Accuracy assessment of National Accounts statistics

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Summary

The Office for National Statistics (ONS) has recently completed a project under the auspices of the Statistical Office of the European Communities (Eurostat) entitled *Accuracy assessment of National Accounts statistics.*

The project's aim was to review the accuracy of the basic data used in the National Accounts (NA). To do this, it took each type of data source and analysed the effects of different types of adjustments applied during the compilation process with the aim of achieving accurate and coherent final estimates.

This present article describes the project's definitions of the quality and the structure of the compilation process used in the NA estimates.

The article examines the project results for the compilation process of the NA (in current prices) for the year 2000, which are consistent with the 2002 editions of the ONS *Blue Book* and the *United Kingdom Input – Output Analyses*.

Introduction

Critical attention has been paid to the compilation processes that transform basic data into the statistical estimates given in the National accounts. The quality of the statistical results is dependent not only on the quality of the underlying data, but also on the quality of the statistical process.

Quality, according to the Data Quality Assessment Framework of the International Monetary Fund, is composed of the following dimensions:

- **Integrity**
  Ensures that the principle of objectivity in the collection, processing and dissemination of statistics is firmly adhered to;

- **Methodological soundness**
  Ensures that the methodological basis for the statistics follows internationally accepted standards, guidelines or good practice;

- **Accuracy and reliability**
  Ensures that source data and statistical techniques are sound and that statistical outputs sufficiently portray reality;

- **Serviceability**
  Ensures that statistics are relevant, timely, consistent and follow a predictable revisions policy; and

- **Accessibility**
  Ensures that data and metadata are easily available and that assistance to users is adequate.

The measurement of accuracy of National Accounts estimates

National accounts aggregates derive from different types of source. The data sources include ONS statistical surveys, such as Annual Business Inquiry (ABI), ProdCom, Purchases Inquiry, Family Expenditure Survey (replaced by Expenditure and Food Survey), and Quarterly Profits Inquiry, as well as administrative systems, such as Governmental Expenditure Monitoring System and Inland Revenue records. The National accounts also use models, such as the Perpetual Inventory Model, which provides estimates for imputed capital consumption.

Accuracy, one of the dimensions of the internationally agreed definition of quality, is defined as the gap between the NA published estimate and the true value of the variable. As the true value of the variable is unknown, in consequence the accuracy is also unknowable.

All of the data sources have a different degree of accuracy. The errors can be divided into knowable sampling errors and unknowable non-sampling errors.

Sampling errors occur in sample survey data that are grossed up to the target population, and are affected by the design and size of the sample. Non-sampling errors are in all types of data sources and include coverage errors, measurement errors, processing errors, non-response errors and modelling errors.

All of these types of errors have an impact on the accuracy of the NA estimates. But whereas sampling errors can (in principle) be calculated by a variety of mathematical models, it is very difficult and costly to calculate the non-sampling errors (Bailar 1983).

Accuracy of estimates in National accounts is rendered even more difficult because many different data sources interact in a complex process, so that even the sampling errors cannot be calculated. Nevertheless, it is clear that some NA systems are more accurate than others, and that their accuracy is related to the accuracy of the same source data, as well as the methodology used to process the source data in order to produce the NA estimates.

However, readily comparable information on NA sources and procedure is difficult to find. Therefore, Eurostat has inaugurated a project to compile such information. The rest of this paper describes the UK's participation in this project.

The structure of the National Accounts compilation process

The compilation of the National Accounts is a very complex process, which draws together many different types of data and balances them against one another to produce an estimate of Gross Domestic Product (GDP) using three different approaches: production, expenditure and income. This estimate of GDP is then transformed into an estimate of Gross National Income.[1]

The structure of the NA compilation process starts with different types of data source as input. The process includes a series of adjustments to the basic data to make them consistent with each other and bring them in line with the NA concepts and methods (*See Figure 1*).

The basis for NA figures comprise different types of data source, such as survey and censuses, administrative data, and data obtained though extrapolations of benchmark year figures and models.

Figure **1**

Structure of the National Accounts compilation process

The adjustments, which aim to improve the source data, can best be explained as a series of different types of adjustments

- **Data Validation Adjustments**
  There are made to correct biases, errors and discontinuities in the data sources;

- **Conceptual Adjustments**
  There are made to bring the NA figures in line with the European System of Accounts 1995 (ESA95) definitions (for example, inclusion of Income in Kind and moving the NA figures into basic prices);

- **Explicit Exhaustiveness Adjustments**
  These are made to cover hidden activities, such as illegal production, smuggling and evasion;

- **Balancing Adjustments**
  These are made to secure a balance between Industry Inputs and Outputs, and between Supply and Demand for products (*see*

Table 1 Percentage contributions to final GDP estimates by type of source data and adjustments in current prices for year 2000

Percentages

Compilation of GDP	Basis for NA figures				Adjustments			Final estimate
	Survey and Censuses	Administrative Data	Extrapolation Models and other	Total	Data Validation	Conceptual and Exhaustiveness	Balancing	
Production approach	67	22	10	99	-3.1	4.8	-0.4	100
Expenditure approach	59	23	17	98	0.3	0.5	0.9	100
Income approach	54	30	13	97	-2.3	5.6	0.1	100

Input-Output Supply and Use Tables). Balancing adjustments result from an optimisation method under linear constraints in which the statistically optimal adjustments depend on the accuracy of the input variables.

While each of these *adjustment* steps eliminates systematic deficiencies and thus increases accuracy, the adjustment itself is inevitably subject to a certain degree of uncertainty, which adds to the variance in the final estimates.

Results

In general, the distribution of data between the components of 'Basis for NA figures' and the components of various 'Adjustments' is more or less similar for all three approaches to the compilation of GDP Final estimate in 2000 (*see* Table 1).

There are substantial differences between the three GDP approaches in their Basis for NA figures.

- **Survey and Censuses**
  These sources made up the largest proportion of the '*Final estimate*' in all three GDP approaches. In the Production approach they contributed 67 per cent of the final estimate, somewhat higher than for the Expenditure (59 per cent) and Income (54 per cent) approaches respectively.

- **Administrative Data**
  These represented the second largest proportion of the '*Final estimate*' in all three GDP approaches. The Income approach gave the highest contribution, 30 per cent, compared to the Production (22 per cent) and Expenditure (23 per cent) approaches respectively.

