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A progress report on ABS investigations into FISIM in National Accounts, Consumer Price Index and Balance of Payments.

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1. Introduction: FISIM in ABS Macroeconomic Statistics

The concept of Financial Intermediation Services Indirectly Measured (FISIM) in national accounts statistics was introduced in the 1993 System of National Accounts (1993SNA). Diagram 1 sets out the relationship between bank interest charges and the SNA concept of interest. ABS implemented the concept in the Australian System of National Accounts (ASNA) in 1998, with some minor modifications to scope and reference rates as set out in the 1993SNA. The FISIM concept was implemented also in the Balance of Payments (BoP), although not required by the Balance of Payments Manual edition 5 (BPM5), for coherence between major macroeconomic datasets.

Diagram 1.

1993 SNA : Interest and FISIM
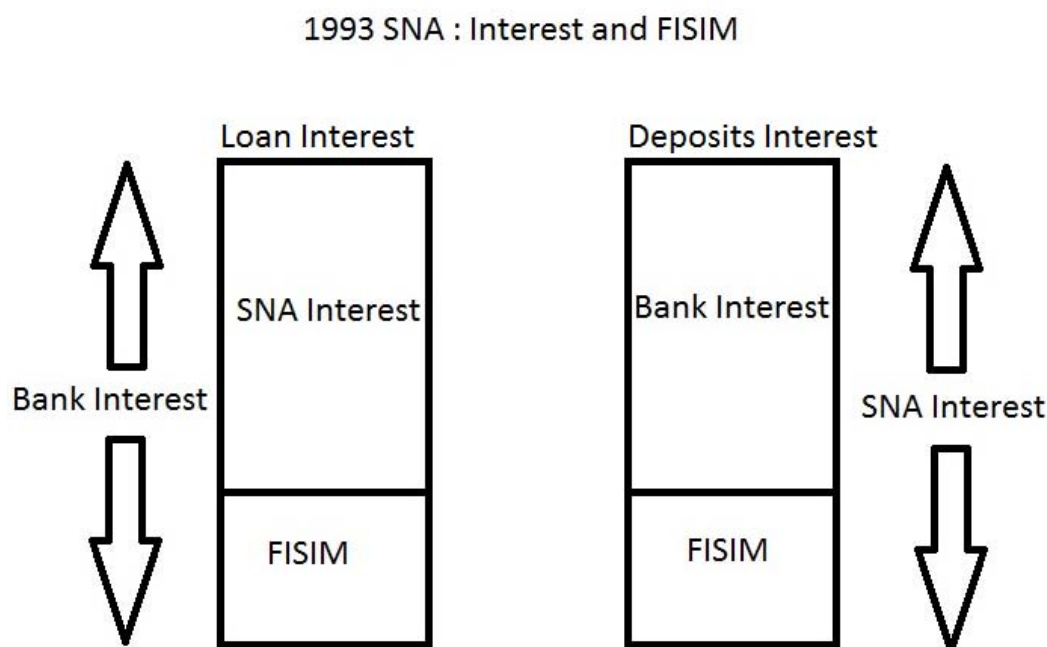
FISIM is a service charge that is bundled with loan interest receipts by banks, and is added to deposit interest payments by banks.
SNA calls the payments bank interest and the components SNA interest and FISIM.

The ILO, IMF, OECD, Eurostat, UN and World bank *Consumer Price Index Manual Theory and Practice* (the ILO Manual) of 2004 recommended the inclusion of FISIM in both the *reference aggregate #1* (for CPIs compiled on an outlays basis) and *reference aggregate #2* (for CPIs compiled on an acquisitions basis). See ILO manual paras 14.59-14-62. After a period of experimentation from 2000, the ABS included FISIM in the 15th series CPI from 2005 consistent with the ILO Manual reference aggregate #2.

The ABS has been considering the introduction of FISIM estimates in the Producer Price Index (PPI) statistics to complete the coverage of FISIM in macroeconomic statistics (see ABS paper for the Voorburg Group meeting in 2010).

