. This can be largely explained by compositional effects which have produced an almost continuous fall over the period in the implicit average service lives of the national estimates of non-dwelling structures. Such an effect is not captured in the alternative estimates, which take as fixed the average service life implied by the national estimates for the 1960s (see Table 2). Not surprisingly, given the assumption of declining service lives underlying the national estimates, the alternative estimates also show a growing tendency to overstate the level of the capital stock for both Australia and the United Kingdom. Where average service lives have been more stable, as is the case for Belgium and France, the alternative estimates are not systematically higher or lower than the corresponding national estimates and, hence, growth rates of two sets of estimates are particularly close.

E. Capital-output ratios

The business sector capital-output ratios derived from the BSDB are presented in Table 7. The capital-output ratio has a positive trend over time in all countries except Norway, Canada and Finland. It has increased particularly rapidly for Japan, New Zealand, Austria, Denmark, Greece, Iceland, Portugal, Spain, Sweden and Switzerland while only small increases have been reported for the United States, Finland and France. In general though, not too much can be made of absolute differences in the capital-output ratios between countries, given the large and somewhat arbitrary differences in the average service life assumptions for some countries. The extent to which cross-country comparisons of capital-output ratios and total factor productivity are affected by these differences could be an interesting area for further research.

Table 6. BSDB and national (NAT) estimates of the gross capital stock

Year	Non-dwelling structures			Plant and Equipment			Total Business Sector									
	Ratio BSDB/NAT	Growth (%) NAT	Scrap Rate BSDB	Ratio BSDB/NAT	Growth (%) NAT	Scrap Rate BSDB	Ratio BSDB/NAT	Growth (%) NAT	Scrap Rate BSDB							
	<u>United States</u>															
60-70	94.1	2.9	3.7	2.4	2.1	2.4	99.4	4.5	4.2	5.1	5.4	96.3	3.6	3.9	3.5	3.5
70-80	100.2	2.7	3.1	2.0	1.6	2.0	98.6	5.0	5.3	4.8	4.8	99.4	3.8	4.1	3.3	3.0
80-88	102.2	2.5	2.6	2.0	1.8	2.0	101.1	3.9	4.1	5.4	5.1	101.7	3.2	3.3	3.7	3.4
60-88	98.6	2.7	3.2	2.2	1.8	2.2	99.7	4.5	4.6	5.1	5.1	98.9	3.5	3.8	3.5	3.3
	<u>France</u>															
60-70	100.3	3.0	3.2	2.4	2.2	2.4	100.9	7.8	7.9	5.9	5.8	100.5	4.7	4.9	3.6	3.4
70-80	100.5	3.7	3.6	1.8	1.8	1.8	102.6	6.4	6.4	6.0	5.6	101.4	4.8	4.9	3.6	3.5
80-87	101.3	2.2	2.4	1.9	1.6	1.9	100.3	2.9	2.1	6.4	7.0	100.8	2.5	2.3	4.0	4.2
60-87	100.6	3.1	3.2	2.1	1.9	2.1	101.3	6.0	5.8	6.1	6.1	100.9	4.2	4.2	3.7	3.7
	<u>United Kingdom</u>															
60-70	100.7	3.2	3.4	1.0	0.8	1.0	99.9	4.6	4.3	2.7	3.0	100.3	3.9	3.9	1.8	1.9
70-80	102.2	2.7	2.8	0.9	0.7	0.9	100.1	3.2	3.4	2.9	2.7	101.1	2.9	3.1	1.9	1.7
80-87	103.8	2.0	2.2	0.9	0.6	0.9	102.5	1.8	2.1	3.6	3.2	103.1	1.9	2.2	2.3	1.9
60-87	102.0	2.7	2.9	0.9	0.7	0.9	100.7	3.3	3.4	3.1	3.0	101.4	3.0	3.1	2.0	1.8
	<u>Australia</u>															
60-70	97.0	5.4	5.6	0.9	0.8	0.9	101.8	6.0	6.2	3.9	3.4	99.3	5.7	5.9	2.3	2.1
70-80	99.4	4.6	4.8	0.8	0.6	0.8	103.3	4.3	4.5	4.1	3.7	101.3	4.4	4.7	2.4	2.1
80-89	101.4	4.0	4.2	0.8	0.6	0.8	105.8	3.9	4.1	5.0	4.3	103.5	4.0	4.2	2.8	2.4
60-89	99.2	4.7	4.9	0.8	0.7	0.8	103.6	4.7	5.0	4.3	3.8	101.3	4.7	5.0	2.5	2.2
	<u>Belgium</u>															
60-70	98.4	3.8	4.2	1.9	1.5	1.9	102.5	5.8	5.2	5.0	5.4	99.6	4.4	4.5	2.8	2.7
70-80	100.0	3.9	3.9	1.4	1.4	1.4	100.3	4.6	4.6	5.0	4.9	100.1	4.1	4.1	2.6	2.5
80-88	99.9	2.3	2.3	1.3	1.4	1.3	100.1	3.6	3.4	5.5	5.7	100.0	2.7	2.7	2.8	2.8
60-88	99.4	3.4	3.5	1.5	1.4	1.5	101.1	4.7	4.5	5.2	5.3	99.9	3.8	3.8	2.7	2.7

Table 7. Business sector capital-output ratios (KBV/GDPBV)

	1960	1965	1970	1975	1980	1985	1986	1987	1988
United States	1.9	1.8	1.9	2.1	2.1	2.1	2.1	2.1	2.1
Japan	..	1.3	1.4	1.9	2.0	2.2	2.3	2.3	2.3
Germany	2.0	2.2	2.3	2.6	2.6	2.8	2.9	2.9	2.9
France	..	2.6	2.5	2.7	2.7	2.8	2.8	2.8	2.8
Italy	2.9	3.0	2.7	3.0	2.7	2.9	2.9	..	..
United Kingdom	..	2.7	2.9	3.2	3.3	3.2	3.2	3.1	3.0
Canada	..	..	2.0	1.9	2.0	2.1	2.1	2.1	2.1
Australia	..	..	2.7	3.0	3.1	3.1	3.2	3.2	3.2
New Zealand	..	1.2	1.3	1.5	1.8	1.8	1.9	2.0	2.0
Austria	1.8	2.0	2.2	2.6	2.9	3.2	3.3	3.3	3.3
Belgium	..	..	2.3	2.4	2.5	2.7	2.8	2.8	2.7
Denmark	2.6	2.6	2.9	3.3	3.5	3.5	3.5	3.7	3.8
Finland	3.2	3.2	3.1	3.2	3.4	3.4	3.4	3.4	3.2
Greece	..	1.5	1.7	1.9	2.2	2.5	2.6	2.6	2.6
Iceland	..	..	..	3.2	3.2	3.6	3.5	3.4	..
Ireland	..	2.4	2.6	2.8	3.0	3.2	3.3	3.2	..
Luxembourg	..	..	3.0	3.2	3.2	3.1	3.1	3.1	3.0
Netherlands	..	..	2.2	2.3	2.4	2.4	2.5	2.5	2.5
Norway	..	1.4	1.7	2.1	2.6	3.1	3.1	3.4	3.6
Portugal	1.1	1.0	1.2	1.4	1.4	1.6	1.6	1.5	..
Spain	..	1.1	1.4	1.7	2.2	2.5	2.5	2.5	..
Sweden	..	2.4	2.5	2.8	3.1	3.3	3.3	3.3	3.3
Switzerland	1.9	2.0	2.1	2.6	2.7	3.0	3.0	3.1	..
Turkey	..	..	..	1.6	2.0	1.9	1.9	1.8	..

IV. Energy for the Major Seven Countries: Sources and Methods

A. Introduction

For the major seven OECD countries, series have been constructed for business sector expenditures on energy, at both current and constant prices. Given that these represent expenditures on an intermediate input, they cannot be identified from standard national accounts tables which, typically, only present expenditure on components of final demand. The use of national accounts input-output data as a source is also precluded because of problems with timeliness, frequency, missing observations and a lack of suitable sectoral detail. Therefore, estimates of business sector expenditure are built up using fairly disaggregated data on energy balances and prices provided by, primarily, the International Energy Agency (IEA). An outline of the procedures used in constructing these energy series is given below and a discussion follows of the resulting estimates of energy intensity and average energy prices. An important feature of these estimates is the construction of representative price series covering a range of energy products. This is described in detail in Annex A which also gives a more complete documentation of the methods and sources used to obtain the BSDB energy series.

B. Construction of BSDB energy series

The IEA does not collect data on the cost of energy expenditures as such but does have very detailed statistics of energy consumption by end user and type of energy measured in tonnes of oil equivalent (TOE). Using these data, energy consumption expressed in tonnes of oil equivalent can be identified from 1960 onwards (see Annex A for details) for the following end users comprising the business sector:

-- Agriculture; Industry; Transport; Commerce;

and, for each user, by the following types of fuel:

-- Coal; Other Solid Fuels; Oil and Petroleum Products; Gas (natural and town); Electricity; Heat.

In order to calculate total business sector expenditure on energy, price series must also be identified for each of these users and for each type of energy. This is a difficult task as the IEA data on energy prices are less comprehensive than the data on energy consumption in physical units and are only available from 1978 onwards. Moreover, some of the categories of energy such as oil and petroleum products cover a heterogeneous range of energy products and so a further disaggregation of price and quantity data is required in order to construct representative prices for each broad type of energy.

Therefore, a number of different sources and assumptions have been used to supplement the IEA data in order to build up representative price series by end user and type of energy (see Annex A).

The final BSDB estimates of total business energy expenditure in nominal terms (ENB) are obtained by summing for the end users mentioned above, expenditure on each type of energy, i.e.

$$ENB = \sum P_{u,s} * Q_{u,s} \quad \text{for all } u \text{ and } s$$

where, for each end user, u , and type of energy, s , P represents the price of energy (on a national currency per TOE basis) and Q is the quantity of energy consumed (in TOE). In accordance with usual national accounts procedures, the corresponding constant-price series (ENBV) is constructed as follows:

$$ENBV = \sum PB_{u,s} Q_{u,s} \quad \text{for all } u \text{ and } s$$

where PB represents the price of energy in the national accounts base year and Q , u and s are as before. The implicit price deflator for business energy use (PENB) can then be obtained by dividing the resulting nominal expenditures by constant price expenditures, i.e.

$$PENB = ENB / ENBV$$

The national accounts procedure of revaluing quantities by the prices of a single base year to obtain constant-price series is subject to the usual drawbacks. For example, the growth rates of the constant-price series and the implicit deflators will be dependent on the choice of base year and will be affected by large movements in price relativities for different end users and for different types of energy. However, for the BSDB energy series, this effect is, in practice, rather negligible. Alternative constant-price energy series and their corresponding deflators were constructed using a chain-index method and although there is some yearly variation in the growth rates of these alternative series compared to fixed base-year series, there is no systematic differences over a longer run of years. The simpler national accounts procedure was therefore retained for the BSDB estimates.