- **Extrapolations Models and Other**
  These techniques came next in all GDP approaches. Their share in the Expenditure approach (17 per cent) was higher than for the Production and Income approaches (10 per cent and 13 per cent, respectively).

There were also substantial differences between the three approaches in the composition of the 'Adjustments'.

- **Data Validation Adjustments**
  These were bigger in the Production (-3.1 per cent) and Income (-2.3 per cent) approaches than in the Expenditure approach (0.3 per cent).

- **Conceptual and Exhaustiveness Adjustments**
  These were higher in the Production and Income approaches (4.8 per cent and 5.6 per cent, respectively), compared to those in the Expenditure approach (0.5 per cent).

- **Balancing Adjustments**
  These were relatively low in all approaches, but they have the highest share in the Expenditure approach (0.9 per cent).

Table 1 shows that the differences between the totals for the Basis of NA figures and the Final estimate are only 1 per cent, 2 per cent or 3 per cent. However, it would be wrong to infer that the total adjustments to the Basis of NA figures have had only a small effect on all three GDP approaches. When the *Data Validation* and *Conceptual and Exhaustiveness* adjustments are looked at in more detail, they can be seen to offset each other, hence the adjustments have a significant effect on the distribution of GDP.

Production approach

The Production approach uses the highest proportion of *Surveys and Censuses* of all three approaches. It contributed 67 per cent to the final estimate in 2000. NA figures derived from *Administrative Data* sources contributed 22 per cent of the final estimate but only 10 per cent of the final estimate came from *Extrapolations and Models*.

Most *Surveys and Censuses* data used in the Production approach are derived from the Annual Business Inquiry (ABI) which, according to *ABI 1998–2000 regional results*[2], provided £621 billion to the Gross

Value Added (GVA) in 2000. Although the ABI survey is used as the principal source for Output, Intermediate Consumption and Gross Value Added, it is supplemented or replaced with alternative surveys and administrative data that are judged to be of better quality. Surveys source data are mainly provided by:

- Ministry of Agriculture, Fisheries and Food (MAFF)[3] for the Agriculture (NACE A17 section A): 1 per cent of GVA;

- Department of Environment, Transport and Regions, which supplied data on output for Great Britain only for Construction industry (NACE A17 section F): 4 per cent of output.

However, the ABI data for Transport (NACE A17 section I), Education (NACE A17 section M) and Health (NACE A17 section N) industries have been replaced by a variety of surveys and administrative source data, such as:

- Civil Aviation Authority: 1 per cent of GVA;
- National Health Service (NHS) and NHS Trusts: 2 per cent of GVA.

The *Administrative Data* have been sourced mainly from HM Customs and Excise and from the Government Expenditure Monitoring System (GEMS) of HM Treasury, which covered taxes and subsidies on products worth £119 billion and £6.7 billion, respectively. In addition, a high proportion of *Administrative* Data derived from the GEMS and the Ministry of Defence records covered the Public administration and defence industries, and contributed £35 billion to GVA.

Extrapolations and Models data used in the Production approach have been sourced from models, such as the model that estimates owner-occupied dwelling services, and the Perpetual Inventory Model (PIM)[4] that estimates the non-market imputed consumption of capital. Data from the above models contributed £64 billion and £17 billion, respectively, to the Gross Value Added of Real estate, renting and business activity and Education industries.

Total *Adjustments* applied in the Production approach have a discernible impact on the final estimate. This is due to the fact that *Data Validation Adjustments* have been coincidentally offset by *Conceptual and Explicit Exhaustiveness Adjustments*. (*see* Table 1).

Data Validation Adjustments have reduced the GVA of the Basis for NA Figures. There are two main reductions. One is £15 billion in the GVA of Real estate, renting and business activities industry. The other main reduction of £12.6 billion is in the Wholesale and retail trade and repair of vehicles industry.

Whereas, *Conceptual Adjustment* has increased the value of the GVA of Wholesale and retail trade, and repair of vehicles industry by only £7.1 billion. Another high *Conceptual Adjustment* of £7 billion has been recorded in the GVA of Manufacturing. The above adjustments have been applied:

- to include Income in Kind;
- to include taxes on production to ensure that the GVA is at basic prices;
- to exclude the value of rent on land.

Further *Conceptual Adjustments* were required for Manufacturing industry, to include within output, the values of changes in inventories, artistic originals, insurance premium supplements and computer software.

The *Explicit Exhaustiveness Adjustments*, derived mainly from the GVA of the following industries, have completed the offset of the *Data Validation Adjustments*:

- Construction, which has adjusted the Basis for NA figures up by £3.3 billion;
- Transport, storage and communication, which revised the Basis for NA figures up by £2.3 billion;
- Wholesale and retail trade, repairs of vehicles industry, which revised the Basis for NA figures up by £1.7 billion.

The reason for *Explicit Exhaustiveness Adjustments* in the above components was to include unrecorded activities in the ABI and the Inter-Departmental Business Register (IDBR), as well as actively related to the smuggling of goods in the Retail Trade.

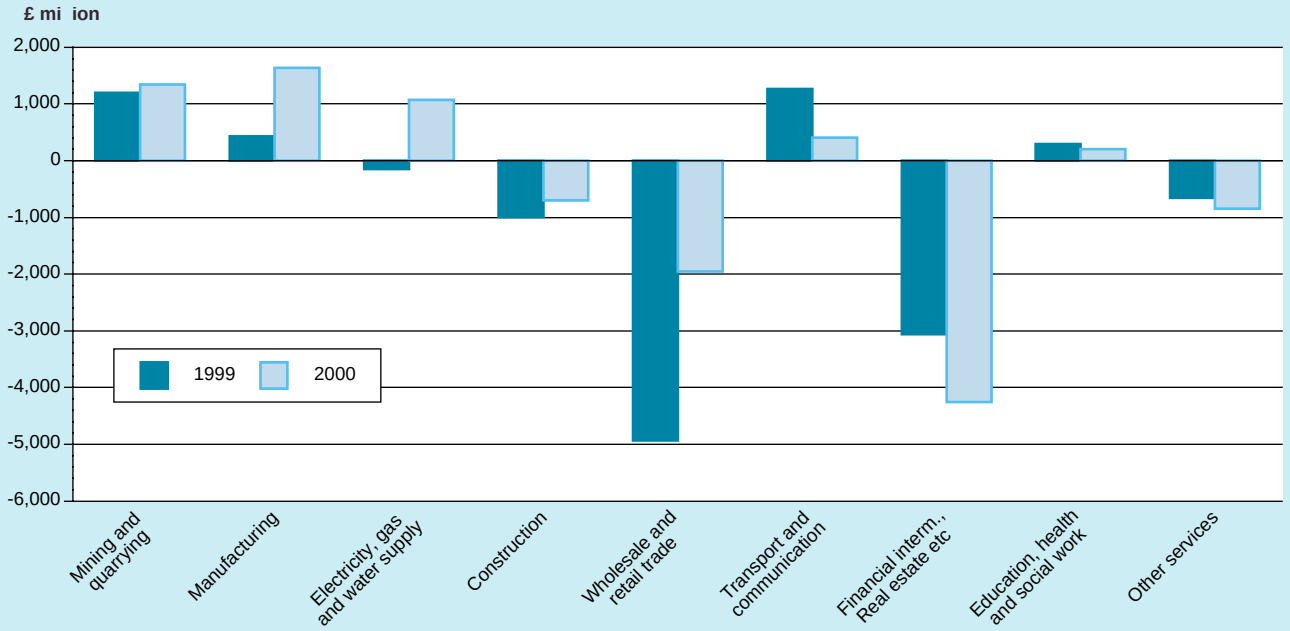
The balancing process has a rather small impact on the final estimates in the Production approach in 2000. This is the result of balancing adjustments of industries largely offsetting each other (*see* Figure 2).

