Measuring financial sector output and its contribution to UK GDP
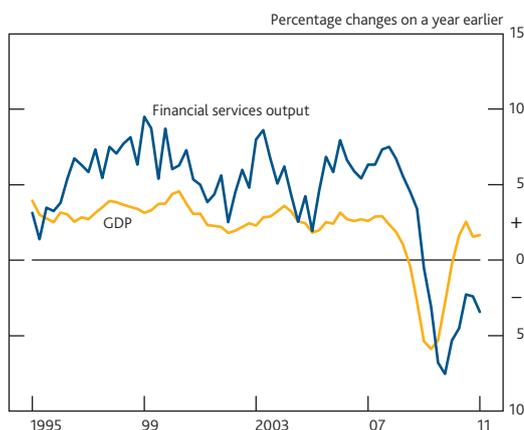
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In the decade before the financial crisis, the UK financial services sector grew more than twice as fast as the UK economy as a whole. But there are many conceptual difficulties associated with measuring output in finance. This article describes the contribution of the financial sector to GDP and assesses the uncertainty around recent estimates. There is some evidence that financial services output grew less quickly over the recent past than the official data suggest, although this probably had only a small impact on the rate of growth of overall GDP.

Introduction

In the decade before the financial crisis, measured output growth in the UK financial services sector[2] averaged over 6% per year, compared with overall UK GDP growth of 3% per year (**Chart 1**). The sector's share of the economy also grew significantly and by more than in most other major advanced economies (**Chart 2**).
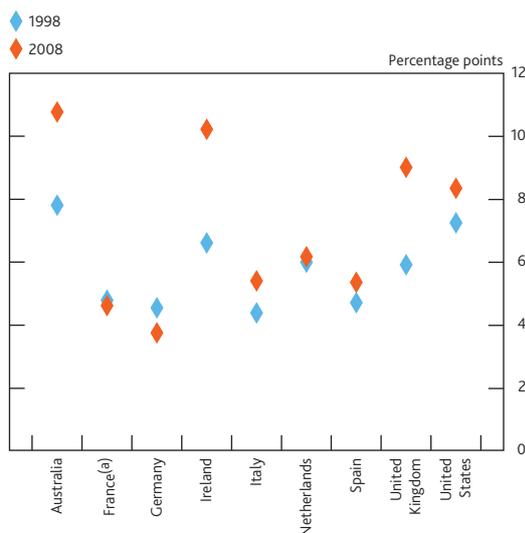
Chart 1 Financial services output

Chart 2 Share of nominal GDP accounted for by financial services

Sources: OECD, ONS and Bank calculations.

(a) Data for France are for the years 1999 and 2008.

Finding practical ways of measuring the output of financial firms accurately is challenging. That is a problem for all statisticians involved in measuring output in finance and not one specific to the United Kingdom. Financial services output data in the United Kingdom are compiled in accordance with international best practice, but care is often needed when interpreting them.

Policymakers need to understand the extent to which estimates of financial sector output may be subject to uncertainty.[3] First, they may want to assess the contribution

made by the financial sector to overall economic activity, especially at a time when there is an intense debate about the need for reform of finance. Second, data uncertainty could also create problems for measuring GDP itself, particularly in economies with large financial sectors.[4] Third, if the effect on GDP were large enough, it could create uncertainty in

(1) The author would like to thank Jeremy Rowe for his help in the production of this article.
(2) The box on page 237 explains how the 'financial services sector' is defined for the purposes of this article.
(3) See Ashley et al (2005) for more background on the Bank's work on data uncertainty.
(4) For example, Basu, Fernald and Wang (2008) argue that the GDP of Luxembourg could be overstated by as much as 11% because of current practice in output measurement in finance.

estimating the size of the output gap, or the potential growth rate of an economy.[1]

The analysis in this article finds that financial services output in the pre-crisis period was probably overstated. But much of this effect was concentrated in consumption of financial services by other production sectors, so would mostly be matched by understatement of value added in those sectors. Overall, it is unlikely that average annual GDP growth in the decade before the crisis would have been boosted by more than 0.1 percentage points as a direct result of difficulties in measuring output in financial services.

This article builds on previous Bank work by Haldane *et al* (2010). They explain why it is important from a financial stability perspective to be able to measure accurately the contribution of the financial sector to the economy, and why problems may be created by including compensation for banks' risk-taking in measured output. This article considers why measurement issues may also matter for monetary policy. It considers a range of potential difficulties, particularly those affecting real measures of output, and assesses their possible impact on estimates of overall economic growth.

The first section describes the growth of the financial sector in the United Kingdom in more detail. The second section explains some of the conceptual and practical challenges associated with measuring output in finance. The final section explains why it is likely that output was overstated prior to the crisis, and estimates what effect that might have had on growth in GDP.

The growth of the financial sector in the United Kingdom

The contribution of a sector to overall economic activity can be measured by its share in gross value added (GVA). **Table A** compares the growth of real GVA in the financial services sector with rates of GDP growth since 1856. The historical trends in financial sector growth are striking.

Table A Average calendar-year growth rates of real GVA

	Financial services	GDP
1856–1913[a]	7.6	2.0
1914–70[a]	1.5	1.9
1971–96	2.7	2.2
1997–2007	6.1	3.0
2008	5.0	-0.1
2009–10	-4.1	-1.6
1856–2010	4.2	2.0

Sources: Feinstein (1972), Mitchell (1988), ONS and Bank calculations.

(a) Data before 1920 include Southern Ireland.

In the 60 years before the First World War, GVA in the financial sector grew at an annual average of 7.6%, well above GDP growth. That probably reflected its small initial base, the increasing need for finance in the wider economy, legal changes such as the removal of restrictions on joint-stock banking (Davies *et al* (2010)) and the establishment of building societies.