C. Comparative trends in energy intensities and prices

Chart 1 illustrates energy expenditure-output ratios for the business sectors of the seven major OECD countries over the period 1960 to 1988. For the purposes of international comparisons, both the energy expenditures (ENBV) and output (GDPBV) series have been expressed at 1985 prices. As can be seen from Chart 1, energy expenditures per unit of output rose significantly in all countries between 1960 and 1973, followed by significant energy savings in the wake of the first and second oil shocks of 1974 and 1979. Relative to output, the share of expenditure on energy was highest in Japan until the beginning of

the 1980s when, as a result of progressive energy savings since the first oil shock, it reached similar levels to those in Canada and France. In general, energy expenditure ratios have been lowest for the United States, Germany and Italy, followed by the United Kingdom, and the largest trend declines since the mid-1970s have been for Japan, the United Kingdom and Canada, of the order of 30 per cent, compared with 15 to 20 per cent reductions for the other countries.

The expenditure-output ratios in Chart 1 are the result of both price and quantity effects and a somewhat different picture emerges when energy requirements are considered in terms of physical units rather than at constant prices. In Chart 2, for example, comparative trends for the major economies are presented on the basis of energy consumed by the business sector per unit of output, where energy is measured in terms of tons of oil equivalent (TOE) and output has been expressed in 1985 US dollars using purchasing power parities (12). This corresponds to the more conventional measure of energy intensity which is employed by, for example, the IEA. On this basis, Canada and the United States emerge as being generally the most intensive energy users, followed by France, Japan, Germany, the United Kingdom and Italy. At the same time there is rather less evidence of an energy boom in the mid-1960s and a more pronounced decline in energy intensities since the mid-1970s. The largest trend reductions are those for Japan, France and the United Kingdom, at around 35 to 45 per cent, with those for the other major countries in the range of 25 to 30 per cent.

The apparent difference in trend reductions between Charts 1 and 2 can be explained by the fact that there have been progressive structural shifts over time in almost all countries, towards more heat-efficient but, in terms of base year prices, more expensive forms of energy; for example, from oil and coal to electricity. This effectively dampens the trend fall in energy intensities when measured in terms of constant prices.

The differences between Charts 1 and 2 in the rankings of countries by energy-output ratios can be accounted for by international differences in the average price of energy paid for by the business sector. These are illustrated in Chart 3. Thus, the fact that Japan is currently at the lower end of the spectrum in terms of physical energy intensities and yet spends a higher proportion of output on energy relative to most other major countries is explained by the relatively high average cost of energy in Japan in the base year. For the reference year 1985 used to construct the comparable constant price energy-output ratios in Chart 1, it would appear that the average cost of energy (measured in TOE) for the business sector in Japan is about one and a half times higher than in the United States and Canada.

On the whole, the BSDB estimates of business energy use and prices should be seen as approximations to the underlying concepts, based on available information. A much more detailed set of energy prices, particularly for petroleum products, would be needed to obtain significantly more accurate estimates. Nevertheless, while these series may imply some under- or over-estimation in terms of levels, they are likely to be more accurate in terms of growth rates. Also in terms of providing estimates which are up-to-date and internationally comparable, the methods used are probably the best available, without engaging in a much more substantial and resource-intensive country-by-country research effort.

Notes

1. Data from the BSDB have been used in a variety of recent OECD studies concerning total factor productivity, capacity utilisation, investment and potential output for the business sector. On the modelling work of production and investment see Helliwell *et al.* (1986), Jarrett and Torres (1987) and Torres *et al.* (1989) and on total factor productivity see Englander and Mittelstädt (1988). Basic references to the OECD INTERLINK model may be found in Richardson (1988).
2. Data on imputed rent for owner-occupier are available from the SNA for the United Kingdom and represent a share of total GDP growing from 1.6 per cent in 1960 to 3.8 per cent in 1989. This suggests a non-negligible bias from not deducting imputed rent.
3. For the United States, Japan, Germany, Ireland and Turkey, the key output concept is taken as GNP instead of GDP, reflecting usual data practices.
4. For Japan, national accounts data on government output at current and constant prices are used. For Denmark, the government wage bill deflator is taken from the Finance Ministry's ADAM databank.
5. This relatively broad BSDB measure of business investment differs for a number of countries from narrower published definitions, which often exclude public-sector enterprise. For consistency, the BSDB also include data for the separate coverage adjustment component (IBCSV) used to reconcile broad and narrow measures (as for example published regularly in the OECD *Economic Outlook*). For some countries, other coverage adjustments are included in this series, notably so for Norway, which excludes relatively erratic off-shore elements of investment.
6. For most of these countries the annual data can be found in an existing OECD publication on capital stocks, OECD (1990f), which is regularly updated on the basis of information supplied by member countries or taken directly from national statistical sources. This publication also covers several other countries whose estimates could not be incorporated directly into the BSDB because of differences in coverage (France, the United Kingdom, Canada and Australia) or because of the absence of suitable gross capital stock measures (Greece and Norway).
7. There are two exceptions. For Japan, a "simultaneous exit" model is used such that all retirements of capital goods occur at their average age. For the United Kingdom, a "delayed linear" model is used and retirements are spread over the period of ± 20 per cent of the average service life assumed for each capital good.

8. As discussed by Blades (1983), when a straight-line depreciation schedule has been used, a measure of the (harmonic) mean of the service lives for a group of capital goods can be constructed by dividing the constant-price aggregate gross capital stock series by the constant-price aggregate depreciation series.
9. The statistical authorities in Sweden are in the process of reviewing their procedures for estimating the gross capital stock and it is possible that some average service lives may be revised downwards.
10. This assumption of a "technologically" given retirement pattern which has been much criticised (see Miller (1990)). Clearly, in reality, scrapping is determined by changes in relative prices and technology and not just as a function of the age of capital assets. This is a weakness which applies both to BSDB estimates and to all national estimates of the capital stock which use a perpetual inventory method.
11. Estimates of the capital stock made by the United States Department of Labor, Bureau of Labor Statistics (BLS (1983)) do make an allowance for a loss of efficiency by using a hyperbolic or concave function with the curvature depending on the type of capital good. However, given its Tornquist method of weighting, the BLS aggregate measure for the capital stock is only available in index or growth rate form. Efficiency-adjusted measures of the capital stock are sometimes referred to as net capital stock estimates and, theoretically, are the most appropriate measure for use in a production function. These net estimates should not be confused with wealth-based measures of the net capital stock which represent the discounted future flow of capital inputs. These two measures will only coincide if the efficiency function is exponential so that there is a constant rate of decline in terms of efficiency units of a capital good with age (see Biørn (1989), p.47).
12. For a detailed description of purchasing power parity see OECD (1985) A broadly similar set of comparisons are obtained by using actual 1985 exchange rates to convert business sector output. The relative trend movements would be identical to those reported in Chart 2 although the relative levels of energy intensity will vary according to the deviations of 1985 dollar exchange rates from their purchasing power parity equivalents. On such a basis, the corresponding ranking in energy-intensity levels for the average of the 1970s is from, highest to lowest, Canada, to France, the United Kingdom, the United States, Japan, Germany and Italy.

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Annex A

Technical Notes on Energy Estimates

This annex provides more details of the sources and adjustments made to identify the major economy business sector consumption of energy and to build up representative prices by major type of energy for each of the sub-sectors of the business sector.

A. Energy consumption

The business sector is not explicitly identified in Energy Balances (IEA (1990a)) but instead estimates of energy consumption in tons of oil equivalent (where 1 TOE = 10^7 kcal) from 1960 onward are broken down by five main end users: residential, agriculture, industry, transport and commerce and public service. In constructing the BSDB estimates, all uses of energy in agriculture and industry are ascribed to the business sector (government participation in these activities being negligible) while that of residential use is simply excluded. The transport category is more problematic since it includes household consumption of motor fuels. As this component is not explicitly identified, all use of gasoline for road transport is ascribed to the household sector and excluded from the transport total (1). The underestimation of business sector use of energy as a result of this approximation is largely offset by not making an adjustment for transport use by households of other fuels such as liquified petroleum gas (LPG) and diesel fuel. The commercial use of energy has been split out from the IEA estimates for commerce and public service by using the information for this split provided in earlier editions of Energy Balances. In this way, estimates of energy consumption can be obtained for the following four end users which comprise the business sector: agriculture, industry, transport and commerce.

Adjustments for various breaks in the basic IEA series are also made on the basis of country notes and detailed statistics in IEA (1990b). These sources are also used to reallocate IEA estimates of energy consumption for which no end user is identified. An adjustment is also made to the series for electricity consumption in Japan which are recorded on a fiscal-year basis. Quarterly data on power generated (EPA (1990)) are used as a guide series to adjust these series to a calendar year basis. Finally, a distinction is made between energy products used simply as intermediate products in the production of chemicals, plastics, etc. and the use of energy as a factor of production to power machines, light factories and buildings, etc. All feedstock use of gas and oil products and other "non-energy use" of energy products is excluded from the business sector estimates.

B. Energy prices

As outlined in Section IV.B above, price series are required for 6 major types of energy (coal, other solid fuels, oil, gas, electricity and heat) according to end use in 4 sub-sectors of the business sector (agriculture, industry, transport and commerce). Thus, in total, 24 energy price series are required (2). The following section describes the construction of long historical series for 12 key energy prices and then discusses the methods and additional sources used to generate a complete set of representative prices from these key series.

The IEA publication Energy Prices and Taxes (IEA (1990c)) contains quarterly and annual price series for a range of energy products from 1978 onwards. Price series for both household and industry are available for steam coal, light fuel oil, natural gas and electricity. In addition, there are industrial prices for heavy fuel oil and coking coal as well as general price series for gasoline and automotive diesel fuel (3). Corresponding historical series for the period 1955 to 1980 can be found in a United States Department of Energy (DOE) publication (Baade (1981)) which also contains price information for kerosene (4). The IEA series are extended back from 1978 to 1960 using the DOE series (suitably scaled by the ratio of the IEA to DOE series for 1978).

However, these price series cover only part of the business sector use of energy. In particular, no information is provided on the price of energy for users in agriculture or commerce. In addition, while the IEA prices for gas and electricity are fairly representative prices for these fuels, there is only limited coverage of the more heterogeneous categories of coal, other solid fuels and oil products. Therefore, a number of assumptions and additional price series are required to build up a complete set of representative prices. The final construction of these prices is summarised in Table A.1 and a detailed discussion by energy type follows.