However, the balancing process in the year 2000 has resulted in a relatively smaller balancing adjustment then the previous year (*see* Annex 1). An important contribution to this difference has been the GVA Wholesale and retail trade, where the balancing process reduced the basic NA figure by £2 billion in 2000, compared to a £5 billion reduction in 1999.

A high negative total *Balancing Adjustment* has also been recorded in the GVA of the Financial intermediation and Real estate, renting and business activities industries of minus £4.3 billion in 2000, when in 1999 it was minus £3 billion.

Figure **2**

Balancing Adjustments of the GDP production components in 1999–2000



Source: ONS (2002) *UK National Accounts: The Blue Book*

Expenditure approach

The Expenditure approach includes a high proportion of data derived from *Extrapolations and Models*, which contributed 17 per cent of the final estimate. However, data derived from *Surveys and Censuses* still form the largest source data, and *Administrative* Data are still as important as in the Production approach (*see* Table 1).

The greatest contribution of the data derived from the *Extrapolations and Models* in the Expenditure approach has been recorded in Household Final Consumption Expenditure (HHFCe) and Gross Fixed Capital Formation (GFCF), *see* Annex 2.

In HHFCe the following sections were the main ones subject to modelling:

- Housing, water, electricity, gas and other fuel (section 04) where £55 billion derived from the model that estimated owner-occupied dwelling services;

- Restaurants and hotels (section 11), £24 billion derived from a model that estimated data for alcoholic beverages, using administrative data on volume and commercial data on prices.

In GFCF the following divisions were the main ones subjected to modelling:

- Construction of housing (division 04), where £26 billion derived from a model that estimated expenditure on the construction of dwellings based on the production measure;

- Other Products (division 06), where £13 billion was derived from a model that estimated data for dual military use capital consumption expenditure.[5]

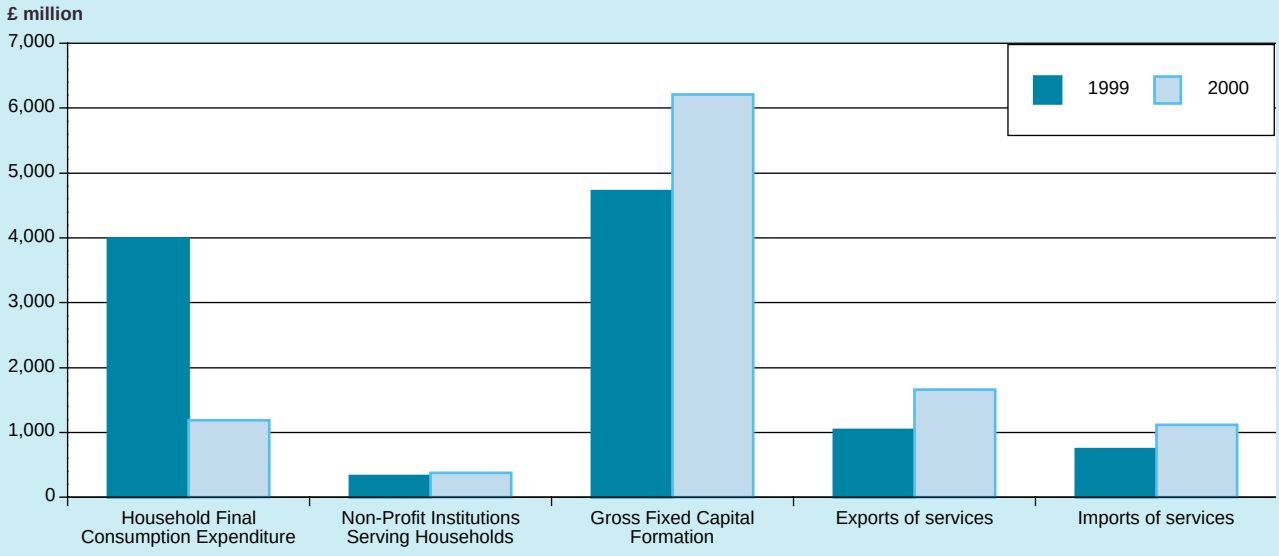
The *Administrative Data* in the Expenditure approach has been the largest contributor to General Government Final Consumption Expenditure and HHFCe components, which contributed £170 billion and £47 billion respectively. The above *Administrative Data* were obtained from the GEMS and British Telecommunications (BT), Office for Telecommunications (OFTEL), HM Customs and Excise, and the National Health Service.

A large proportion of *Surveys and Censuses* data in the Expenditure approach is derived from HHFCe and GFCF components, which contributed £444 billion and £96 billion, respectively.