Between 1914 and 1970 the sector grew more slowly than the rest of the economy, perhaps reflecting tighter government control, restrictions on the movement of capital or the increasing maturity of the industry. The more recent past has been associated with a second period of financial deepening, with output growing at over 6% per annum between 1997 and 2007.

Measured financial services output also grew strongly during 2008, in contrast with indicative surveys of financial sector output, which fell back at the onset of market disruption in mid-2007 (**Chart 3**). There was a sharp reduction in lending growth and the provision of some financial services to the rest of the economy around that time, but financial markets themselves were very active.

Chart 3 Financial services output and business surveys
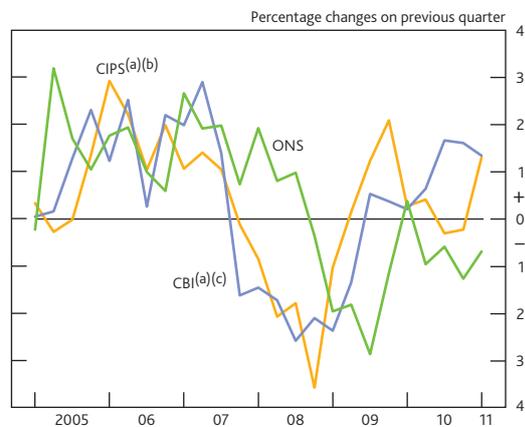
Sources: CBI/PwC, CIPS/Markit and ONS.

(a) Survey measures scaled to have the same mean and standard deviation as ONS series over the period 1996–2011.
(b) CIPS: Balance of firms reporting that business activity was higher than one month earlier; averaged across three months of the quarter.
(c) CBI: Balance of firms reporting that business volumes were higher than three months earlier.

From the beginning of 2009 onwards, the level of output in the sector fell sharply and continued to do so even as the rest of the economy recovered (**Chart 4**). By the end of 2010, it was 10% below its pre-crisis peak.

As the next section will explain, output in the financial sector is hard to define and measure accurately. Since it is important to

(1) See Benito *et al* (2010) and Section 3.2 of the November 2010 *Inflation Report* for more about estimating potential supply and how to estimate the extent of spare capacity in the economy. It is also important to note that measured output is not necessarily the best measure of the demand for resources that determines inflationary pressure: see Churm *et al* (2006).

have confidence in rates of economic growth observed in the past, the remainder of this article focuses on the period 1997–2007 when financial sector output grew rapidly.

Chart 4 Financial services output since 2007

Indices: 2008 Q1 = 100
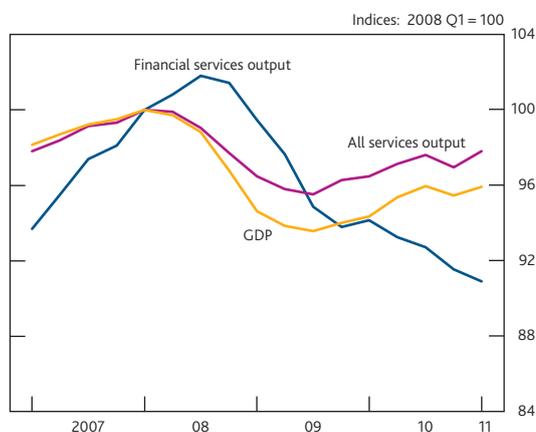
One reason to focus on this period concerns the behaviour of measured productivity. Although measured financial services output almost doubled between 1997 and 2007, there was barely any growth in financial sector employment (**Chart 5**). It is possible that productivity growth in the sector was very high (Haldane *et al* (2010) consider this possibility). But another possibility is that the national accounts, while compiled in accordance with international best practice, led to an overstatement of the sector's output growth. If that also had a material effect on overall GDP growth over that decade, that would be an important issue for policy both now and in the future.

Chart 5 Employment and output in UK financial services[a]

Percentage changes on a year earlier
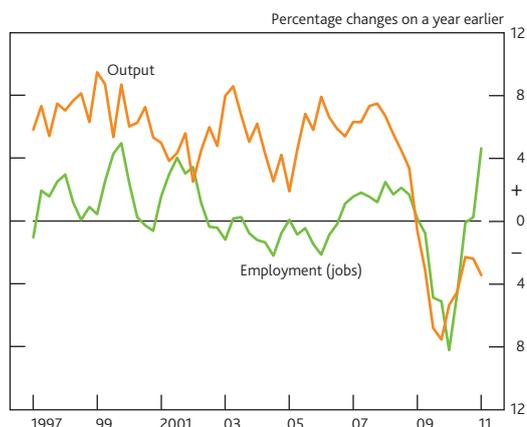
(a) Employment data are based on the SIC 2007 classification system, whereas the output data are based on the SIC 2003 system.

Table B shows the contribution of different financial industries to growth in real value added since 2000. Although banks and building societies (hereafter simply 'banks') account for only around 55% of the level of output in the sector, they

accounted for the vast majority of growth in the period before the crisis. The material in the next section therefore concentrates on output measurement in banking, rather than in finance more generally. A box on page 237 provides more detail about the composition of the financial services sector as a whole, and the main methods used to measure the output of the individual industries.

Table B Sources of financial sector growth since 2000

	Weight in financial services (2006 prices)	Average growth rates[a]		Contribution to financial services growth,[b] 2000–07
		2000–07	2008–10	
Banks and building societies[c]	57%	7.5	-4.7	4.2
Other financial intermediaries[c]	9%	6.9	3.5	0.6
Insurance and pension funds[c]	19%	-1.6	-0.3	-0.3
Auxiliary activities[c]	15%	4.4	3.3	0.7
Total financial services	100%	5.6	-2.1	

(a) Average annualised quarterly measures.
(b) Using time-varying weights.
(c) These data have been provided by the ONS and are not subject to the scrutiny applied to officially released national statistics. Although they are taken from the Index of Services data set, they may not be fully consistent with the series for total financial services.