Gas, Electricity and Heat Prices

The IEA series for the industry price of gas and electricity represent, in general, the average price paid for these two types of energy and so can be used as the representative prices for industry. However, some assumptions must be made about the price of these fuels for users in transport, agriculture and commerce. For France, supplementary information on the price of gas and electricity supplied to the service sector is provided in IEA (1990c). A high correlation exists between the household prices for these fuels and the service sector price with an average price differential over the period 1978 to 1987 of 0.9 for gas and 0.8 for electricity. These factors are applied to the household prices for gas and electricity for each country to obtain the representative prices for these fuels for users in commerce and agriculture. For transport, the industry prices for gas and electricity are used without any adjustment. All price series for gas and electricity are converted to a TOE basis using the conversion factors in Table A.2 below.

For heat, information for France shows that the price of steam supplied to industry is about half as much as the price of electricity (IEA (1990c)).

This price differential is applied to the industry price of electricity (expressed in TOE) in each country to obtain the price of heat for all users.

Coal and Other Solid Fuel Prices

Coal consumption in industry can be divided into two broad classes: the consumption of steam coal for general heating purposes and the consumption of coke oven and gas coke in iron and steel works. Steam coal comprises the categories hard coal (bituminous coal and anthracite), brown coal and brown coal briquettes. To obtain the representative industry price per TOE for coal, the IEA industry prices for steam coal and coking coal (suitably converted to a TOE basis using the factors in Table A.2 below) are weighted by the proportion of each broad class of coal in total coal consumption (again expressed in TOE). For transport, agriculture and commerce, the TOE industry price of steam coal is used as the representative price as, in general, consumption by these users of coal is mainly for heating purposes.

For other solid fuels, the DOE price series for waste and wood consumed by electric utilities (U.S. Department of Energy (1990a)) is used as the representative price for all end users in the United States (5). The Canadian series is obtained by applying the price differential for steam coal between Canada and the United States to this series. For the other countries, the reported use of other solid fuels is either non-existent or negligible and so the price of other solid fuels is obtained simply by applying a factor of 0.7 to their TOE industry price series for steam coal. This factor corresponds to the average TOE price differential between these two energy sources in the United States over the period 1978 to 1987.

Oil Prices

The IEA provides price series for only some of the oil products which make up the category "Oil and Petroleum Products". Therefore, in order to construct a representative series for the price of oil and petroleum products, price series are constructed for the most important oil products not covered -- jet fuel, LPG and naphtha. For the United States, the first two series are readily available from data on average prices paid for these fuels reported in U.S. Department of Energy (1990a) (6). The corresponding Canadian series are constructed by assuming that the prices of jet fuel and LPG relative to the industry price of light fuel oil are the same as in the United States. For the remaining countries, the price of jet fuel is obtained by applying the "mark up" between the domestic (IEA) and international (Rotterdam) prices for light fuel oil to the Rotterdam price for jet fuel (see Energy Economics Research Ltd. (1990) for the Rotterdam price series). This procedure has also been used to obtain the price series for naphtha for all countries. Finally, for all countries excluding North America, LPG prices are constructed using a French series for the industry price of LPG (see the table "Prix rendus de l'énergie dans l'industrie à Versailles" in Observatoire de l'Énergie (1990)). For these countries it is assumed that the price differential of LPG relative to the industry price of light fuel oil is the same as in France. As the Rotterdam prices for jet fuel and naphtha are only available from 1974 onwards and the French price of LPG from 1971 onwards, all series derived from these prices are extended back to 1960 using the growth rates in each country's

series for the industry price of light fuel oil. All prices have been converted to a TOE basis using the factors in Table A.2 below.

Finally, for each end user in the business sector, a suitable basket of oil products which covers most of the user's total consumption of energy in the form of oil is then chosen as follows:

Agriculture: LPG, kerosene, diesel fuel, heavy fuel oil and gasoline;

Industry: LPG, kerosene, light fuel oil, heavy fuel oil and naphtha;

Commerce: LPG, kerosene, light fuel oil, heavy fuel oil and gasoline;

Transport: diesel fuel and jet fuel.

Using consumption weights, the prices (in TOE) of each oil product in the user's basket is then weighted together to obtain the representative oil price for each end user.

Notes

1. Estimates of the consumption of gasoline for road transport come from IEA (1990b) and are adjusted from metric tons to TOE using 1.07 as the conversion factor for all countries.
2. Actually only 21 energy prices are required because there is only negligible use of other solid fuels and heat for transport and no consumption of heat by agriculture.
3. There is currently no IEA price series available for coking coal for the United Kingdom and so a series is constructed using a factor of 1.6 (obtained from information in U.K. Central Statistical Office (1990)) to scale up the IEA series for steam coal.
4. As there is only a single DOE price series for coal used by industry, this series has been used to extend back the IEA price series for both steam coal and coking coal. The DOE series for kerosene are extended forwards from 1978 onwards using the growth rates in the IEA industry series for the price of light fuel oil.
5. This price series is updated using movements in the U.S. producer price index for woodchips.
6. These two series are updated using movements in end user prices for kerosene-type jet fuel and propane reported in U.S. Department of Energy (1990b).

Table A.1. Representative prices by user for each major type of energy (1)

	Coal	Other Solid Fuels (2)	Oil (3)	Gas	Electricity	Heat
Industry	PSI (4)	0.7*PVI	POI	PGI	PEI	0.5*PEI
Transport	PVI	n.a.	POT	PGI	PEI	n.a.
Agriculture	PVI	0.7*PVI	POA	0.9*PGH	0.8*PEH	n.a.
Commerce	PVI	0.7*PVI	POC	0.9*PGH	0.8*PEH	0.5*PEI

1. The first letter "P" of the codes indicates that they correspond to energy price series. The second letter indicates the type of energy: "S" for coal; "O" for oil; "G" for gas; "E" for electricity; and "V" for steam coal. Finally, the third letter indicates the user: "I" for industry; "T" for transport; "A" for agriculture; "C" for commerce; and "H" for household. Thus, for example, the representative price for agricultural use of electricity is defined to be equal to 0.8 times the price of electricity for households. Unless stated otherwise, all prices come from IEA (1990c).
2. For Canada and the United States, the price of other solid fuels is built up using a price series for waste and wood consumed by electric utilities in the United States (U.S. Department of Energy (1990a)) rather than the price of steam coal (PVI).
3. Constructed as weighted averages of the prices for diesel fuel and jet fuel for transport and the prices of light fuel oil, heavy fuel oil, liquified petroleum gas (LPG), gasoline, kerosene and naphtha for other users. See above for details of sources for the prices for jet fuel, LPG and naphtha.
4. Constructed as a weighted average of the prices of steam coal and coking coal.

Table A.2. Conversion Factors

A. Factors Used to Convert Prices in Original Units to Prices per TOE

	USA	Japan	Germany	France	Italy	U.K.	Canada
TOE per Metric Ton							
Steam Coal	0.595	0.570	0.721	0.662	0.616	0.661	0.713
Coking Coal	0.709	0.730	0.662	0.729	0.665	0.654	0.716
Heavy Fuel Oil	0.960	0.960	0.980	0.975	0.960	0.987	0.960
Light Fuel Oil & Auto. Diesel	1.076	1.035	1.020	1.010	1.021	1.026	1.035
Metric Tons per Kilolitre							
Light Fuel Oil & Auto. Diesel	0.830	0.830	0.850	0.840	0.830	0.847	0.830

B. Factors Used to Convert Quantities to a TOE Basis

	USA	Japan	Germany	France	Italy	U.K.	Canada
TOE per Metric Ton							
Hard Coal	0.630	0.580	0.647	0.638	0.625	0.614	0.647
Brown Coal	0.391	0.317	0.206	0.409	0.250	0.317	0.327
Briquettes	0.481	0.513	0.486	0.480	0.430	0.480	0.480
Coke Oven Coke	0.656	0.684	0.684	0.686	0.700	0.654	0.654
Gas Coke	0.670	0.684	0.684	0.670	0.640	0.644	0.654

For all countries:

TOE per Metric Ton

Heavy Fuel Oil	0.960
Light Fuel Oil & Auto. Diesel	1.035

Table A.2 (continued)

Conversion Factors

C. Factors Used to Convert Both Prices and Quantities to a TOE Basis

For all countries:

TOE per Metric Ton

Gasoline	1.070
Jet Fuel	1.065
LPG	1.130
Kerosene	1.045
Naphtha	1.075

Metric Tons per Kilolitre

Kerosene	0.810
Gasoline	0.780

Net Calories/Gross Calories

Gas	0.917
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TOE per Terawatt Hour

Electricity	0.086
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Sources: IEA (1990a) and IEA (1990c).

Annex B

Technical Notes

The following tables provide detailed information on a country-by-country basis for each series making up the Business Sector Data Base. The following general notes apply:

- Period of availability (at the time of the drafting of this paper)

- Primary source of data

In most cases the data have been taken from national sources or OECD publications and the exact reference is in the footnotes. When series are obtained by a simple calculation, the formula is given using our usual mnemonics.

The frequency of the original data is indicated in parenthesis. Quarterly data are seasonally adjusted, either by source or by the OECD, using, in general, the U.S. Bureau of the Census "Method II, X-11 version". Any resulting discrepancy between the yearly average of the original series and the yearly average of the adjusted series is distributed amongst the quarters of each year of the adjusted series on a *pro rata* basis to preserve the original yearly average.

- Secondary source (S): sources and estimation of historical series

In constructing long historical series it is often necessary to splice series from different sources or series from the same source but corresponding to slightly different definitions and/or national accounts base years in the case of series at constant prices. Splicing is carried out by extending back in time the most up-to-date series (the original series) by the historical series suitably rescaled by the ratio of their respective average values in their first full year of overlap. The average of the first full year of overlap is preferred to the first quarter of overlap in the case of quarterly series because annual data are generally more reliable than higher frequency data. Effectively, this method preserves the annual growth rates of the historical series and the quarterly growth rates as well except for, possibly, the last period of the common year. When a yearly historical series is spliced onto a quarterly series, it is first interpolated and then spliced as a quarterly series. In the detailed tables below, the frequency of the historical series is given between parenthesis.

-- Interpolation methods

Quarterly and semiannual series are estimated using two techniques, both of which preserve the original yearly average or total. The first and simplest method is called the "Minimisation of first differences method" and consists of finding the "smoothest" quarterly time series by minimising the sum of squares of its quarterly variation. The second method combines the preceding method with the use of a reference or guide series which is given in the tables below in parenthesis. The principle is the following: the annual series and the yearly averages of the reference series are interpolated using the first method. A regression is then run to determine the scale factor between the growth rate of the annual series and of the reference series. Finally, this proportion of the difference between the reference series and its interpolated series is added to the interpolated values of the annual series.