HHFCe *Surveys and Censuses* data have mainly contributed to Transport (section 07: £81 billion), Miscellaneous goods and services (section 12: £72 billion), Recreation and culture (section 09: £59 billion) and Food and non-alcoholic beverages (section 01: £58 billion). These components have been obtained from the Family Expenditure Survey (FES) and National Food Survey (NFS).[6]

Figure **3**

Balancing Adjustments of the GDP Expenditure components in 1999–2000



Source: ONS (2002) *UK National Accounts: The Blue Book*

GFCF *Surveys and Censuses* data have mainly contributed to Metal product and machinery equipment (division 2: £54 billion) and other construction (division 5: £30 billion). GFCF data have been obtained from ABI, Quarterly Capital Expenditure (CAPEX) inquiry, and various surveys provided by governmental institutions, such as the Ministry of Agriculture Fishery and Forestry (MAFF), HM Customs and Excise, and the Department of Trade and Industry (DTI).

All adjustments applied in the Expenditure approach have increased the Basis for NA figures by £17 billion. This is a much greater effect than the adjustments of the Production approach.

The highest *Data Validation Adjustments* have been recorded in the HHFCe component, of £3.8 billion. The following HHFCe COICOP[7] sections have been adjusted upwards:

- Restaurants and hotels (section 11) by £1.7 billion;
- Furnishing, household equipment and routine household equipment (section 05) by £0.8 billion;
- Miscellaneous goods and services (section 12), by £0.8 billion.

But downwards adjustments have been made to:

- Food and non-alcoholic beverages (section 01) by £0.3 billion;
- Transport (section 07) by £0.3 billion.

High *Data Validation Adjustments* have also been recorded in Export of Services reducing the final estimate by £1.2 billion, and in GFCF increasing the final estimate by £0.6 billion.

High *Balancing Adjustments* of £8.3 billion occurred in 2000. These adjustments were higher than in the other two approaches, but they were smaller than in 1999 (*see* Annex 1).

The following components of the Expenditure approach have the highest balancing adjustments (*see* Figure 3)

- GFCF's balancing adjustment has increased the final estimate by £6.2 billion. GFCF division 2 (Metal products and machinery equipment) and division 3 (Transport equipment), contributed £3.8 billion and £1.4 billion, respectively, to the total balancing adjustment.

- HHFCe's balancing adjustment has increased the final estimate by £1.2 billion in 2000. It is important to mention that the adjustment was significantly smaller than the £4 billion applied a year earlier.

- Export and Import of Services balancing adjustments, which were higher than in 1999, have increased the final estimate by £1.7 billion and £1.1 billion in 2000, respectively.

Income approach

In the Income approach, as in the other two approaches, *Surveys and Censuses* provided the highest proportion (54 per cent) of final GDP estimate. *Administrative Data* sources provided the second (30 per cent), highest, while *Extrapolations and Models* were smallest (13 per cent) of final GDP estimate *(see* Table 1).

Although the contribution of *Surveys and Censuses* data in the Income approach is smaller than in the other two approaches, it is still the crucial source data for the 'Basis for NA figures'. The high proportion of *Surveys and Censuses* data has been due to the Compensation of Employees component of £480 billion, which is largely based on the Pay-As-You-Earn (PAYE) Income survey of Inland Revenue (*see* Annex 2).

Administrative Data have mainly covered Taxes on production and imports, and Private Non-financial Corporations (PNFC) Gross Operating Surplus components, which contributed £137 billion and £113 billion, respectively. The Inland Revenue, and HM Customs and Excise have been the main data suppliers for the above components.

Data for *Extrapolations and Models* of £121 billion has been derived largely from Gross Operating Surplus (GOS) and Mixed Income components. Most of Mixed Income data were based on a model calculating Sole Traders' income.[8] Private Non-financial Corporations GOS component has also used a model to calculate the value of computer software, Patent Royalties, and a proportion of the tax-deductible interest. However, the greatest proportion of *Extrapolation and Models* data has been obtained from the Rental Income of Households component, where the model used calculates the imputed rents for owner-occupied housing.

The total of *Adjustments* in the Income approach have increased the Basis for NA figures by £32 billion. This is a much greater effect than the adjustments of the other two approaches. However, the *Data Validation Adjustments*, as in the case of the Production approach, have been offset by *Conceptual Adjustments* and *Explicit Exhaustiveness Adjustments*. (*see* Table 1)

The Data Validation Adjustment applied to the Compensation of Employees (CoE) component has decreased the NA figure downward by £22 billion, whereas the *Conceptual Adjustment and Exhaustiveness Adjustment* have increased the value of the CoE component by £21 billion and £8 billion, respectively.

The *Data Validation Adjustment* has been applied to the CoE to improve the quality of the component caused by the benchmark estimate of PAYE Income data being weaker than usual and unrepresentative of the population. However, the reason for the *Conceptual Adjustment* was to include Income in Kind. The *Exhaustiveness Adjustment* has been made to include incomes of those earning below tax thresh hold.

Conceptual Adjustments also have a significant impact on the other components in the Income approach, increasing the value of the Basis for NA figures by £8 billion. The components, which required adjusting to the ESA95 basis, were Financial Corporations' Gross Trading Profits, and Non-market Imputed Capital Consumption.

The *Exhaustiveness Adjustments* had an impact on other components, namely GOS and Mixed Income, which have increased the value of the components by £17 billion. These adjustments have been made to include an estimate of concealed employment income not declared through PAYE Income within the Mixed Income component.

The *Balancing* process has a minor impact on the final estimates in the Income approach. *Balancing Adjustments* have increased the Basis for NA figures by a mere £0.6 billion. This increase was due to a negating balancing adjustment of £0.5 billion to the GOS and Mixed Income being offset by a positive adjustment of £1.1 billion to the Compensation of Employees components (*see* Annex 2). It is worth mentioning that the *Balancing* process in 1999 resulted in much higher adjustments of £4 billion than in 2000 (*see* Annex 1).

Quality indicators of the major surveys and censuses

As surveys and censuses are an essential source of data in the National Accounts system, it is also important to present the quality of the main surveys and censuses. As mentioned at the beginning of the article, surveys are subject to various errors. All of the surveys have been designed to minimise the total error, which consists of the sampling error and the non-sampling error.

The standard error is the estimated value of the sampling error. The standard error shows the difference between the survey estimate and the value for the entire population. The estimate for a variable, plus and minus the standard error for the variable (presented as a percentage of the survey estimate), indicates a range in which the true unknown value for the population probably lies. The closer the standard error is to zero, the more reliable is the estimate.

Non-sampling errors are not easy to quantify and include inadequate coverage, measurement, processing, and non-response. The response rate gives an indication of the likely impact of a non-response error on the survey estimates.