There is a description of the method of estimation of FISIM in the CPI in the appendix to this paper. The national accounts method is similar. Of course the CPI estimates are for household consumption only, whereas the national accounts estimates total production of FISIM, final consumption by households and government and intermediate consumption by other sectors. The estimates of exports and imports of FISIM are undertaken by ABS Balance of Payments statisticians. However, the calculation of FISIM in the international accounts is on reported income flows payable on bank borrowing and lending in each currency, rather than reported asset and liability stocks to ensure that calculated FISIM is consistent with reported income. The methodology for calculating FISIM for each currency by income flows is:

[(Loan rate - reference rate) * interest flow on loan/loan rate] + [(reference rate - deposit rate) * interest flow on deposit/deposit rate]

2. FISIM and the Global Financial Crisis (GFC)

Although the inclusion of FISIM in these datasets achieved conceptual consistency, the data sources used to compile the estimates in each dataset were very different. The FISIM series in ASNA and BoP had been well behaved through a long period of steady growth in Australia but became difficult to interpret from late 2008. Reviews of FISIM in the ASNA and BoP identified better data sources and processes and some revisions resulted. However, the methods employed were confirmed.

It should be noted that the changes in FISIM standards between the 1993SNA and the 2008SNA had little impact on ABS FISIM methods because the decisions about some scope questions that ABS had undertaken in 1998 anticipated the revision to the standards. Additionally, the pragmatic choice by ABS of a reference interest rate midpoint between prevailing deposit and loan rates provided some insulation from the impacts of interest rate movements that characterised the global financial crisis, by comparison with some exogenous reference rates such as the interbank lending rate.

At the same time as the ASNA and BOP FISIM reviews were taking place, the FISIM series in the CPI were behaving unpredictably. The CPI was also due for one of the major periodic reviews. The 16th series review was commenced and it became clear that many users were not satisfied with the behaviour of the FISIM series and the impact it was having on the headline results. A significant portion of the research effort in the 16th series review has been devoted to investigating issues to do with FISIM. This paper shows the outcomes so far of those investigations. Many of the findings are relevant to measurement of FISIM and its decomposition into prices and volumes for both national accounts and balance of payments.

Misbehaviour of series... "volatility"

The main challenge for ABS in interpreting volatility exhibited by series in reaction to the events of the GFC was determining if the volatility was some statistical artifact induced by errors of concept, method or data source or reflecting a real-world phenomenon. Following the reviews mentioned above the conclusion reached was that the GFC resulted in a repricing of risk reflected in changing spreads in credit markets that continue to impact data series, that is the GFC-induced volatility was largely a pricing effect, not a volume effect. Observation of both national accounts and CPI FISIM estimates show steady *volume* changes and volatility in the *price* series. This is consistent with observations of inputs of capital and labour to the financial services industry which likewise showed steady volume changes over the period.

This conclusion is not supported by work by Baso, Wang, Inkelaar et al that resulted in a number of discussion papers contributed to various fora by the ECB, for example STD/CSTAT/WPNA(2008)4 "An Enhanced Methodology of Compling Financial Intermediation Services Indirectly Measured (FISIM)" presented to the 2008 meeting of the OECD WPNA. This work suggests the estimation method adopted by the 2008SNA incorrectly includes elements of default risk and term risk, i.e. the concept of FISIM requires clarification and improvement, and therefore the methods used and estimates currently produced are incorrect. Further, by excluding default and term risk, volatility would be much reduced.

The ABS has two concerns with this proposition -
- The first is that the discussion has not considered, until recently, the price and volume dimensions as mentioned above. Instead it has concentrated on unacceptable volatility in the nominal measures only.
- The second is that FISIM is a component bundled with another SNA concept, interest. Any redefinition of FISIM <u>requires</u> a redefinition of interest, refer to diagram 1 at the head of this paper. A conceptual reconsideration of interest and its role in the national accounts has not been on the agenda, and cannot be taken as a by-product of a decision on FISIM. At this point the ABS is inclined towards inclusion of compensation for default and term risk as intermediation services rather than interest property income, which can be thought of as the opportunity cost of money.