Interpolation and extrapolation of capital stocks

Both national and BSDB estimates of the business capital stock are originally derived as end-year estimates and have been subsequently interpolated to half-yearly and quarterly form. First the implicit annual series of scrapping is calculated from the following identity:

$$\text{SCRAP}_t = \text{KBV}_{t-1} - \text{KBV}_t + \text{IBBV}_t$$

using the end-year estimates of the business capital stock and the annual series for business investment. This series is then interpolated using the simple interpolation routine described above. Given the perpetual inventory method, the implicit scrapping series should have a relatively smooth profile through time and is amenable to this sort of simple procedure. If KBV_{t2} represents the end-year estimate of the capital stock, then the mid-year capital stock, KBV_{t1} , can be found for each year by rearranging the above identity and by using the half-yearly series for investment and scrapping, that is,

$$\text{KBV}_{t1} = \text{KBV}_{t2} - \text{IBBV}_{t2} + \text{SCRAP}_{t2}$$

A quarterly series can be constructed in the same way.

Occasionally, the business investment series for a country may refer to more recent history than the series for the capital stock. When this occurs an extrapolation of the capital stock series is carried out. First the implicit rate of scrapping series (RSCRB) is extended forwards using a fixed rate of growth which is set equal to the average growth rate in the rate of scrapping over the last five years for which the data exists. The capital stock can then be extended recursively by again using the identity between investment, scrapping and the capital stock, that is,

$$\text{KBV}_{t+1} = \text{KBV}_t * (1 - \text{RSCRB}_{t+1}) + \text{IBBV}_{t+1}$$

Quarterly interpolation of energy series

Quarterly interpolation of the energy expenditure series, which are essentially derived on an annual basis, uses the Main Economic Indicators (MEI) seasonally adjusted, quarterly series for industrial production for each country (OECD(c) 1990) as a guide series. For prices, a more complicated procedure is followed. First of all, quarterly, reference price indices are built up for 5 major categories of business expenditure on energy: solid fuels (coal and other solid fuels), gas, electricity (including heat) and transport and non-transport use of petroleum products. These are based on IEA sources from 1978 onwards (IEA(c) 1990). For earlier years these series are spliced onto MEI producer and consumer price indices for energy use (OECD(e) 1990). An overall quarterly guide series for PENB is then constructed using a Divisia index to weight the price index for each major category by that category's share in total business nominal expenditure on energy.

General Glossary of Variable Names

The following mnemonics are used throughout the data base in denoting individual statistical series names.

CFKG	Consumption of fixed capital, general government
CGW	Compensation of employees, general government
EE	Number of employees
EEP	Number of employees, private sector
EG	Employment, general government
ENBV	Energy input in business sector, constant prices
ES	Number of self-employed
ET	Total employment
ETB	Employment, business sector
GDP	Gross domestic/national product
GDPB	Value added at factor cost, business sector, current prices
GDPBV	Value added at factor cost, business sector, constant prices
GDPV	Gross domestic/national product, constant prices
IBBV	Gross fixed capital formation, business sector, constant prices
IBCSV	Business sector investment, coverage adjustment (see note 5)
IG	Gross fixed capital formation, general government
IGV	Gross fixed capital formation, general government, constant prices
IH	Gross fixed capital formation, households
IHV	Gross fixed capital formation, households, constant prices
IRL	Long term interest rate
IT	Gross fixed capital formation, total
ITV	Gross fixed capital formation, total, constant prices
KBV	Gross fixed capital stock, business sector, constant prices
NITV	Net indirect taxes
PCGW	Deflator for government compensation of employees
PENB	Deflator for energy input in business sector
PGDP	Deflator for gross domestic/national product
PIB	Deflator for investment, business sector
PIG	Deflator for investment, general government.
PIH	Deflator for investment, households
PIT	Deflator for investment, total
RSCRB	Business sector capital scrapping rate
TIND	Indirect taxes
TSUB	Subsidies
WSSE	Compensation per employee, private sector
WSSS	Compensation of employees

UNITED STATES

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	n.a			
CGW	1955-1989	BEA ¹ (Q)		
EG	1955-1989	BLS ² (M)		
ENBV	1960-1988	IEA ³ (Y)		Smoothing
ES	1955-1989	BLS ² (M)		
ET	1955-1989	BLS ² (M)		
GDP	1955-1989	BEA ¹ (Q)		
GDPV	1955-1989	BEA ¹ (Q)		
IBBV	1955-1989	ITV-IHV		
IG	n.a ⁵			
IGV	n.a ⁵			
IH	1955-1989	BEA ¹ (Q)		
IHV	1955-1989	BEA ¹ (Q)		
IRL	1955-1989	Rate of the Moody's AAA corporate bonds (M)		
IT	1955-1989	BEA ¹ (Q)		
ITV	1955-1989	BEA ¹ (Q)		See section III
KBV	1956-1989	OECD ⁴ (Y)		
PCGW	1955-1989	index (CGW/EG)		
PENB	1960-1989	IEA ³ (Y)		
TIND	1955-1989	BEA ¹ (Q)		
TSUB	1955-1989	BEA ¹ (Q)		
WSSS	1955-1989	BEA ¹ (Q)		Smoothing

1. "Survey of Current Business", Bureau of Economic Analysis, United States Department of Commerce. The base year for constant prices data is 1982.
2. "Monthly Labor Review", Bureau of Labor Statistics, United States Department of Labor.
3. Estimated using data from the International Energy Agency, Paris, see section IV.
4. "Flows and Stocks of Fixed Capital", OECD. See Table 1. The gross capital stock for business sector is obtained by summing "Agriculture", "Industry" and "Services excluding dwellings".
5. In the U.S. System of national accounts, included as part of general government consumption.

JAPAN

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1988	EPA ¹ (Y)		Smoothing
CSW	1960-1988	EPA ¹ (Y)		Smoothing
EG	1962-1988	EPA ¹ (Y)		Smoothing
ENBV	1960-1988	IEA ³ (Y)		Smoothing
ES	1955-1989	EPA ² (M)		
ET	1955-1989	EPA ² (M)		
GDP	1955-1989	EPA ¹ (Q)		See note 1 below
GDPV	1955-1989	EPA ¹ (Q)		See note 1 below
IBBV	1955-1989	EPA ^{1,4} (Q)		See note 1 below
IG	1956-1988	EPA ¹ (Q)		See note 1 below
IGV	1955-1989	EPA ¹ (Q)		See note 1 below
IH	1955-1989	EPA ¹ (Q)		See note 1 below
IHV	1955-1989	EPA ¹ (Q)		See note 1 below
IRL	1962-1989	Longest term life bonds rate. ⁵ (M) NTT subscribers' bonds 1962-1979 (M)		
IT	1955-1989	EPA ¹ (Q)		See note 1 below
ITV	1955-1989	EPA ¹ (Q)		See note 1 below
KBV	1956-1989	OECD ⁶ (Y)		See section III
PCGW	1961-1988	EPA ¹ (Y)		Smoothing
PENB	1960-1989	IEA ³ (Y)		Smoothing
TIND	1960-1988	EPA ¹ (Q)	EPA 1960-1969 (Y)	See note 1 below
TSUB	1960-1988	EPA ¹ (Q)	EPA 1960-1969 (Y)	See note 1 below
WSSS	1955-1989	EPA ¹ (Q)		See note 1 below

1. "Annual Report on National Accounts", Economic Planning Agency. The original quarterly figures, corrected for seasonal variations by EPA, do not correspond to the published yearly levels because of the seasonal adjustment method. The ADB quarterly series are obtained by interpolating official yearly data using the quarterly pattern of EPA seasonally adjusted quarterly series. The series only available in yearly levels are interpolated using the simple smoothing technique. The base year for constant prices is 1980.
2. "Japanese Monthly Labour Force Survey", Economic Planning Agency.
3. Estimated using data from the International Energy Agency, Paris, see section IV.
4. Business investment here includes government enterprises investment.
5. "Economic Statistics, Monthly", Bank of Japan.
6. "Flows and Stocks of Fixed Capital", OECD. See Table 1.

GERMANY

(Western Germany: Federal Republic of Germany before the unification of Germany)

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1989	DIW ¹ (Q)	DIW ¹ 1960-1983 (Q)	
CGW	1960-1989	SB ² (Y)	SNA ⁵ 1955-1959 (Y)	Smoothing
EE	1960-1989	DIW ¹ (Q)	SNA ⁵ 1955-1959 (Y)	Smoothing
EG	1960-1989	SB ² (Y)	DIW ¹ 1960-1967 (Q)	Smoothing
ENBV	1960-1988	IEA ³ (Y)	DIW ¹ 1960-1967 (Q)	
ES	1960-1989	ET-EE	DIW ¹ 1960-1983 (Q)	ET (DIW)
ET	1960-1989	SB ⁴ (Y)	SNA ⁵ 1955-1959 (Y)	GDP (Bundesbank)
GDP	1955-1989	SB ⁴ (Y)	SNA ⁵ 1955-1959 (Y)	GDPV (Bundesbank)
GDPV	1955-1989	SB ⁴ (Y)	DIW ¹ 1960-1967 (Q)	
IBBV	1960-1989	SB ⁴ (Q)	DIW ¹ 1960-1967 (Q)	
IG	1960-1989	SB ⁴ (Q)	DIW ¹ 1960-1967 (Q)	
IGV	1960-1989	SB ⁴ (Q)	DIW ¹ 1960-1967 (Q)	
IRL	1956-1989	7-15 years public sector bond rate (M)		
IT	1960-1989	SB ⁴ (Y)		IT (Bundesbank)
ITV	1960-1989	SB ⁴ (Y)		ITV (Bundesbank)
KBV	1959-1989	OECD ⁶ (Y)		See section III
PCGW	1960-1989	index (CGW/EG)		
PENB	1960-1989	IEA ³ (Y)		
TIND	1960-1989	DIW ¹ (Q)		
TSUB	1960-1989	DIW ¹ (Q)		
WSSS	1960-1989	Bundesbank (Q)		Smoothing

1. Deutsches Institut für Wirtschaftsforschung, Berlin. Quarterly series are seasonally adjusted by the OECD.
2. "Volkswirtschaftliche Gesamtrechnungen", Statistisches Bundesamt, Wiesbaden.
3. Estimated using data from the International Energy Agency, Paris, see section IV.
4. Statistisches Bundesamt, Wiesbaden. Quarterly figures are obtained by interpolating these figures using quarterly seasonally adjusted series published by the Deutsche Bundesbank in "Monatsberichte der Deutschen Bundesbank". The base year for constant prices data is 1980.
5. "National Accounts, 1952-1981", OECD.
6. "Flows and Stocks of Fixed Capital", OECD. The gross capital stock for business sector is obtained by summing "Agriculture", "Industry" and "Services excluding dwellings".