Table 2 Contribution of major surveys and censuses to GDP and quality indicators in 2000

Percentages

	Approximate contribution to GDP	Response rate	Standard error	Sample coverage
Production approach				
Annual Business Inquiry	22 [a]	85	1.50 [in 1998]	73
	48 [b]			
Expenditure approach				
Family Expenditure Survey	18	62	1.00	1
Charity Survey	0.5		2.58	3
Quarterly Capital Expenditure Inquiry	10 [c]	82		34
Quarterly Stock Inquiry	0.5	90		68
IntraStat	11 [export]			
	-12 [import]	90		97
International Passenger Survey	2 [export]	89 [in 1998]		0.3 [in 1998]
	-3 [import]			
Income approach				
Inland Revenue National Income Survey (PAYE)	46	98	0.25	1
Quarterly Profits Inquiry	2 [d]	83		100

a Approximate contribution of the ABI data at basic prices for *Agricultural and Manufacturing sectors* (NACE A17: A to E) to the total GVA at basic prices

b Approximate contribution of the ABI data at factor cost *for Construction and Services sectors* (NACE A17: F to P) to the total GVA at basic prices. ABI data are adjusted to basic prices using governmental sources

c The CAPEX data are the principal source initial for the GFCF. Two years later the ABI data became available and replaced the CAPEX inquiry data. However, the CAPEX inquiry data are still the principal source for the GFCF assets breakdown, and results are benchmarked on estimates collected in the ABI.

d The QPI covers all privatised companies, ie companies that were formerly government-owned. The non-privatised companies are covered by the administrative data from the Inland Revenue, but two and half years later. In 2001, when the Inland Revenue data were not available, QPI covered approximately 11% of GDP.

Source: Office for National Statistics

Table 2 provides information on standard error and response rates of various surveys used in the NA compilation process.

In the Production approach, the largest proportion of data is derived from the Annual Business Inquiry (ABI). The approximate contribution of the ABI data at basic prices for Agricultural and Manufacture sectors (NACE A17: A to E) to the total GVA at basic prices was 22 per cent. The ABI data at factor cost for Construction and Services sectors (NACE A17: F to P) contributed 48 per cent of the total GVA at basic prices. The ABI data for construction and services sectors (NACE A17: F to P) are adjusted to basic prices using governmental sources.

The standard error of the total Gross Value Added data source derived from the ABI was 1.5 per cent in 1998. The ABI response rate was 85 per cent, and it covered 73 per cent of the total population in 2000.

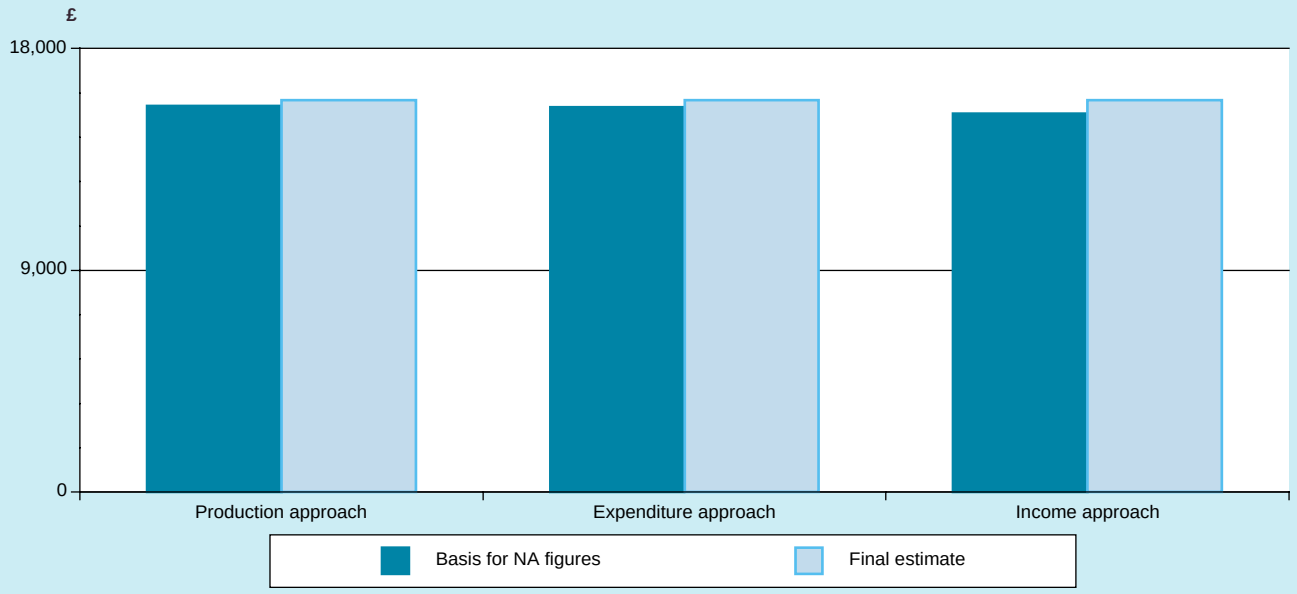
In the Expenditure approach, the Family Expenditure Survey (FES) formed an important part of the Household Final Consumption Expenditure component contributing 18 per cent of GDP, and therefore its quality contributes to the overall quality of the HHFCe data. The standard error of the total HHFCe components derived from the FES was 1 per cent in 2000. However, the highest standard error was the 6 per cent in the Miscellaneous goods and services component (section: 12), *see* ONS (2000) Family Spending. The response rate of the FES was 62 per cent in 2000 and it covered 1 per cent of the total population.

Other important surveys in the expenditure approach were the Quarterly Capital Expenditure (CAPEX) Inquiry and IntraStat, which contributed to approximately 10 per cent of the GDP in 2000. The CAPEX inquiry covered 34 per cent of the population and its response rate was 82 per cent. Slightly higher response rates can be observed in the IntraStat survey of 90 per cent, and 97 per cent coverage of the population, the highest coverage in the Expenditure approach.

The survey data source in the Income approach are dominated by the Pay-As-You-Earn (PAYE) part of the Inland Revenue National Income survey (46 per cent of GDP), which provides data for Wages and Salaries, a component of Compensation of Employees. The estimates of the PAYE system are derived from a 1 per cent sample of tax deducted documents, and are sufficient to estimate Wages and Salaries with a standard error of about 0.25 per cent and response rate of 98 per cent.