The measurement of output in the banking sector

This section explains some of the challenges involved in measuring output in banking, before describing the recommended processes for addressing them in national accounts guidelines.[1] Many of the same difficulties arise when trying to measure demand for financial services by users — that is, viewing the problem from the expenditure side of the accounts rather than the output side, as this section does.

In many industries, it is straightforward to specify sensible measures of output. By contrast, formulating a satisfactory definition of 'output' in the financial sector is challenging, and remains an area of research and debate for both academic researchers and national accounts statisticians. The problem of formulating a satisfactory definition of output is not unique to financial services: it applies also to public sector output and the output of many non-financial business services, such as consultancy and advertising.

The discussion begins by describing difficulties that relate to all measures of bank output (real or nominal). It then outlines some problems that relate specifically to real measures of output, before explaining how these are used as the basis for calculating real GVA.

(1) Triplett and Bosworth (2004) provide a comprehensive treatment of many of these issues, reflecting on both the academic literature on banking output and on national accounts practice.

The composition of the financial services sector

Throughout this article, the 'financial services' sector is taken to be the set of firms that are classified under Division J ('Financial Intermediation') in the Standard Industrial Classification (2003) system.[1] Under this system, firms are classified into industries according to the type of goods and services they are mainly involved in producing, not by their ultimate ownership.

Within the financial sector, monetary financial institutions[2] — banks and building societies — account for around 55% of value added. Since they have been the main source of movements in output in the recent past, the article focuses more on issues of measurement in banking than in other

industries. The other 45% is accounted for by insurance companies and pension funds (around 20%) and a range of other financial intermediaries and auxiliary companies (around 25%). These weights are based on shares of value added in the base year (currently 2006). As **Chart 2** indicates, value shares can vary significantly over time.

Table 1 gives more detail about the types of firms in the financial sector, along with a summary of how value and volume indicators of output are constructed. The information below is based on Williams *et al* (2009) and the ONS's 'Methodology of the Monthly Index of Services',[3] which contain much more detail. Further information about the measurement of output in the banking sector is given in a separate box on page 240.

Table 1 The composition of the financial services industry

Financial services industry	Description and examples	National accounts division (SIC 2003)	Weight in financial intermediation (weight in GDP)	Examples of nominal value added indicators	Examples of real value added indicators
Monetary intermediation ('Monetary financial institutions')	Central bank; other banks; building societies.	65.1	57% (4.4%)	Indirect measures (FISIM); direct measures (fees and commissions; other operating income) — see box on page 240.	Deflated version of nominal value added. Direct measures are deflated by an adjusted earnings (AWE) measure for the sector.
Other financial intermediation	Finance leasing; non-bank credit grantors; bank holding companies; investment funds; unit trusts; securities dealers; factoring companies.	65.2	9% (0.7%)	FISIM used for non-bank lenders. Output of investment funds proxied by the value of funds under management.	Finance leasing based on capital stock of leased assets. Investment fund measures calculated by deflating nominal measure using suitable share index.
Insurance companies	Life assurance; general insurance; reinsurance.	66.01, 66.03	13% (1%)	Value of premiums earned less claims due, with technical adjustments.	Direct quantity measures such as (weighted) numbers of policies.
Pension funds	Autonomous schemes only.	66.02	5% (0.4%)	For privately run schemes this is the excess of contributions over payments, with technical adjustments.	Direct quantity measures such as (weighted) numbers of schemes.
Activities auxiliary to financial intermediation	Administration of financial markets; advisory services; fund management; miscellaneous other activities.	67	15% (1.1%)	Range of measures; generally volume measures are collected first and then reflated using earnings or share price series.	Range of direct volume measures such as number of members of funds being managed; number of transactions on particular exchanges.
Total financial intermediation	**Combination of the above.**		**100% (7.7%)**		

(1) SIC 2003 is the system currently used in the national accounts, though this is shortly to be updated to SIC 2007.
(2) Specifically, these are deposit-taking institutions. Not all financial institutions that describe themselves as 'banks' or 'investment banks' would necessarily fall under this heading: some would be classified under 65.2.
(3) See www.ons.gov.uk/ons/guide-method/user-guidance/index-of-services-methodology/source-data/business-and-finance.pdf.

Conceptual difficulties

Banks provide a number of important services to the wider economy:

(i)   payment, settlement and transaction services to depositors and borrowers;

(ii) intermediation, that is, transforming deposits from savers into funding for households, companies or governments who wish to borrow; and

(iii) risk transfer and insurance.

Banks' gross output is, in principle, just the sum of the output of each of these individual services. But some of them are easier to quantify than others.

In some cases it is possible to derive an intuitive measure of output. For example, where a bank charges a customer a fee for an overdraft or for a mortgage application, that can be treated as part of its current price output in the same way that overall turnover from car sales would be treated as the current price gross output of a car manufacturer.

But many of the above services are not charged for explicitly. An obvious example of this is transaction services provided to depositors. Many banks offer their customers automated payment facilities, bookkeeping services and safekeeping of money in exchange for a steady flow of funding for their own lending and investment activities.

Measuring the output of services associated with a loan also introduces conceptual difficulties. The actual transfer of funds is often a small part of the operation and in some cases could equally well be done through capital markets, without the need for an intermediary such as a bank. But a bank may provide services in other ways. For example, they may have a comparative advantage in screening and monitoring potential borrowers (Campbell and Kracaw (1980), Mester (1991)), through gathering information about their customers that is not available to other lenders. That might help their management of risk and generate a better allocation of capital across the economy.

But it is hard to quantify the benefits arising when banks use this additional information. Banks with better risk management practices should be regarded as providing higher-quality services, and therefore as generating higher output when they provide finance. But this activity is almost impossible to measure *ex ante*. Conversely, the impact of poor decision-making may only become apparent years later, and cannot easily be reflected in estimates of output when a loan is first made.