FRANCE

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	n.a			
CGW	1963-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q)	
EG	1963-1988	INSEE ³ (Y)		Smoothing
ENBV	1960-1988	IEA ⁴ (Y)		Smoothing
ES	1963-1988	OECD ⁵ (Q)		
ET	1956-1989	OECD ⁵ (Q)		
GDP	1960-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q), SNA ⁶ 1960-1962 (Y)	
GDPV	1960-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q), SNA ⁶ 1960-1962 (Y)	
IBBV	1963-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q)	
IG	1963-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q)	
IGV	1963-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q)	
IH	1960-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q), SNA ⁶ 1960-1962 (Y)	
IHV	1960-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q), SNA ⁶ 1960-1962 (Y)	
IRL	1960-1989	Public and semi-public bonds rate (M)		
IT	1960-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q), SNA ⁶ 1960-1962 (Y)	
ITV	1960-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q), SNA ⁶ 1960-1962 (Y)	
KBV	1963-1989	INSEE ⁷		See section III
PCGW	1963-1988	index (CGW/EG)		
PENB	1960-1989	IEA ³ (Y)		Smoothing
TIND	1963-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q)	
TSUB	1963-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q)	
WSSS	1963-1989	INSEE ¹ (Q)	INSEE ² 1963-1969 (Q)	

1. Comptes trimestriels, Institut National de la Statistique et des Etudes Economiques. The base year for constant prices data is 1980.
2. Comptes trimestriels, base 1970, Institut National de la Statistique et des Etudes Economiques.
3. "Rapport sur les Comptes de la Nation", INSEE.
4. Estimated using data from the International Energy Agency, Paris, see section IV.
5. Estimated on the basis of the official unemployment rate and non-published INSEE labour force data. Self employment is then derived as a residual using national accounts data for numbers of employees.
6. "National Accounts, 1952-1981", OECD.
7. Provided by INSEE. See Table 1.

ITALY

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1989	Relazione ¹ (Y)		Smoothing
CGW	1960-1989	Relazione ¹ (Y)		Smoothing
EG	1960-1989	SNA ² (Y)		Non-market services (ISTAT)
ENBV	1960-1988	IEA ⁷ (Y)		Smoothing
ES	1960-1989	ISTAT ³ (Q)	SNA ² 1960-1970 (Y)	
ET	1955-1989	ISTAT ³ (Q)	SNA ² 1960-1970 (Y), ISTAT ⁴ 1955-1959 (Y)	
GDP	1957-1989	ISTAT ³ (Q)	ISCO ⁵ 1960-1970 (Q), SNA ⁶ 1957-1959 (Y)	
GDPV	1957-1989	ISTAT ³ (Q)	ISCO ⁵ 1960-1970 (Q), SNA ⁶ 1957-1959 (Y)	
IBBV	1960-1986	ITV-IHV-IGV		
IG	1960-1989	Relazione ¹ (Y)		Smoothing
IGV	1960-1986	IG/PIG		
IH	1960-1989	Relazione ¹ (Y)		Smoothing
IHV	1960-1989	Relazione ¹ (Y)		Smoothing
IRL	1960-1989	Rate of treasury bonds (M)		
IT	1960-1989	ISTAT ³ (Q)	ISCO ⁵ 1960-1970 (Q)	
ITV	1960-1989	ISTAT ³ (Q)	ISCO ⁵ 1960-1970 (Q)	
KBV	1959-1986	OECD ⁸ (Y)		See section III
PCGW	1960-1989	index (CGW/EG)		
PENB	1960-1989	IEA ⁷ (Y)		Smoothing
PIG	1960-1986	SNA ² (Y)		Smoothing
TIND	1960-1989	Relazione ¹ (Y)		Smoothing
TSUB	1960-1989	Relazione ¹ (Y)		Smoothing
WSSS	1960-1989	Relazione ¹ (Y)	SNA ² 1960-1970 (Y)	Compensations (ISTAT) from 1970

1. "Relazione sulla Situazione Economica del Paese", Ministero per il bilancio e la programmazione economica, Rome.

2. "National Accounts, 1975-1987", OECD.

3. "Bollettino Mensile di Statistica" and "Notiziario", Istituto Centrale di Statistica, Rome. The base year for constant prices data is 1980.

4. "Statistiche Storiche dell'Italia 1861-1975", Istituto centrale di statistica, Rome, 1976.

5. "Quaderni Analitici", Istituto Nazionale per lo Studio della Congiuntura, Rome.

6. "National Accounts, 1952-1981", OECD.

7. Estimated using data from the International Energy Agency, Paris, see section IV.

8. See section III.

UNITED KINGDOM

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	n.a			
CGW	1960-1988	CSO ¹ (Y)		Smoothing
EG	1961-1989	CSO ² (Y)		Smoothing
ENBV	1960-1988	IEA ³ (Y)		Smoothing
ES	1960-1989	HMSO ⁴ (Q)		
ET	1960-1989	HMSO ⁴ (Q)		
GDP	1955-1989	CSO ² (Q)		
GDPV	1955-1989	CSO ² (Q)		
IBBV	1962-1989	CSO ² (Q)	CSO ⁵ 1962-1964 (Q)	
IG	1963-1989	CSO ² (Q)		
IGV	1962-1989	CSO ² (Q)	CSO ⁵ 1962-1964 (Q)	
IH	1955-1989	CSO ^{2,8} (Q)		
IHV	1962-1989	CSO ² (Q)	CSO ⁵ 1962-1964 (Q)	
IRL	1960-1989	Rate of the 10 years British government securities ⁶ (M)		
IT	1955-1989	CSO ² (Q)		
ITV	1955-1989	CSO ² (Q)		
KBV	1956-1989	CSO ⁷		See section III
PCGW	1961-1988	index(CGW/EG)		
PENB	1960-1989	IEA ³ (Y)		
TIND	1955-1989	CSO ² (Q)		Smoothing
TSUB	1955-1989	CSO ² (Q)		
WSSS	1955-1989	CSO ² (Q)		

1. "Blue Book", Central Statistical Office, London.
2. "Economic Trends", Central Statistical Office, London. The base year for constant prices data is 1985.
3. Estimated using data from the International Energy Agency, Paris, see section IV.
4. "Employment Gazette", Department of Employment.
5. "Economic Trends", Central Statistical Office, London. 1980 base year National Accounts data.
6. "Financial Statistics", Central Statistical Office, London.
7. Provided by the CSO, see section III.
8. Seasonally adjusted by OECD.

CANADA

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1989	StatsCan ¹ (Q)		
CGW	1960-1989	StatsCan ¹ (Q)		
EG	1966-1989	StatsCan ² (M)		
ENBV	1960-1987	IEA ³ (Y)		Smoothing
ES	1956-1989	StatsCan ² (M)		
ET	1956-1989	StatsCan ² (M)		
GDP	1955-1989	StatsCan ¹ (Q)	SNA ⁴ 1955-1959 (Y)	
GDPV	1955-1989	StatsCan ¹ (Q)	SNA ⁴ 1955-1959 (Y)	
IBBV	1960-1989	StatsCan ¹ (Q)		
IG	1960-1989	StatsCan ¹ (Q)		
IGV	1960-1989	StatsCan ¹ (Q)		
IH	1960-1989	StatsCan ¹ (Q)		
IHV	1960-1989	StatsCan ¹ (Q)		
IRL	1960-1989	10 years and over federal government bonds rate (M)		
IT	1960-1989	StatsCan ¹ (Q)		
ITV	1960-1989	StatsCan ¹ (Q)		
KBV	1950-1988	StatsCan ⁵ (Y)		See section III
PCGW	1966-1989	index (CGW/EG)		
RENB	1960-1989	IEA ³ (Y)		Smoothing
TIND	1960-1989	StatsCan ¹ (Q)		
TSUB	1960-1989	StatsCan ¹ (Q)		
WSSS	1960-1989	StatsCan ¹ (Q)		

1. "National Income and Expenditure Accounts", Statistics Canada. The base year for constant prices data is 1986.
2. Household Survey, Statistics Canada.
3. Estimated using data from the International Energy Agency, Paris, see section IV.
4. "National Accounts 1952-1981", OECD.
5. Provided by Statistics Canada. See section III.

AUSTRALIA

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFPG	1966-1989	ABS-NIF ¹ (Q)		
CGW	1959-1989	OECD ²		Government consumption (ABS)
EG	1960-1989	OECD ²		
ES	1964-1989	ABS ³ (Q)	ABS-NIF ¹ 1964-1977 (Q)	
ET	1960-1989	ABS ³ (Q)		
GDP	1960-1989	ABS ⁴ (Q)		
GDPV	1960-1989	ABS ⁴ (Q)		
IBBV	1960-1989	ABS ⁴ (Q)		
IG	1960-1989	ABS ⁴ (Q)		
IGV	1970-1989	ABS ⁴ (Q)		
IH	1960-1989	ABS ⁴ (Q)		
IHV	1960-1989	ABS ⁴ (Q)		
IRL	1969-1989	15 Year Commonwealth Bonds (M)		
IT	1960-1989	ABS ⁴ (Q)		
ITV	1970-1989	ABS ⁴ (Q)		
KBV	1960-1989	ABS ⁵ (Y)		See section III
PCGW	1960-1988	Index (CGW/EG)		
TSUB	1960-1989	ABS ⁴ (Q)		
TIND	1960-1989	ABS ⁴ (Q)		
WSSS	1960-1989	ABS ⁴ (Q)		

1. Australian Bureau of Statistics(ABS), NIF 10S model, online data extraction.
2. Estimated on the basis of data from "Australian National Accounts: National Income and Expenditure", ABS, Catalogue Number 5204.0 for public sector.
3. "Labour Force Australia", ABS, Catalogue Number 6203.0
4. "Australian National Accounts, Quarterly" ABS, Catalogue Number 5206.0. The base year for constant price data is the fiscal year 1984/1985.
5. "Australian National Accounts, Capital Stock", ABS, Catalogue number 5221.0.