Figure **4**

GDP per capita in 2000 at curent prices



Source: Author's estimations based on ONS (2002) *UK National Accounts: The Blue Book*

Impact on GDP per capita

A noticeable impact on GDP per capita has been seen in the Income approach, where the Basis for NA Figure has been adjusted by £531, or 3.5 per cent of the final GDP estimate. The smallest impact has been observed in the Production approach, where the Basis for NA figure has been adjusted upwards by £221 or 1.4 per cent of the final GDP estimate (see Figure 4).

Conclusions

Undoubtedly, the Eurostat project on *Accuracy assessment of National Accounts statistics* has provided important information on the accuracy of NA statistics. It has confirmed that the majority of National Accounts data derive from *Surveys and Censuses* and *Administrative* Data sources, and the compilation process has a smaller impact on the final estimates.

It can be inferred from the article that, although the adjustments added to the Basis for NA figures have discernible impact on the Final estimate, in Production and Income approaches, high *Data Validation, Conceptual and Exhaustiveness Adjustments* have been applied, which offset one another.

The GDP components that have mostly been affected by the NA process were:

- **In the Production approach**
  Real estate, Constructions, Wholesale and retail trade industries;
- **In the Expenditure approach**
  Household Final Consumption Expenditure and Gross Fixed Capital Formation;
- **In the Income approach**
  Compensation of Employees.

Although the adjustments were small and have very little effect on the final estimate for any given year, their results from year to year could have a considerable effect on the annual rates of change.

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Penneck S (1995) Measuring the accuracy of the National Accounts, *Proceedings of the International Conference in Survey Measurement and Process Quality*. Paper presented at conference held in Bristol, April 1995.

Notes:

1. Gross National Income (GNI) is used in calculating the top limit of financial contributions to the European Union (EU) and forms the basis of the *4th Resource* contribution. The GNI data are also used in calculating the UK's VAT base, which forms the *3rd Resource* contribution. The other two contributing resources to the EU's budget are customs duties paid at the external frontier of the single market and certain levies required by the Common Agriculture Policy (CAP).

2. *ONS (2002)* Annual Business Inquiry. *Regional data for 1998 – 2000 has been available since 18 September 2002. Online at www.statistics.gov.uk.abi/regional.asp*

3. Now known as DEFRA (Department for Environment, Food and Rural Affairs).

4. The PIM is used in the UK accounts to estimate the level of assets held at a particular point in time. This is done by cumulating the acquisitions of such assets over a period, and then subtracting the disposals of such assets over that period. Adjustments are made for price changes over time.

5. Dual military use covers assets that are for both military and civil use, such as buildings, telecommunications and transport equipment.

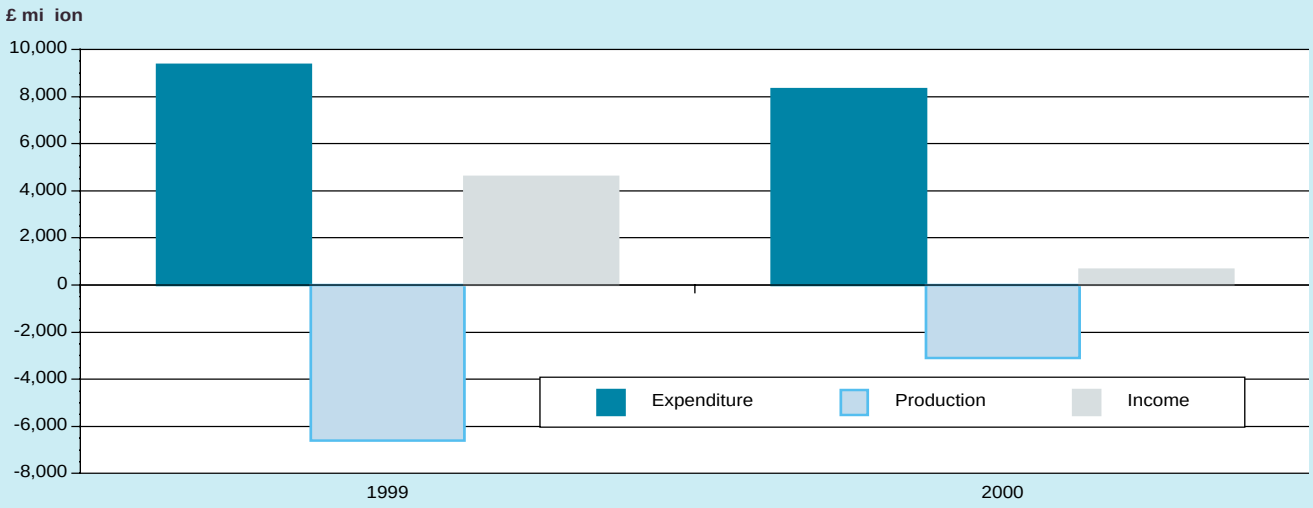
6. The Family Expenditure Survey and National Food Survey were combined in September 2001 to form the Expenditure and Food Survey.

7. COICOP (Classification of Individual Consumption by Purpose) is an international classification that groups consumption according to its function or purpose. For example, the heading Clothing (section 03) covers expenditure on garments, clothing materials, laundry, and repairs.

8. The usual administrative benchmark data were not available, therefore the 1999 benchmark data were extrapolated forward.

Annex 1

Balancing Adjustments in 1999 and 2000 at current prices Based on: ONS (2002), *UK National Accounts: The Blue Book*



Production Approach	1999	2000
Agriculture	28	- 2
Mining and quarrying	1,192	1,348
Manufacturing	432	1,639
Electricity, gas and water supply	- 150	1,067
Construction	- 997	- 700
Wholesale and retail trade	-4,933	-1,955
Transport and communication	,260	142
Financial interm., Real estate etc	-3,064	-4,260
Education, health and social work	296	203
Other services	- 660	- 847

Expenditure Approach	1999	2000
Household Final Consumption Expenditure	3,990	1,190
Non-Profit Institutions Serving Households	330	380
Gross Fixed Capital Formation	4,722	6,216
Exports of services	1,040	1,660
Imports of services	740	1,120
Income Approach	**1999**	**2000**
Compensation of Employees	2,845	1,124
Financial Corporations	650	-
Private Non-Financial Corporations	907	-400