Computing real measures of output

In order to be able to calculate real GDP from the output side, it is necessary to find measures of real GVA for each industry.

This section explains some of the conceptual problems involved in finding real measures of activity for banks, beginning with the calculation of gross output.

In an ideal world, one would try to observe quantities that corresponded to banks' real output, in the same way that one might count the number of cars produced by a car manufacturer (taking account of improvements) to measure its real output. But for many services provided by banks, finding a suitable unit of output is difficult. Steindel (2009) gives a flavour of the potential complications when describing a bank making a market in a corporate stock:

'Even a very simple transaction…raises some complexity in determining the real activity involved. Is the unit of transaction a single sale of a block of shares, or the sale of one share? It certainly seems as if the sale of ten shares in one block involves no more physical services than a sale of one share…; however, the sale of multiple shares may also involve transactions with multiple buyers.'

Rather than trying to measure explicitly the actual quantity of services provided (or their prices), an alternative approach is to begin with a nominal measure of output and to deflate it using a suitable generic deflator, such as the GDP deflator or an average earnings series. This is often the most practical approach, given the amount of data required for the explicit quantity approach, and it is the one used in the United Kingdom and most other European countries. But it only provides a proxy for real output and could diverge significantly from an explicit quantity measure of activity, where that is also available.

For example Inklaar and Wang (2011) compare different methods for estimating the real services provided to depositors. The explicit quantity approach involves counting the number of transactions banks process in connection with customers' accounts, applying suitable weights to different types of payment. The alternative approach takes some indicator of the stock of deposits that customers hold, and applies a suitable deflator. Inklaar and Wang demonstrate that those two methods can provide substantially different answers for real services provided.[1]

GVA is calculated by deducting banks' use of inputs produced by other industries (their intermediate consumption) from their gross output. Although some information is available about banks' purchases of goods and services in current prices, they are not calculated in constant prices. So real GVA is

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(1) They find that in most countries, explicit quantity measures of depositor services would have outgrown the deflated balances measures in the years 2000–08. That could have major implications for cross-country comparisons of output and productivity in financial services. For example, the measures of real output produced by the US Bureau of Labor Statistics are based on direct measures, whereas most European countries, like the United Kingdom, use the deflated balances approach.

usually estimated by assuming that it is a constant fraction of banks' gross output.

Treatment of bank output in national accounts

Most of the data on the financial sector presented in this article are taken from the UK national accounts. These are compiled from data collected by both the Bank of England and the Office for National Statistics, and are produced in accordance with international best practice.[1]

While strict standards exist for best practice, it is important not to have unreasonably high expectations of any particular method of measurement. As the previous section demonstrated, even providing a theoretical basis for measuring output in finance is difficult. And finding measures that accord with a particular theoretical basis can often be challenging.

Statistical standards recommend a two-faceted approach to measuring banks' output. Where explicit measures of activity are available, such as banks' income from fees and commissions, those direct measures are to be included. For most of the services listed above, this is not possible, so in these cases an indirect method has to be used to proxy the output of the remaining services.

The main indirect measure of output used in the national accounts is known as Financial Intermediation Services Indirectly Measured (FISIM). It is calculated on deposits and loans, though not on securities, even though the boundary between them has become increasingly fluid. It is assumed that the output of all the implicit services associated with loans and deposits is captured in the margin that the bank makes on them.[2] The margin is calculated relative to a particular reference rate that is assumed to reflect the pure cost of borrowing. For most deposits and loans, the current practice in the United Kingdom is to use Bank Rate, though other alternatives, such as Libor or an index of bond yields, could be used instead. The precise choice of the reference rate can have a material impact on the estimated level of output and how its consumption is allocated to different sectors.

Despite the uncertainty involved with using FISIM to impute the output of bank services, it is still a useful exercise because the alternative would be not to reflect these indirectly measured services anywhere in GDP. That would clearly understate the contribution of the sector.

Dealing profits and losses on assets held by banks are not treated as output, consistent with the treatment across the rest of the national accounts. Trading activities affect measured output only to the extent that customers are paying fees and commissions for investment services, or that banks making a market for an asset may buy or sell at a price that is not the market mid-price. For example, where a bank sells foreign currency to a customer and takes a margin over the

market exchange rate, those net spread earnings are considered to be output.

A more complete explanation of methodologies used in measuring output in the banking sector is given in the box on page 240.

The effect of data uncertainty in the pre-crisis period

Having identified the main difficulties in measuring output, this section explains why the contribution of the financial sector might have been overstated in the decade before the crisis. It also shows that this is unlikely to have had a major impact on overall GDP growth over that period, though that judgement is subject to uncertainty.

Since the object of the exercise is to evaluate the potential impact on *real* GDP, the discussion focuses on problems in measuring *real* output in the financial sector.

Specific issues concerning pre-crisis estimates of financial services output

Following the distinctions made in the national accounts, this section begins by considering indirect measures of output (FISIM), before discussing direct measures. On the whole, indirect measures are more subject to measurement problems because they may only be a very rough proxy for the services they are intended to capture. The final part of the discussion considers possible bias in the opposite direction from incomplete coverage of the financial sector.

The discussion on FISIM identifies three potential issues that may have led to an overstatement of financial sector output before the crisis: the effect of choosing a particular reference rate; possible problems with deflating; and the difficulty in measuring quality changes.

Indirect measures: (a) choice of reference rate

The calculation of FISIM on loans and deposits relies on the specification of a reference rate. Any margin that a bank makes relative to that rate is assumed to be an implicit payment for a service. For most lending, a risk-free rate such as Bank Rate is chosen as the benchmark.