AUSTRIA

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1988	SNA ¹ (Y)		Smoothing
CGW	1960-1988	SNA ¹ (Y)		Smoothing
EG	1955-1988	WIFO ² (Y)		Smoothing
ES	1960-1989	WIFO ³ (Q)	OECD ⁴ 1960-1984 (Q)	
ET	1960-1989	WIFO ³ (Q)	OECD ⁴ 1960-1984 (Q)	
GDP	1960-1989	WIFO ³ (Q)	SNA ⁵ 1960-1963 (Y)	
GDPV	1960-1989	WIFO ³ (Q)	WIFO ⁶ 1964-1975 (Q), SNA ⁵ 1960-1963 (Y)	
IBEV	1960-1988	ITV-IHV-IGV		
IG	1960-1988	SNA ¹ (Y)		Smoothing
IGV	1960-1988	IG/PIG		
IH	1960-1988	SNA ¹ (Y)		Smoothing
IHV	1960-1988	SNA ¹ (Y)		Smoothing
IRL	1965-1989	Yield of bonds on the secondary market (M)		
IT	1960-1989	WIFO ³ (Q)	SNA ⁵ 1960-1963 (Y)	
ITV	1960-1989	WIFO ³ (Q)	WIFO ⁶ 1964-1975 (Q), SNA ⁵ 1960-1963 (Y)	
KBV	1950-1988	OECD ⁸ (Y)		See section III
PCGW	1960-1988	Index (CGW/EG)		
PIG	1960-1989	WIFO ³ (Q)	WIFO ⁶ 1964-1975 (Q), SNA ⁵ 1960-1963 (Y)	
TIND	1960-1989	SNA ¹ (Y)		Smoothing
TSUB	1954-1989	SNA ¹ (Y)		Smoothing
WSSS	1954-1989	WIFO ³ (Q)	SNA ⁵ 1960-1963 (Y)	

1. "National Accounts, 1975-1987", OECD.
2. "Österreichisches Institut für Wirtschaftsforschung" (WIFO), Vienna.
3. "Monatsberichte", WIFO. Quarterly figures are corrected for seasonal variations by the OECD.
4. Breaks in series in 1969, 1981 and 1983 are corrected by the OECD.
5. "National Accounts, 1952-1981", OECD.
6. "Monatsberichte", WIFO, 1976 base year data. Quarterly figures are corrected for seasonal variations by the OECD.
7. See section III.

BELGIUM

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1988	SNA ¹ (Y)		Smoothing
CGW	1970-1988	INS ² (Y)		Smoothing
EG	1960-1988	INS ² (Y)	INS ³ 1960-1979 (Y)	Smoothing
ES	1956-1988	OECD ⁴ (Y)		Difference of two smoothed series
ET	1956-1988	OECD ⁴ (Y)		Smoothing
GDP	1960-1989	SNA ¹ (Y)		Sum of smoothed components
GDPV	1960-1989	SNA ¹ (Y)		Sum of smoothed components
IBBV	1970-1988	ITV-IHV-IGV		
IG	1960-1988	MdF ⁵ (Y)		Smoothing
IGV	1960-1988	MdF ⁵ (Y)		Smoothing
IH	1960-1989	SNA ¹ (Y)		Smoothing
IHV	1970-1989	SNA ¹ (Y)		Smoothing
IRL	1955-1989	Rate three month treasury bills (M)		
IT	1960-1989	SNA ¹ (Y)		Smoothing
ITV	1960-1989	SNA ¹ (Y)		Smoothing
KBV	1959-1987	OECD ⁶ (Y)		Smoothing
PCGW	1970-1988	index (CGW/EG)		See section III
TIND	1960-1988	SNA ¹ (Y)		Smoothing
TSUB	1960-1988	SNA ¹ (Y)		Smoothing
WSSS	1960-1988	SNA ¹ (Y)		Smoothing

1. "National Accounts, 1976-1988", OECD. The base year for constant prices data is 1985.
2. "Les comptes Nationaux de la Belgique", Institut National de la Statistique.
3. INS data based on a pre-1980 census.
4. "Labour Force Statistics", OECD.
5. "Note de conjoncture", Ministère des Finances.
6. "Flows and Stocks of Fixed Capital", OECD. See section III. The gross capital stock for business sector is obtained by summing "Agriculture", "Industry" and "Services excluding dwellings".

DENMARK

Variable (source)	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation
CFKG	1948-1988	ADAM ¹ (Y)		Smoothing
CGW	1948-1988	ADAM ¹ (Y)		Smoothing
EG	1948-1988	ADAM ¹ (Y)		Smoothing
ES	1958-1988	ADAM ¹ (Y)		Smoothing
ET	1948-1988	ADAM ¹ (Y)		Smoothing
GDP	1948-1988	ADAM ¹ (Y)		Sum of smoothed components
GDPV	1948-1988	ADAM ¹ (Y)		Sum of smoothed components
IBBV	1948-1988	ITV-IHV-IGV		
IG	1948-1988	ADAM ¹ (Y)		Smoothing
IGV	1948-1988	ADAM ¹ (Y)		Smoothing
IH	1948-1988	ADAM ¹ (Y)		Smoothing
IHV	1948-1988	ADAM ¹ (Y)		Smoothing
IRL	1955-1989	Yield of long term government bonds (M)		
IT	1948-1988	ADAM ¹ (Y)		Smoothing
ITV	1948-1988	ADAM ¹ (Y)		Smoothing
KBV	1948-1988	OECD ² (Y)		See section III
PCGW	1948-1988	ADAM ¹ (Y)		Smoothing
TIND	1948-1988	ADAM ¹ (Y)		Smoothing
TSUB	1948-1988	ADAM ¹ (Y)		Smoothing
WSSS	1948-1988	ADAM ¹ (Y)		Smoothing

1. ADAM Databank, Denmark's Statistics. The base year for constant prices data is 1980.

2. See section III.

FINLAND

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1988	SNA ¹ (Y)		
CGW	1960-1987	CSO ² (Q)		Smoothing
EG	1960-1988	SNA ¹ (Y)		Employment in services (CSO)
ES	1960-1988	SNA ¹ (Y)		Survey data (CSO)
ET	1960-1988	SNA ¹ (Y)		Survey data (CSO)
GDP	1960-1989	CSO ² (Q)	SNA ¹ 1960-1969 (Y)	
GDPV	1960-1989	CSO ² (Q)	CSO ² 1970-1974 (Q), SNA ¹ 1960-1969 (Y)	
IBBV	1960-1989	ITV-IHV-IGV		
IG	1960-1989	CSO ² (Q)	SNA ¹ 1960-1969 (Y)	
IGV	1960-1989	CSO ² (Q)	CSO ² 1970-1974 (Q), SNA ¹ 1960-1969 (Y)	
IH	1960-1989	CSO ² (Q)	SNA ¹ 1960-1974 (Y)	
IHV	1960-1989	CSO ² (Q)	CSO ² 1970-1974 (Q), SNA ¹ 1960-1969 (Y)	
IRL	1961-1989	Long term unregulated market rate ³ (M)		
IT	1960-1989	CSO ² (Q)	SNA ¹ 1960-1969 (Y)	
ITV	1960-1989	CSO ² (Q)	CSO ² 1970-1974 (Q), SNA ¹ 1960-1969 (Y)	
KBV	1960-1989	OECD ⁴ (Y)		See section III
PCGW	1960-1987	index(CGW/EG)		
TIND	1960-1988	SNA ¹ (Y)		Smoothing
TSUB	1960-1988	SNA ¹ (Y)		Smoothing
WSSS	1960-1988	SNA ¹ (Y)		Smoothing

1. "National Accounts, 1975-1987", OECD.

2. Central Statistical Office of Finland, Helsinki. Quarterly figures are corrected for seasonal variations by the OECD. The base year for constant prices data is 1985.

3. Bank of Finland.

4. "Flows and Stocks of Fixed Capital", OECD. The gross capital stock for business sector is obtained by summing "Agriculture", "Industry" and "Services excluding dwellings".

GREECE

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	n.a			
CGW	1960-1987	NAT ¹ (Y)		Smoothing
EG	1961-1988	OECD ² (Y)		Smoothing
ES	1956-1988	LFS ³ (Y)		Difference of smoothed series
ET	1956-1988	LFS ³ (Y)		Smoothing
GDP	1960-1988	SNA ⁴ (Y)		Sum of smoothed components
GDPV	1960-1988	SNA ⁴ (Y)		Sum of smoothed components
IBBV	1960-1988	ITV-IHV-IGV		
IG	1960-1988	SNA ⁴ (Y)		Smoothing
IGV	1960-1988	NAT ¹ (Y)	SNA ⁴ 1960-1970 (Y)	Smoothing
IH	1960-1988	NAT ¹ (Y)		Smoothing
IHV	1960-1988	NAT ¹ (Y)		Smoothing
IRL	1955-1989	Long-term loans, general rate (M)		
IT	1960-1988	SNA ⁴ (Y)		Smoothing
ITV	1960-1988	SNA ⁴ (Y)		Smoothing
KBV	1955-1988	OECD ⁵ (Y)		See section III
PCGW	1961-1987	index (CGW/EG)		
PIG	1960-1987	IG/IGV		
TIND	1960-1988	SNA ⁴ (Y)		Smoothing
TSUB	1960-1988	SNA ⁴ (Y)		Smoothing
WSSS	1960-1988	SNA ⁴ (Y)		Smoothing

1. "National Accounts of Greece", Athens.

2. OECD estimate.

3. "Labour Force Statistics", OECD.

4. "National Accounts 1976-1988", OECD. The base year for constant price data is 1970.

5. See section III.

ICELAND

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1973-1989	SNA ¹ (Y)		Smoothing
CGW	1973-1988	SNA ¹ (Y)		Smoothing
EG	1963-1987	OECD ²		Smoothing
ES	1967-1987	LFS ³ (Y)		Smoothing
ET	1960-1989	LFS ³ (Y)		Smoothing
GDP	1960-1989	SNA ¹ (Y)		Smoothing
GDPV	1960-1989	SNA ¹ (Y)		Smoothing
IBBV	1960-1988	Residual		Smoothing
IG	1960-1988	OECD ² (Y)		Smoothing
IGV	1960-1988	IG/PIG		Smoothing
IHV	1960-1989	SNA ¹ (Y)	1960-1976 SNA ⁵	Smoothing
IRL	1966-1986	Rate of securities (M)		Smoothing
IT	1960-1989	SNA ¹ (Y)		Smoothing
ITV	1960-1989	SNA ¹ (Y)		Smoothing
KBV	1960-1988	OECD ⁴ (Y)		Smoothing
PCGW	1973-1987	Index (CGW/EG)		Smoothing
PIG	1960-1988	SNA ^{1,5} (Y), deflator of Producers of Government Services Investment		Smoothing
TIND	1960-1989	SNA ¹ (Y)		Smoothing
TSUB	1960-1989	SNA ¹ (Y)		Smoothing
WSSS	1960-1989	SNA ¹ (Y)		Smoothing

1. "National Accounts, 1976-1988", OECD. The base year for constant prices data is 1980.