Annex 2 Quantitative overview of the National Accounts process

Compilation of GNI	Level of Details	Basis for NA Figures					Adjustments				Final estimate
		Surveys & Censuses	Administrative Data	Extrapolations & models	Other	Total	Data validation	Conceptual	Explicit exhaustiveness	Balancing	
PRODUCTION APPROACH											
NACE A17	**TOTAL**										
Output of goods and services (at basic prices)		**1,293,737**	**193,935**	**221,595**		**1,709,267**	**-2,360**	**62,780**	**24,771**	**28,962**	**1,823,420**
Intermediate consumption (at purchasers' prices)		**659,888**	**95,591**	**128,922**		**884,401**	**26,879**	**30,043**	**11,611**	**32,421**	**985,355**
Gross value added (at basic prices)		**633,849**	**98,344**	**92,673**		**824,866**	**-29,239**	**32,737**	**13,160**	**-3,459**	**838,065**
A	**Agriculture, hunting and forestry**										
Output of goods and services (at basic prices)		16,975	3			**16,978**	-285	203	2,693	-2	**19,587**
Intermediate consumption (at purchasers' prices)		10,188				**10,188**	-315	-99	1,455		**11,229**
Gross value added (at basic prices)		6,787	3			**6,790**	30	302	1,238	-2	**8,358**
B	**Fishing**										
Output of goods and services (at basic prices)		879	3			**882**	-146	12			**748**
Intermediate consumption (at purchasers' prices)		517				**517**	-215	2			**304**
Gross value added (at basic prices)		362	3			**365**	69	10			**444**
C	**Mining and quarrying**										
Output of goods and services (at basic prices)		33,789	2			**33,791**	527	510		-80	**34,748**
Intermediate consumption (at purchasers' prices)		10,905	1			**10,906**	1	-38		-1,428	**9,441**
Gross value added (at basic prices)		22,884	1			**22,885**	526	548		1,348	**25,307**
D	**Manufacturing**										
Output of goods and services (at basic prices)		410,797				**410,797**	-53	6,096	1,000	1,359	**419,199**
Intermediate consumption (at purchasers' prices)		265,781				**265,781**	-3	-922	400	270	**265,526**
Gross value added (at basic prices)		145,016				**145,016**	-50	7,018	600	1,089	**153,673**
E	**Electricity**										
Output of goods and services (at basic prices)		44,865				**44,865**		1,764		1,504	**48,133**
Intermediate consumption (at purchasers' prices)		32,226				**32,226**		-260		437	**32,403**
Gross value added (at basic prices)		12,639				**12,639**		2,024		1,067	**15,730**
F	**Construction**										
Output of goods and services (at basic prices)		71,699		1,483		**73,182**	1,740	33,727	6,327	738	**115,714**
Intermediate consumption (at purchasers' prices)		30,582		880		**31,462**	3,650	32,120	2,997	1,438	**71,667**
Gross value added (at basic prices)		41,117		603		**41,720**	-1,910	1,607	3,330	-700	**44,047**

Annex 2 - *continued* **Quantitative overview of the National Accounts process**

Compilation of GNI	Level of Details	Basis for NA Figures					Adjustments				Final estimate
		Surveys & Censuses	Administrative Data	Extrapolations & models	Other	Total	Data validation	Conceptual	Explicit exhaustiveness	Balancing	
G	**Wholesale and retail trade, repair of vehicles and personal and HH goods**										
Output of goods and services (at basic prices)		185,960				**185,960**	4,785	6,901	2,153	3,926	**203,725**
Intermediate consumption (at purchasers' prices)		76,520				**76,520**	17,425	-154	457	7,146	**101,394**
Gross value added (at basic prices)		109,440				**109,440**	-12,640	7,055	1,696	-3,220	**102,331**
H	**Hotels and restaurants**										
Output of goods and services (at basic prices)		38,365		1,427		**39,792**	-210	3,713	707	40	**44,042**
Intermediate consumption (at purchasers' prices)		17,397		680		**18,077**	-1,205	-56	154	-1,225	**15,745**
Gross value added (at basic prices)		20,968		747		**21,715**	995	3,769	553	1,265	**28,297**
I	**Transport, storage and communication**										
Output of goods and services (at basic prices)		120,451	13,240			**133,691**	4,085	3,651	4,384	3,259	**149,070**
Intermediate consumption (at purchasers' prices)		64,025	8,347			**72,372**	3,386	-305	2,113	2,661	**80,227**
Gross value added (at basic prices)		56,426	4,893			**61,319**	699	3,956	2,271	598	**68,843**
J	**Financial intermediation**										
Output of goods and services (at basic prices)		28,991	64	81,507		**110,562**			4,150	11,702	**126,414**
Intermediate consumption (at purchasers' prices)		-20,107	4,923	81,426		**66,242**			2,685	11,702	**80,629**
Gross value added (at basic prices)		49,098	-4,859	81		**44,320**			1,465		**45,785**
K	**Real estate, renting and business activity**										
Output of goods and services (at basic prices)		201,795	-69	101,849		**303,575**	-10,432	2,386	1,759	2,581	**299,869**
Intermediate consumption (at purchasers' prices)		75,539	-19,064	37,577		**94,052**	4,542	-170	641	6,841	**105,906**
Gross value added (at basic prices)		126,256	18,995	64,272		**209,523**	-14,974	2,556	1,118	-4,260	**193,963**
_ **K**	**Services of owner-occupied dwellings**										
Output of goods and services (at basic prices)				73,427		**73,427**			-439		**72,988**
Intermediate consumption (at purchasers' prices)				9,677		**9,677**					**9,677**
Gross value added (at basic prices)				63,750		**63,750**			-439		**63,311**