The approach of using a risk-free rate has been criticised by some commentators (Colangelo and Inklaar (2010), Haldane *et al* (2010), King (2010)). They argue that the services provided by financial intermediaries do not involve the bearing of risk, as that is not a productive activity. Therefore

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(1) UK national accounts are produced in accordance with the guidelines in the European System of Accounts, which are legally binding. In most respects the standards are similar to those laid down in the United Nations System of National Accounts.
(2) A more formal motivation for this approach is that the margin represents the user cost to the bank of a particular liability or asset. The theory behind this is described in Hancock (1985) and Fixler and Reinsdorf (2006).

The measurement of output in the banking sector

The box on page 237 summarises some of the measures used to calculate nominal and real output in the financial sector as a whole. This box focuses on the measurement of output in the banking sector.

Banking sector output is divided into four main components:

(1) **Fees and commissions receivable** (30% of gross output).[1] This direct measure of output includes all the fees banks obtain from investment banking activities (underwriting, brokerage, advisory services), fees associated with loans and advances and current accounts (eg credit card, mortgage and overdraft fees) and commissions associated with sales of insurance products by banks. To provide a volume indicator, these revenue data are deflated using the AWE series for the financial services industry, excluding bonuses and adjusted for changes in productivity.[2] This assumes that price changes in an industry can be proxied by the part of pay growth that is not accounted for by productivity improvements.

(2) **Net spread earnings** (10% of gross output).[1] This is a measure of service income provided by banks involved in dealing activities. It captures earnings that banks receive by undertaking transactions at prices above or below the mid-market price; for example, the sale of foreign currency to a consumer at a favourable rate to the bank. These earnings can be generated on securities and derivatives as well as on foreign exchange. Net spread earnings are deflated in the same way as fees and commissions.

(3) **Other operating income** (20% of gross output).[1] This component includes rents received by banks and other miscellaneous sources of income. These revenues are deflated in the same way as those from fees and commissions.

(4) **Financial Intermediation Services Indirectly Measured (FISIM)** (40% of gross output).[1][3] This measure uses the margin between the interest rates offered by banks and an assumed reference rate to impute a service charge for all the valuable activities of banks that cannot be measured directly. Akritidis (2007) provides a comprehensive account of how this has been implemented in the United Kingdom.

Consider a personal loan of £1,000 that is priced at 10% and assume that the reference rate (in this case Bank Rate) is 5%. The imputed service charge on this loan (over one year) is given by:

Loan FISIM = (10% – 5%) * £1,000 = £50.

A similar concept applies to customer deposits. If another customer placed £500 in a bank account at a rate of 3%, the service charge (over one year) would be:

Deposit FISIM = (5% – 3%) * £500 = £10.

The margin on the account is assumed to give some idea of the value the customer attaches to the services offered by the bank. Suppose the 3% rate above was being offered by an ordinary high street bank. If the customer were to move the deposit to an internet account paying 4.5%, then the FISIM on the deposit would fall to £2.50 per year. The difference (£7.50) gives a measure of the value the customer places on being able to walk into a branch and use the extra services available there.

The calculation of volume measures for FISIM is more complicated. The spread (5% in the loan example above) is assumed to be the price of the implicit service, and the size of the loan or deposit is an indicator of the volume of services provided. So to produce a constant price measure, the spread is held fixed at its base-year value. A further adjustment is necessary because the stocks of lending and deposits themselves tend to grow over time with inflation. Hence there is an additional deflation process whereby the stocks are revalued using the GDP deflator (adjusted to exclude FISIM). Specifically, the real FISIM on the loan described above is given (over one year) by:

$$\text{Real loan FISIM} = \frac{(\text{Spread over Bank Rate in base year (2006)}) * \pounds1{,}000 * \text{GDP deflator in base year}}{\text{GDP deflator in current period}}$$

Of course, it is impractical to calculate FISIM for individual loans and deposits. Instead an average rate and a total stock are calculated for each sector of the economy that banks transact with. This enables the provision of services to each part of the economy to be computed. More information about this is given in the box on page 243.

Changes in the spreads on lending and deposits therefore have no impact on changes in real FISIM, or on real GDP growth.[4] Changes over time in the real measure of FISIM are determined mainly by growth in the stocks of loans and deposits on banks' balance sheets. Money and credit growth in excess of final output price inflation will therefore tend to raise the imputed value of services.

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(1) These figures for the gross output shares in 2006 exclude the contribution of building societies.
(2) Williams *et al* (2009) explain the motivation for excluding bonuses.
(3) It is sometimes stated that FISIM is around two thirds of banking sector value added. While true in an arithmetic sense, this is somewhat misleading. FISIM accounts for 40% of gross output, and it is only two thirds of value added on the basis that intermediate consumption by the banking sector is all netted off from the other 60% of output. But those intermediate inputs are used in banks' production processes to produce all of their output, including the FISIM element.
(4) Strictly speaking this is true only in recent years. When the base year for the national accounts is updated, estimates of real growth prior to the base year are affected by changes in the weights (which depend on the spreads) and on annual chain-linking.

they argue that although risk is unobservable and difficult to measure, the margin used to reflect banks' service provision should exclude some measure of risk premia. Such an approach would mean using a reference rate that reflected risk, implying a much lower margin being used in the imputation for nominal output of most lending services.

Because the spread between the lending rate and the reference rate is treated as part of the price of FISIM, such a change would have no direct effect on the growth of real financial sector output, which is measured from balance sheet stocks (see the box on page 240 for more details). It would, however, have the effect of reducing the weight of the financial sector in overall GDP. Colangelo and Inklaar (2010) calculate that, for the euro area, using a reference rate that fully reflected risk premia would reduce total FISIM by up to 40%, and the level of GDP by up to 0.3 percentage points.[1] If the relative size of the adjustment were the same in the United Kingdom as in the euro area, it would lower the weight of financial services in UK GDP from 7.7% to 6.1%.[2]

Indirect measures: (b) deflating to produce real output
Real FISIM reflects the size of banks' stocks of loans and deposits. The stocks are adjusted for the effects of inflation, using the GDP deflator, but further growth in the stocks is assumed to reflect higher real service provision.