2. OECD estimations based on information provided by Icelandic Authorities.

3. "Labour Force Statistics", OECD, annual.

4. See section III.

5. "National Accounts 1960-1977", OECD.

IRELAND

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1987	SNA ¹ (Y)		Smoothing
CGW	1960-1987	CSO ² (Y)		Smoothing
EG	1961-1988	OECD ³ (Y)		Smoothing
ES	1956-1988	LFS ⁴ (Y)		Difference of smoothed series
ET	1956-1988	LFS ⁴ (Y)		Smoothing
GDP	1960-1988	IDF ⁵ (Y)		Estimated quarterly indicator
GDPV	1960-1988	IDF ⁵ (Y)	IDF ⁵ 1960-1982 (Y)	Industrial production
IBBV	1960-1987	ITV-IGV-IHV		
IG	1960-1987	CSO ² (Y)	SNA ¹ 1970-1976 (Y) ; SNA ¹ 1960-1969 (Y)	Smoothing
IGV	1960-1987	IG/PIG		
IH	1960-1987	CSO ² (Y)	SNA ¹ 1960-1969 (Y)	Smoothing
IHV	1960-1987	CSO ² (Y)	SNA ¹ 1960-1969 (Y)	Smoothing
IRL	1960-1989	Yield of long term government bonds (M)		
IT	1960-1988	IDF ⁵ (Y)		Smoothing
ITV	1960-1988	IDF ⁵ (Y)	IDF ⁵ 1960-1982 (Y)	Smoothing
KBV	1960-1987	OECD ⁶ (Y)		See section III
PCGW	1961-1987	index (CGW/EG)		
PIG	1960-1987	CSO ⁷ (Y)	SNA ¹ 1960-1969 (Y)	Smoothing
TSUB	1960-1987	CSO ² (Y)	SNA ¹ 1970-1976 (Y) ; SNA ¹ 1960-1969 (Y)	Smoothing
TIND	1960-1987	CSO ² (Y)	SNA ¹ 1970-1976 (Y) ; SNA ¹ 1960-1969 (Y)	Smoothing
WSSS	1960-1987	SNA ¹ (Y)	OECD ³ 1977-1987 (Y) ; SNA ¹ 1960-1976 (Y)	Smoothing

1. "National Accounts", OECD.
2. "National Income and Expenditure", Central Statistical Office, Ireland.
3. OECD estimates.
4. "Labour Force Statistics", OECD.
5. "Economic Review and Outlook", Irish Department of Finance. The base year for constant price data is 1985. Original constant prices series prior to 1982 were in 1980 base year.
6. See section III.
7. Estimated as total construction implicit deflator.

LUXEMBOURG

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1970-1986	SNA ¹ (Y)		Smoothing
CGW	1970-1988	SNA ¹ (Y)		Smoothing
EG	1970-1988	SNA ¹ (Y)		Smoothing
ES	1960-1989	LFS ³ (Y)		Smoothing
ET.	1960-1989	LFS ³ (Y)		Smoothing
GDP	1960-1989	SNA ¹ (Y)		Smoothing
GDPV	1960-1989	SNA ¹ (Y)		Smoothing
IBBV	1960-1988	Residual		
IG	1960-1988	SNA ¹ (Y)	1960-1970 SNA ⁵ (Y)	Smoothing
IGV	1960-1988	IG/PIG		
IHV	1960-1988	SNA ¹ (Y)	1960-1970 SNA ⁵ (Y)	Smoothing
IT	1960-1989	SNA ¹ (Y)		Smoothing
ITV	1960-1989	SNA ¹ (Y)		Smoothing
KBV	1960-1988	OECD ⁴ (Y)		Smoothing
PCGW	1970-1988	index(CGW/EG)		
PIG	1960-1988	SNA ^{1,5} (Y), deflator of Producers of Government Services Investment		Smoothing
TIND	1960-1989	SNA ¹ (Y)		Smoothing
TSUB	1960-1989	SNA ¹ (Y)		Smoothing
WSSS	1960-1989	SNA ¹ (Y)		Smoothing

1. "National Accounts, 1976-1988", OECD. The base year for constant prices data is 1980.

3. "Labour Force Statistics", OECD, annual.

4. See section III.

5. "National Accounts 1960-1977", OECD.

NETHERLANDS

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1970-1989	CPB ¹ (Q)		
CGW	1970-1989	CPB ¹ (Q)		
EG	1970-1989	CPB ¹ (Q)		
ES	1970-1989	CPB ¹ (Q)		
ET	1960-1989	CPB ¹ (Q)	LFS ⁵ 1960-1974 (Y)	
GDP	1960-1989	CPB ¹ (Q)	SNA ³ 1960-1974 (Y)	
GDPV	1960-1989	CPB ¹ (Q)	SNA ³ 1960-1974 (Y)	
IBBV	1960-1989	ITV-IHV-IGV		
IG	1960-1989	CPB ¹ (Q)	SNA ² 1960-1974 (Y)	
IGV	1960-1989	CPB ¹ (Q)	SNA ² 1960-1974 (Y)	
IH	1960-1989	CPB ¹ (Q)	SNA ² 1960-1974 (Y)	
IHV	1960-1989	CPB ¹ (Q)	SNA ² 1960-1974 (Y)	
IRL	1960-1989	5-8 years government bonds (M) (CPB ¹)		
IT	1960-1989	CPB ¹ (Q)	SNA ² 1960-1974 (Y)	
ITV	1960-1989	CPB ¹ (Q)	SNA ² 1960-1974 (Y)	
KBV	1960-1989	OECD ⁴ (Y)		see section III
PCGW	1970-1989	index(CGW/EG)		
TSUB	1970-1989	CPB ¹ (Q)		
TIND	1970-1989	CPB ¹ (Q)		
WSSS	1970-1989	CPB ¹ (Q)		

1. Central Planning Bureau, original annual data converted to quarterly by the CPB.
2. "National Accounts, 1975-1987", OECD.
3. Derived from components in "National Accounts, 1975-1987", OECD. The base year for constant prices data is 1980.
4. See section III.
5. "Labour Force Statistics", OECD.

NEW ZEALAND

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	n.a			
CGW	1962-1986	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q)	
EG	1962-1988	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q)	
ES	1961-1987	QSH ³ (Q)	DL ⁴ 1961-1985 (Q)	
ET	1957-1988	QSH ³ (Y)	DL ⁴ 1980-1988 (Q) SNA ⁵ 1957-1979	
GDP	1960-1987	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q) SNA ⁵ 1960-1961 (Y)	
GDPV	1960-1988	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q) SNA ⁵ 1960-1961 (Y)	
IBBV	1962-1988	RBNZ ¹ (Q)		
IG	1962-1987	RBNZ ¹ (Q)		
IGV	1962-1988	RBNZ ¹ (Q)		
IH	1962-1988	PIH*IHV		
IHV	1962-1988	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q)	
IRL	1956-1989	Yield of long term government bonds (M)	RBNZ ² 1962-1968 (Q)	
IT	1960-1987	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q)	
ITV	1960-1987	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q)	
KBV	1962-1988	OECD ⁶ (Y)		See section III
PCGW	1962-1986	index (CGW/EG)		
TSUB	1960-1989	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q)	
TIND	1962-1986	RBNZ ¹ (Q)	RBNZ ² 1962-1968 (Q)	
WSSS	1961-1988	RBNZ ¹ (Q)		

1. Reserve Bank of New Zealand, tape. The base year for constant prices data is the fiscal year 1976/1977.
2. Historical data from the Reserve Bank of New Zealand.
3. "Quarterly survey of households", New Zealand Department of Labour.
4. New Zealand Department of Labour.
5. "National Accounts, 1975-1987", OECD.
6. See section III.

NORWAY

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1962-1986	CBS ¹ (Y)		Smoothing
CGW	1962-1986	CBS ¹ (Y)		Smoothing
EG	1962-1988	CBS ² (Y)	SNA ³ 1962-1972 (Y)	Smoothing
ES	1956-1989	CBS ⁴ (Q)	SNA ¹ 1970-1972 (Y), LFS ⁵ 1956-1969 (Y)	
ET	1956-1989	CBS ⁴ (Q)	SNA ¹ 1970-1972 (Y), LFS ⁵ 1956-1969 (Y)	
GDP	1960-1988	CBS ¹ (Y)		GDP (CBS ⁶)
GDPV	1960-1987	CBS ¹ (Y)	CBS ⁷ 1960-1983 (Y)	GDPV (CBS ⁶)
IBBV	1962-1987	ITV-IHV-IGV		
IG	1962-1986	CBS ¹ (Y)		IG (CBS ⁶)
IGV	1962-1987	CBS ¹ (Y)	CBS ⁷ 1960-1983 (Y)	IGV (CBS ⁶)
IH	1962-1987	CSO ² (Q)	SNA ¹ 1960-1974 (Y)	
IHV	1962-1987	CSO ² (Q)	CSO ² 1970-1974 (Q), SNA ¹ 1960-1969 (Y)	
IRL	1961-1989	Rate of long term government bonds (M)		
IT	1962-1989	CBS ¹ (Y)		IT (CBS ⁶)
ITV	1960-1987	CBS ¹ (Y)	CBS ⁷ 1960-1983 (Y)	ITV (CBS ⁶)
KEV	1955-1986	OECD ⁸ (Y)		See section III
PCGW	1962-1986	Index(CGW/EG)		
TIND	1960-1986	CBS ¹ (Y)		Smoothing
TSUB	1960-1987	CBS ¹ (Y)		Smoothing
WSSS	1962-1987	CBS ¹ (Y)		Smoothing

1. "Statistisk Ukehefte, Nasjonalregnskap", Central Bureau of Statistics, Oslo. The base year for constant prices data is 1984.
2. "Labour Market Statistics", Central Bureau of Statistics, Oslo.
3. "National Accounts, 1975-1987", OECD.
4. Quarterly survey of persons aged 16 to 74, Central Bureau of Statistics, Oslo.
5. "Labour Force Statistics", OECD.
6. Quarterly National Accounts, Central Bureau of Statistics, Oslo.
7. 1984 base year data from 1984. Data from 1960 to 1983 are obtained by splicing 1970, 1975 and 1980 base year data.
8. See section III.