Annex 2 - *continued* **Quantitative overview of the National Accounts process**

Compilation of GNI	Level of Details	Basis for NA Figures					Adjustments				Final estimate
		Surveys & Censuses	Administrative Data	Extrapolations & models	Other	Total	Data validation	Conceptual	Explicit exhaustiveness	Balancing	
	L Public administration and defence; compulsory social security										
Output of goods and services (at basic prices)			72,864	6,078		**78,942**					**78,942**
Intermediate consumption (at purchasers' prices)			38,094			**38,094**					**38,094**
Gross value added (at basic prices)			34,770	6,078		**40,848**					**40,848**
	M Education										
Output of goods and services (at basic prices)		18,669	29,193	19,728		**67,590**		567			**68,157**
Intermediate consumption (at purchasers' prices)		8,433	7,839	2,761		**19,033**		-39			**18,994**
Gross value added (at basic prices)		10,236	21,354	16,967		**48,557**		606			**49,163**
	N Health and social work										
Output of goods and services (at basic prices)		63,575	68,767	3,178		**135,520**	-195	776		307	**136,408**
Intermediate consumption (at purchasers' prices)		25,628	53,732	889		**80,249**	-415	-25		104	**79,913**
Gross value added (at basic prices)		37,947	15,035	2,289		**55,271**	220	801		203	**56,495**
	O Other community, social and personal service activities										
Output of goods and services (at basic prices)		56,927	5,818	6,345		**69,090**	-2,176	2,474	1,598	3,628	**74,614**
Intermediate consumption (at purchasers' prices)		24,495	1,529	4,709		**30,733**	28	-11	709	4,475	**35,934**
Gross value added (at basic prices)		32,432	4,289	1,636		**38,357**	-2,204	2,485	889	-847	**38,680**
	P Private households with employed persons										
Output of goods and services (at basic prices)			4,050			**4,050**					**4,050**
Intermediate consumption (at purchasers' prices)											
Gross value added (at basic prices)			4,050			**4,050**					**4,050**
Financial Intermediation Services Indirectly Measured		**-37,759**	**-190**			**-37,949**					**-37,949**
Taxes on products			**119,003**			**119,003**					**119,003**
Value added type taxes			64,917			**64,917**					**64,917**
Other taxes on products			54,086			**54,086**					**54,086**
Subsidies on products			**6,653**			**6,653**					**6,653**
Residual item											
Gross domestic product		**633,849**	**210,694**	**92,673**		**937,216**	**-29,239**	**32,737**	**13,160**	**-3,459**	**950,415**

Annex 2 - *continued* **Quantitative overview of the National Accounts process**

Compilation of GNI	Level of Details		Basis for NA Figures: Surveys & Censuses	Administrative Data	Extrapolations & models	Other	Total	Adjustments: Data validation	Conceptual	Explicit exhaustiveness	Balancing	Final estimate
EXPENDITURE APPROACH												
Total final consumption expenditure			**449,201**	**228,205**	**118,259**		**795,665**	**3,764**	**-154**	**3,540**	**1,570**	**804,385**
Household final consumption expenditure	**COICOP (2dig) Total**		**443,879**	**47,435**	**103,749**		**595,063**	**3,764**		**3,540**	**1,190**	**603,557**
		Net tourism	6,949				**6,949**					**6,949**
	1	Food and non-alcoholic beverages	57,845				**57,845**	-251			125	**57,719**
	2	Alcoholic beverages and tobacco		11,851	10,310		**22,161**	75		2,680		**24,916**
	3	Clothing and footwear	34,973	88			**35,061**	15				**35,076**
	4	Housing, water, electricity, gas and other fuel	37,828	13,878	55,153		**106,859**	254			300	**107,413**
	5	Furnishing, household equipment and routine HH maintenance	34,666				**34,666**	753			-270	**35,149**
	6	Health	5,929	2,740			**8,669**	302			-100	**8,871**
	7	Transport	80,556	7,744			**88,300**	-321			300	**88,279**
	8	Communication	13,298				**13,298**	1				**13,299**
	9	Recreation and culture	58,913	9,018	5,191		**73,122**	456			325	**73,903**
	1	Education			9,634		**9,634**					**9,634**
	11	Restaurant and hotels	40,914	751	24,321		**65,986**	1,720			720	**68,426**
	12	Miscellaneous goods and services	72,008	1,365			**73,373**	760			-210	**73,923**
NPISH final consumption expenditure			**5,322**	**10,898**	**6,581**		**22,801**		**-154**		**380**	**23,027**
General government final consumption expenditure				**169,872**	**7,929**		**177,801**					**177,801**
Gross fixed capital formation	**Pi6**	**Total**	**96,088**	**14,352**	**40,017**		**150,457**	**640**	**1,605**		**6,216**	**158,918**
	1	Products of agriculture, forestry, fishery and aquaculture	499				**499**					**499**
	2	Metal products and machinery equipment	54,351	1,777	205		**56,333**	640	577		3,810	**61,360**
	3	Transport equipment	11,334	359	40		**11,733**		387		1,428	**13,548**
	4	Construction of housing		1,791	25,648		**27,439**					**27,439**
	5	Other constructions	29,556	10,425	719		**40,700**		641		978	**42,319**
	6	Other products	348		13,405		**13,753**					**13,753**

Annex 2 - *continued* Quantitative overview of the National Accounts process

Compilation of GNI	Level of Details	Basis for NA Figures					Adjustments				Final
		Surveys & Censuses	Administrative Data	Extrapolations & models	Other	Total	Data validation	Conceptual	Explicit exhaustiveness	Balancing	estimate
Changes in inventories		5,097	-513	1,011		5,595					5,595
Acquisitions less disposals of valuables				5		5					5
Exports of goods and services		184,739	79,946			264,685	-1,210			1,660	265,135
goods		107,990	79,946			187,936					187,936
services		76,749				76,749	-1,210			1,660	77,199
Imports of goods and services		175,502	107,001			282,503				1,120	283,623
goods		111,261	107,001			218,262					218,262
services		64,241				64,241				1,120	65,361
Residual item											
Gross domestic product		559,623	214,989	159,292		933,904	3,194	1,451	3,540	8,326	950,415
INCOME APPROACH											
Compensation of employees		480,099	37,010			517,109	-22,330	21,318	7,669	1,124	524,890
Gross operating surplus and Mixed Income		29,475	120,365	121,672		271,512	327	7,503	16,676	-534	295,484
Taxes on production and imports			137,484			137,484					137,484
Subsidies			7,443			7,443					7,443
Residual item											
Gross domestic product		509,574	287,416	121,672		918,662	-22,003	28,821	24,345	590	950,415
GROSS NATIONAL INCOME											
Compensation of employees received from the rest of the world		185	829			1,014					1,014
Compensation of employees paid to the rest of the world		501	370			871					871
Property income received from the rest of the world		125,878	6,527	1,818		134,223					134,223
Property income paid to the rest of the world		83,346	7,939	33,430	339	125,054					125,054
Taxes on production and imports			4,072			4,072					4,072
Subsidies			292			292					292
Gross national income		638,306	320,862	-2,689	-339	956,140	-29,239	19,345	13,160	-3,459	955,947