The period just before the financial crisis was characterised by growth in money and credit in excess of final output price inflation. There is, therefore, a risk that some of the growth in balance sheets was reflected in higher estimates of real service provision (on both lending and deposits), when it might have been better treated as an increase in prices. For example, the number of mortgage approvals made might be one alternative (quantity) measure of some of the services provided to borrowers by banks. The total number of approvals was relatively stable between 2002 and 2007, suggesting little change in output, but the stock of mortgage lending deflated by the GDP deflator rose by almost 60%.

A similar alternative approach would be to use a house price index to deflate the stocks of mortgages on banks' balance sheets.[3] That might have given a more plausible answer for the growth in real service provision in the years before the crisis, though it might not do so in all circumstances. It could also be argued that as the average size of banks' loans increases, they may have to carry out more screening and monitoring work.

Indirect measures: (c) difficulties in quality adjustment
Although FISIM is intended to capture, among other services, the value of banks' screening and monitoring activity, it is at best only a proxy measure for that work.

It became obvious during the financial crisis that some banks had reduced the effectiveness of their screening and

monitoring services in the preceding years. In a perfect world, that would have been reflected in slower growth in value added in earlier periods. But because it is only possible for national accounts to estimate these services from spreads and the size of banks' loan books, there was no way — at least *ex ante* — that the national accounts could have shown this. The size of this effect is almost impossible to quantify, partly because FISIM is meant to capture other unpriced services, not just banks' screening and capital allocation decisions. But it is conceivable that the value of many bank services may actually have fallen during the pre-crisis period.

Direct measures of output
Direct measures of output are probably subject to less uncertainty than estimates of FISIM. But it is possible that there may have been one-off factors boosting these revenues prior to the crisis.

As explained in the previous section, trading gains are not themselves considered to be output. But it is possible that the prevailing market conditions at the time helped to raise measured output by other means (Weale (2009)). They may have enabled banks to invent new products, such as complex structured derivatives, on which they were able to earn additional fee income. Buoyant household demand for credit would also have increased banks' income from credit card, overdraft and mortgage fees.

This need not necessarily imply that these measures were overstated before the crisis: they accurately reflected rising revenues in banking, and the additional output would have required workers and capital to produce it. But it may be a reason to expect those direct measures to grow more slowly in the long term than they did in the years just before the crisis.

Potential sources of understatement
But there are also reasons to think that growth before the crisis might have been understated. For example, the national accounts coverage of the financial sector is only partial (Williams *et al* (2009), Davies (2009)), and it is possible that official statistics failed to capture output in industries that were growing rapidly, such as those in the 'shadow banking system'.[4]

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(1) A Eurostat Task Force on FISIM is currently reviewing the choice of reference rate, as well as other methodological issues.
(2) These weights are based on data from 2006 (the current national accounts base year).
(3) Inklaar and Wang (2011) explore the impact for the United States of using a house price index rather than the GDP deflator to adjust balance sheet stocks. Deflating by a house price index would have given a lower growth rate of real imputed services over the pre-crisis period.
(4) For example hedge funds are outside the scope of ONS surveys, and assets under management in London hedge funds grew by an average annual rate of 47% between 2000 and 2007 (IFSL (2009)). Until 2010 Q1 there was also only partial coverage of banks' off balance sheet vehicles. So the services associated with some loans that had been securitised would not have been included in GDP data. Ashcraft and Steindel (2008) estimate that, for the United States, similar problems might have led to imputed output being understated by more than 10%. For more information about the impact of securitisation on UK banking statistics, see Burgess and Janssen (2007).

That would have two consequences. First, the fact that some industries were missing would be one reason to think that the sector's share in overall value added was understated. Second, to the extent that they might have grown more quickly than the rest of the financial sector, output growth in finance could actually have been higher than measured. The size of this effect is very uncertain, given the lack of data.

On balance, it is probably the case that real output growth in the sector was overstated and also boosted by temporary effects. But it is important to note that there could also be sources of bias in the opposite direction.

Impact on past estimates of GDP growth

This section considers whether overstatement of financial sector output in the decade before the crisis could have had a material effect on overall rates of GDP growth. Although financial services only make up a relatively small part of the economy (**Chart 2**), measured output grew rapidly over this period, so large errors might have been possible.

The analysis here suggests that the effect of data uncertainty was fairly small, probably adding no more than 0.1 percentage points to average annual GDP growth over the decade before the crisis. The estimates are of a similar order of magnitude to those of Steindel (2009), who estimated upper bounds for the possible effect of output overstatement in finance on US GDP growth in the years before the crisis.

## Sources of growth in demand for financial services

To assess the impact of possibly overstated financial sector growth on overall GDP, it is also necessary to analyse the demand for those services in the expenditure side of the accounts.

It is not necessarily true that an over or understatement in measuring output growth in one sector must automatically lead to an over or understatement in measuring overall GDP growth. If the difficulties relate to output demanded by final consumers (households and the rest of the world),[1] then there will be an impact on overall GDP growth. But if the difficulties relate to output demanded by other firms, and their own gross output is unaffected, then there need not necessarily be any impact on overall GDP growth. The composition of GDP growth might, however, be affected.[2]

In practice, the output and expenditure estimates of GDP never match exactly, because they are compiled from different data sources and each produces estimates that, like all statistical estimates, are subject to errors and omissions. The ONS therefore applies judgement in order to provide its best estimate of GDP growth, which in some years may mean aiming off the output measure.[3] Also, no data are published on real intermediate demand, so this has to be calculated by residual. So this exercise should be regarded as illustrative.