PORTUGAL

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	n.a			
CGW	1958-1988	BANK ¹ (Y)		Smoothing
EG	1960-1987	BANK ¹ (Y)	OECD ² 1975-1983 (Y), SNA ³ 1960-1974 (Y)	Smoothing
ES	1956-1989	QLFS ⁴ (Q)	LFS ⁵ 1956-1983 (Y)	
ET	1956-1989	QLFS ⁴ (Q)	LFS ⁵ 1956-1983 (Y)	
GDP	1960-1988	SNA ³ (Y)		Estimated quarterly indicator
GDPV	1960-1989	SNA ³ (Y)		Industrial production
IBBV	1960-1988	Residual		
IG	1958-1989	BANK ¹ (Y)		Smoothing
IGV	1958-1989	BANK ¹ (Y)		Smoothing
IHV	1958-1989	BANK ¹ (Y)		Smoothing
IRL	1966-1986	Government bonds rate (M)		
IT	1960-1989	SNA ³ (Y)		Smoothing
ITV	1960-1989	SNA ³ (Y)		Smoothing
KBV	1960-1988	OECD ⁶ (Y)		
PCGW	1960-1987	index (CGW/EG)		
TIND	1958-1988	BANK ¹ (Y)		Smoothing
TSUB	1958-1988	BANK ¹ (Y)		Smoothing
WSSS	1958-1988	BANK ¹ (Y)		Total of two smoothed series

1. "Annual Report", Bank of Portugal, Lisbon.
2. OECD estimation.
3. "National Accounts, 1976-1988", OECD. The base year for constant prices data is 1977.
4. "Quarterly Labour Force Statistics", OECD.
5. "Labour Force Statistics", OECD.
6. See section III.

SPAIN

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1964-1986	INE ¹ (Y)	INE ² (Y) 1964-1979	Smoothing
CGW	1964-1986	INE ¹ (Y)	INE ² (Y) 1964-1979	Smoothing
EG	1964-1987	SNA ³ (Y)	LFS ⁵ (Y) 1964-1980	Smoothing
EE	1960-1989	BEL ⁴ (Q)	LFS ⁵ 1960-1965 (Q)	
ET	1960-1989	BEL ⁴ (Q)	LFS ⁵ 1960-1965 (Q)	
GDP	1960-1989	INE ¹ (Y)	INE ² 1964-1979 (Y), SNA ⁶ 1960-1963 (Y)	Smoothing
GDPV	1960-1989	INE ¹ (Y)	INE ² 1964-1979 (Y), SNA ⁶ 1960-1963 (Y)	Smoothing
IBBV	1964-1986	ITV-IHV-IGV		
IG	1964-1986	SNA ³ (Y)	SNA ³ 1964-1979 (Y)	Smoothing
IGV	1964-1986	IG/PIG		
IH	1964-1987	INE ¹ (Y)	INE ² 1964-1979 (Y)	Smoothing
IHV	1964-1987	INE ¹ (Y)	INE ² 1964-1979 (Y)	Smoothing
IRL	1966-1987	Yield of long run government bonds (M)		
IT	1960-1989	INE ¹ (Y)	INE ² 1964-1979 (Y), SNA ⁶ 1960-1963 (Y)	T3(QNA)
ITV	1960-1989	INE ¹ (Y)	INE ² 1964-1979 (Y), SNA ⁶ 1960-1963 (Y)	T3(QNA)
KBV	1964-1986	OECD ⁷ (Y)		See section III
PCGW	1964-1986	index (CGW/EG)		
PIG	1960-1989	PIG=PII		
TIND	1964-1988	INE ¹ (Y)	INE ² 1964-1979 (Y)	Smoothing
TSUB	1964-1989	INE ¹ (Y)	INE ² 1964-1979 (Y)	Smoothing
WSSS	1964-1986	SNA ³ (Y)	SNA ³ 1964-1979 (Y)	Smoothing

1. "Contabilidad Nacional de Espana", Instituto Nacional de Estadística. INE Base year 1980.
2. "Contabilidad Nacional de Espana", Instituto Nacional de Estadística. INE Base year 1970.
3. "National Accounts, 1976-1988", OECD.
4. "Boletin de Estadísticas Laborales", Ministerio de Trabajo Y Seguridad Social.
5. "Labour Force Statistics, 1967-1987", OECD.
6. "National Accounts, 1952-1981", OECD.
7. See section III.
8. Total investment deflator is used as general government investment deflator.

SWEDEN

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	1960-1988	SNA ¹ (Y)		Smoothing
CGW	1963-1987	SNA ¹ (Y)		Smoothing
EG	1960-1987	SNA ¹ (Y)		Smoothing
ES	1960-1987	ETNIA-EE		
ETNIA	1956-1989	SCB ² (Y)	SNA ¹ 1970-1976 (Y), LFS ³ 1956-1969 (Y)	Smoothing
GDP	1960-1989	SCB ⁴ (Q)	SCB ⁵ 1960-1979 (Q)	
GDPV	1960-1989	SCB ⁴ (Q)	SCB ⁵ 1960-1979 (Q)	
IBBV	1960-1986	ITV-IHV-IGV		
IG	1960-1989	SNA ¹ (Y)	SNA ⁶ 1970-1979 (Y), SNA ⁷ 1960-1969 (Y)	Smoothing
IGV	1960-1986	SNA ¹ (Y)	SNA ⁶ 1970-1979 (Y), SNA ⁷ 1960-1969 (Y)	Smoothing
IH	1960-1989	SNA ¹ (Y)	SNA ⁷ 1960-1969 (Y)	Smoothing
IHV	1960-1989	SNA ¹ (Y)	SNA ⁷ 1960-1969 (Y)	Smoothing
IRL	1955-1989	Yield of long term government bonds (M)		
IT	1960-1989	SCB ⁴ (Q)	SCB ⁵ 1960-1969 (Q)	
ITV	1960-1989	SCB ⁴ (Q)	SCB ⁵ 1960-1979 (Q)	
KBV	1963-1986	OECD ⁸ (Y)		See section III
PCGW	1963-1989	index(CGW/EG)		
PIG	1960-1986	IG/IGV		
TIND	1960-1988	SNA ¹ (Y)	SNA ⁶ 1970-1979 (Y), SNA ⁷ 1960-1969 (Y)	Smoothing
TSUB	1960-1988	SNA ¹ (Y)	SNA ⁶ 1970-1979 (Y), SNA ⁷ 1960-1969 (Y)	Smoothing
WSSS	1960-1988	SNA ¹ (Y)	SNA ⁶ 1970-1979 (Y), SNA ⁷ 1960-1969 (Y)	Smoothing

1. "National Accounts 1976-1988", OECD.
2. "Statistics Sweden, Annual Report on National Accounts -Appendix 5, table 5.1".
3. "Labour Force Statistics 1967-1987", OECD.
4. "Statistics Sweden, Stockholm. The base year for constant prices is 1985.
5. "Statistics Sweden, Stockholm (older stats).
6. "National Accounts 1970-1982", OECD.
7. "National Accounts 1960-1971", OECD.
8. "Flows and Stocks of Fixed Capital", OECD. The gross capital stock for business sector is obtained by summing "Agriculture", "Industry" and "Services excluding dwellings".

SWITZERLAND

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	n.a			
CGW	1960-1988	OFS ¹ (Y)		Smoothing
EG	1960-1988	OECD ² (Y)		Smoothing
ES	1956-1988	ET-EE		
ET	1956-1989	QLFS ³ (Y)	QLFS ³ 1969-1985 (Q), LFS ³ 1956-1968 (Y)	
GDP	1948-1989	KOF ⁴ (Q)	OFS ¹ 1948-1966 (Y)	
GDPV	1948-1989	KOF ⁴ (Q)	OFS ¹ 1960-1979 (Q)	
IBBV	1961-1987	ITV-IHV-IGV		
IG	1961-1987	FIN ⁵ (Y)		
IGV	1961-1987	IG/PIC ⁷		
IH	1948-1988	OFS ¹ (Y)	OFS ¹ 1948-1979 (Y)	Smoothing
IHV	1948-1988	OFS ¹ (Y)	OFS ¹ 1948-1979 (Y)	Smoothing
IRL	1960-1989	Rate of confederation bonds on the secondary market (M)		
IT	1948-1989	KOF ⁴ (Q)	OFS ¹ 1948-1966 (Y)	
ITV	1948-1989	KOF ⁴ (Q)	OFS ¹ 1948-1966 (Y)	
KBV	1961-1987	OECD ⁶ (Y)		See section III
PCGW	1960-1988	Index (CGW/EG)		
PIG	1961-1987	IG/IGV		
TIND	1948-1988	OFS ¹ (Y)		Smoothing
TSUB	1948-1988	OFS ¹ (Y)		Smoothing
TSSS	1948-1988	OFS ¹ (Y)		Smoothing

1. "Office Fédéral de la Statistique, Comptes nationaux de la Suisse", OFS.

2. OECD estimate.

3. "Quarterly Labour Force Statistics" and "Labour Force Statistics", OECD.

4. "La Vie Economique", Zurich. The base year for constant prices is 1985.

5. "Finances Publiques en Suisse -tableau 7-", OFS.

6. See section III.

7. General government investment is deflated by the implicit deflator for total investment in construction.

TURKEY

Variable	Availability	Primary source (frequency)	Secondary source(s), period (frequency)	Interpolation (source)
CFKG	n.a			
CGW	1972-1989	SPO ¹ (Y)		Smoothing
EG	1970-1989	SPO ¹ (Y)		Smoothing
ES	1970-1989	SPO ¹ (Y)	SPO ¹ 1970-1977 (Y)	Smoothing
ET	1960-1989	SPO ¹ (Y)	SPO ¹ 1970-1977 (Y)	Smoothing
GDP	1960-1989	SPO ¹ (Y)	SNA ² 1960-1971 (Y)	Smoothing
GDPV	1960-1989	SPO ¹ (Y)	SNA ² 1960-1971 (Y)	Smoothing
IBBV	1960-1989	Residual		
IG	1960-1989	SPO ¹ (Y)	SNA ² 1960-1971 (Y)	Smoothing
IGV	1960-1989	SPO ¹ (Y)	SNA ² 1960-1971 (Y)	Smoothing
IH	1960-1989	SPO ¹ (Y)	SNA ² 1960-1971 (Y)	Smoothing
IHV	1960-1989	SPO ¹ (Y)	SNA ² 1960-1971 (Y)	Smoothing
IRL	1975-1989	Long-term interest rate, one-year deposit, annual rate (M)		
IT	1960-1989	SPO ¹ (Y)	SNA ² 1960-1971 (Y)	Smoothing
ITV	1960-1989	SPO ¹ (Y)	SNA ² 1960-1971 (Y)	Smoothing
KBV	1962-1988	OECD ³ (Y)		
PCGW	1972-1989	index (CGW/EG)		
PIG	1972-1989	IG/IGV		
TIND	1960-1989	SNA ² (Y)		Smoothing
TSUB	1960-1989	SNA ² (Y)		Smoothing
WSSS	1972-1989	SPO ¹ (Y)		Smoothing

1. State Planning Organisation, Ankara.

2. "National Accounts", OECD.

3. See section III.