Chart 6 shows that around 60% of the additional demand for UK financial services in the decade before the crisis came from final demand (consumption and net exports), with about 40% being accounted for by intermediate demand.[4] The rapid growth in demand for financial services did boost GDP growth in the United Kingdom.

Chart 6 Estimated contributions to annual growth in overall real[a] demand for UK financial services
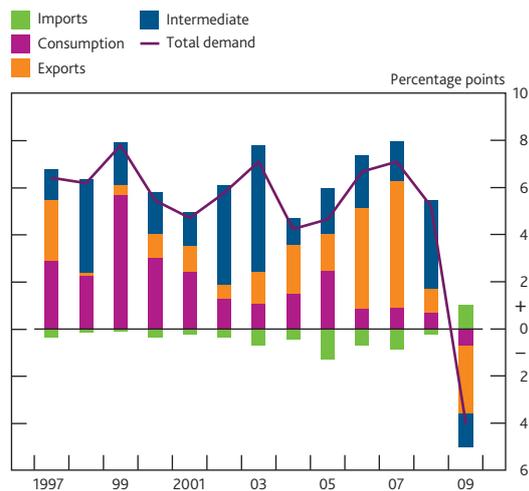
(a) These estimates are not based on fully balanced production accounts, which are only available in current price terms. The methodology used is explained in the notes to **Table C**.

But the sources of bias described earlier are likely to be concentrated in particular components of output. There is reason to suspect that indirect measures of output are subject to more uncertainty than direct ones. And many (though not all) of the problems described in the previous section relate to the provision of lending services. Because those are dominated by loans to businesses and loans for house purchase,[5] they are far more likely to be concentrated in intermediate demand (the blue bars), not final demand.[6] Any overstatement of those services would affect only the composition of GDP growth, not its rate.

(1) The government sector is also a final consumer, though its consumption of financial services is negligible.
(2) Strictly speaking this is only true when national accounts are prepared under double deflation methodology, so that problems in measuring intermediate demand are offset elsewhere in the national accounts. This is not the current practice in the United Kingdom, so there could be some spillover effects to real GDP from overstatement or understatement of intermediate demand for financial services. In the calculations in this article, these effects are assumed to be small.
(3) See, for example, page 92 of the 2010 *Blue Book* for more information about particular adjustments recently applied to the output side of the accounts.
(4) This contrasts with Steindel's (2009) result for the United States, where he finds an increasing share of banking sector gross output being consumed by other businesses.
(5) The reason that mortgage lending is treated as intermediate consumption rather than final consumption of financial services by households is explained in more detail in the box on page 243. Mortgage lending accounts for 85% of the stock of lending to individuals.
(6) This also means that some of the 'shadow banking' activity that fell outside the scope of output estimates would have been missing from intermediate demand, rather than from final demand. So this could have led to some downward bias in financial sector output, and upward bias in the GVA of non-financial firms that were using services from the shadow banking system (such as commercial borrowers whose loans had been securitised).

Intermediate and final demand

Firms involved in production use the economy's endowment of resources (land, labour and capital) to produce output. They also rely on the provision of goods and services by other producing firms, which may be used as inputs in their own production processes. Any attempt to quantify the value of economic production in a given year cannot simply add the total turnover (output) of all industries in the economy, because intermediate inputs will be double counted.

A fully balanced set of national accounts takes into account both the gross output of firms and their intermediate consumption, and calculates their gross value added as follows:

Gross value added of industry A = Gross output of industry A – Intermediate consumption by industry A.

GDP is then defined to be the sum of gross value added (not gross output) across all producing units within an economy. A similar relationship also holds on the demand side, where GDP is also the sum of final demand across all industries:

Demand for output of industry A = Intermediate demand from other firms + Demand from final consumers.

The ONS publishes annual Supply-Use tables (Mahajan (2006)) which make these relationships explicit: demand for each product is decomposed into demand from households, government, the rest of the world and other firms; and the input structure of individual industries is estimated.

Financial companies sell a significant proportion of their output to other businesses. According to the 2008 Supply-Use tables, around 40% of financial services were consumed by other firms (this figure includes mortgage lending: see section below), with the remaining 60% being consumed by other sectors: 32% by UK households and 28% by the rest of the world. It is this latter 60% that is accounted for in final demand and hence in GDP. The other 40% represents part of the gap between output and value added in other industries.

Much of that intermediate business occurs with other financial firms. That is captured to some extent in the Supply-Use tables. But it is of little consequence for the measurement of overall value added because the net service provision by the financial sector as a whole is unchanged.

The article considers the possibility that there may have been periods in the past when output in the financial sector was overstated. If true, then GDP would only be affected to the extent that this occurred in final demand for financial services — essentially consumption and exports. If it were just the intermediate sales to other businesses that were too high, then the only impact would be a greater deduction from gross output in some other industries and a change in the composition of value added across the economy — but not on its overall level.

Production of housing services

One further remark is needed about the treatment of residential mortgages. The national accounts conventionally assume that owner-occupied households are engaged in 'production' of their housing services, in the same way that landlords offer a flow of housing services to their tenants in exchange for rents. So services associated with borrowing for house purchase (primarily mortgage fees and FISIM on the outstanding stock of mortgages) are actually classed as intermediate consumption by another industry, not as consumption by the household sector. Therefore the majority of bank lending services to households do not directly contribute to GDP.

However, any services associated with unsecured lending (credit cards, personal loans, overdrafts) are still treated as final consumption, as are all imputed services to households who hold deposits.

Table C decomposes growth in demand for financial services in the pre-crisis period into demand for directly and indirectly measured components of output, as well as intermediate and final demand. The entries show the growth rates of particular components, with the contributions to overall growth in demand for financial services in brackets.

Table C Estimated average annual growth in sources of real demand for financial services, 1997–2007 (contributions to total in parentheses)

	Total demand, of which:	Intermediate demand (services to other businesses, including residential mortgages)	Final demand (exports, services to households other than residential mortgages)
Demand for indirectly measured components (FISIM)	8.8 (2.0)	8.1 (0.9)	9.8 (1.1)
Demand for directly measured components	5.2 (4.0)	3.6 (1.5)	7.0 (2.5)
Total demand	6.0	4.7 (2.4)	7.5 (3.6)
Memo: overall growth in real (calendar year) GDP			2.9
Weight of financial services in GDP (simple average 1997–2007)			0.07

Notes: Fully balanced production accounts are only published in current price terms and no data are available on real intermediate consumption, so these calculations rely on certain assumptions. Consumption of financial services by government and non-profit institutions is assumed to be negligible. The intermediate consumption component is calculated by residual, and hence may implicitly include small chain-linking effects, because they are derived from chain-linked output and expenditure series. In order to reconcile properly output data at basic prices with expenditure data at market prices, an adjustment for taxes and subsidies on production is applied by taking a proportion of the ONS's basic price adjustment corresponding to the financial sector's share in GDP.

Sources: Bank calculations, based on estimates and ONS data.

The top row shows that FISIM grew rapidly over the decade before the crisis, with intermediate and final demand for those services both contributing about the same to overall growth. Demand for these indirectly measured services accounted for around a third of total growth in demand for financial services. For the non-FISIM components, which accounted for the remaining two thirds, final demand grew around twice as fast as intermediate demand.

Sensitivity of past estimates
Table C can be used for sensitivity analysis to estimate how average annual GDP growth would have been affected in the ten years before the crisis under different assumptions about financial sector output. This is done by constructing simple alternative scenarios and assessing how final demand (in the right-hand column) would have been different. The weights of those components in GDP are then used to estimate the effects on overall economic growth.[1]

If the demand for all financial services had grown in line with GDP in the ten years before the crisis, GDP growth would have been 0.3 percentage points per year weaker on average. But that alternative scenario is likely to be an extreme one.

The right-hand column of the table shows that around two thirds of growth in final demand was accounted for by directly measured services (ie not FISIM).[2] If the true value of

those services had grown by only half as much as the national accounts suggest, then GDP growth would have been 0.15 percentage points per year weaker on average. But there is no reason to suspect that those services were particularly poorly measured, albeit that they might have grown at an unusually rapid rate in the pre-crisis period.

As discussed earlier in the section, the indirect measures are more likely to be subject to measurement difficulties. For example, if part of the FISIM on loans was imputing the screening and monitoring services offered by banks, it could be argued that it should have been falling over the pre-crisis period, not growing rapidly.

If real FISIM had actually not grown at all during the 1997–2007 period, then GDP growth would have averaged 0.15 percentage points less than it did. That is probably an overestimate, because FISIM also proxies for other valuable services, such as processing customer payments, many of which increased.[3] If instead the true growth of real FISIM had been half what is currently stated in the national accounts,[4] the effect would have been to reduce average annual GDP growth by around 0.1 percentage points over the 1997–2007 period. Given the huge uncertainties involved, this figure should be treated as a very rough upper bound.

Wider effects of growth and contraction in the financial sector
This article has shown that the direct effect of measurement difficulties in the financial sector on past GDP growth is likely to have been relatively small. But to some extent it has only been a partial analysis. There may be other channels, not considered in this article, through which changes in activity in the financial sector could affect the wider economy.

First, there may be supply chain effects that have not been considered explicitly. Financial institutions are consumers of goods and services from other sectors, such as utilities, legal and accountancy services, and output in the financial sector may have an impact on overall demand for those services.

Second, financial deepening can have more general effects on non-financial firms, by influencing the cost of transactions, the allocation of capital in the economy and the availability of credit and working capital. It may also influence the ease with

(1) A maintained assumption throughout the analysis is that the ratio of GVA (which is what is most relevant for GDP) to gross output (which is shown in **Table C**) in the industry is relatively stable over time.
(2) The analysis in this final section relates to the whole of the financial services sector, so in this context the 'direct measures' also include growth in non-bank industries. But, as **Chart 4** shows, most of the growth over the 1997–2007 period was driven by banks.
(3) Data from the 'Red Book' published by the Bank for International Settlements show that the number of direct debit and credit transfer payments processed by UK banks rose significantly over the period, though this was partly offset by a fall in the number of cheques processed.
(4) Another way to motivate this counterfactual would be to note that Colangelo and Inklaar (2010) recommend changing the reference rate for the FISIM calculation in a way that would roughly halve its level (though not necessarily its growth rate).

which new businesses can be started up. These effects are discussed in more detail by authors such as Levine (2005), Rajan and Zingales (1998) and Benito *et al* (2010).

Third, because labour productivity in financial services is around double that in the rest of the private sector (Weale (2010)), a change in the proportion of the labour force working in financial services could also have an impact on aggregate output and productivity. For example, a rebalancing of the economy away from financial services might not be neutral for measured GDP. However, because the employment share is small (around 3.5%) and the higher productivity in the sector may partly reflect worker-specific characteristics (eg their level of qualifications), any effect on measured GDP would probably be relatively minor.

Conclusion

In the decade before the financial crisis, the financial services sector grew at more than double the rate of the UK economy as a whole. Measured output also grew strongly during the financial crisis, before falling back sharply.

However, this article has illustrated that defining and collecting suitable measures of output in financial services is not straightforward. Users should not have unreasonably high expectations of some of the proxy measures that have to be used to estimate output in the sector.

It seems likely that the conventions used in the UK national accounts probably did flatter the contribution of the financial sector in the pre-crisis period. But the effect of those distortions on overall rates of GDP growth in the past is likely to have been relatively small.

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