FISIM and Macroeconomic Performance Indicators

The ABS, like many statistical agencies, has been the subject of criticism about volatility of FISIM. However, it has been the CPI FISIM estimates, not so much the national accounts, that have been criticised. One possible reason for this is that the CPI results are linked to monetary policy settings more strongly than most macroeconomic statistics are linked to other performance measures in Australia. The use of official statistics in regulatory regimes creates heightened expectations and scrutiny of accuracy, revisability, transparency and forecastability. These factors have certainly been drivers for the criticisms of FISIM in the CPI. Another example is the forthcoming Basle 3 banking regulation arrangements where the capital adequacy of banks is to be linked to macro measures of credit and GDP. It is of interest to note that in the EU the linkage of some measures of performance to <u>nominal</u> GDP and revenue contributions to <u>nominal</u> GNI may be the source of the focus on the nominal measures of FISIM. From a purely national

accounting quality point of view, steady FISIM volumes with volatile price movements are a reasonable explanation of the GFC phenomenon. However, the use of nominal performance indicators means unpredictable regulatory outcomes, even when the national accounts, or in Australia's case the CPI, are telling a reasonably accurate and coherent story in turbulent times.

3. Some Conclusions and possible directions for ABS research into FISIM

Lessons and conclusions drawn from the review of FISIM in the CPI

The Appendix lists the results of a number of investigations into criticisms made about the ABS' inclusion of FISIM in the CPI.

One set of conclusions from this work relates to **detail and complexity**. The degree of disaggregation required in the source data to calculate effective rates and possibly adjust for differential impacts on results of fixed rate products is significant. Another set of conclusions, that also contribute to complexity relates to **sensitivity to small changes** in relative interest rates and small data errors.

Thus simplicity, and therefore cost of compilation and data provision, cannot be traded off against accuracy.

The choice of a **reference rate**, or indeed the question of multiple reference rates, is not clear in the absence of consensus about what constitutes interest versus services, accounting for the cost of wholesale funds, and decomposition of nominal measures into price and volume components.

The **measurement of cost of funds** is a significant conceptual and methodological task in itself. Investigation and agreement is needed on issues such as whether to take into account market yield changes, hedging strategies, non-performing loan allowances and write backs, and the treatment of securitisation.

Possible directions for the ABS research into FISIM

Given that **conceptually** FISIM belongs in national accounts, balance of payments, and prices economic series and cannot be left out credibly there are a number of methodological and data investigations that are needed.

Methodologically there are a number of issues we are pursuing, including:

(a) Measurement of FISIM in aggregate by observing margins. Such investigations will include the appropriateness of including the cost of wholesale funds in margins, investigation of whether debtor or creditor approaches for the measurement of bank interest are appropriate, and the impact the bad debt write off, write down and write back may have on FISIM calculations. The

aim is to provide an estimate of total FISIM output by banks independently of the choice of reference rates.

(b) The use of a reference rate as an allocator of total output derived in (a) above to borrowers from banks and depositors with banks.

(c) Investigation of possible alternative methods for price/volume decomposition other than the indexed base period balances method currently used.

(d) Transparency of methods and forecasting is important

Data Sources require improvement and quality assurance

(a) Data needed is dependent on methods requirements (see above).

(b) Negotiation with data suppliers and bank regulators will be needed to achieve accurate and timely delivery of the data needed.

(c) Release of more detailed data to support transparency and forecasting is required.

Organisationally we are contemplating a "FISIM team" to undertake production of estimates and quality assurance for all of the macro accounts.

Macroeconomic and Integration Group
Australian Bureau of Statistics

Appendix. Investigation of FISIM in the CPI

A component of the ABS CPI is the deposits and loans index. This index covers directly charged fees for banking services and FISIM, indirectly charged fees. This appendix provides a summary of the methodology used to calculate the FISIM component of the Deposit and loan facilities index and provides details of ABS analysis of some of the methodological concerns raised by users. Data limitations made it difficult to perform experiments on variants of current procedures using the entire dataset. In many cases only subsets of the input data were used. These results cannot be compared with published numbers.

Summary of current methodology for FISIM

To calculate the indirect banking service charge in the CPI, monthly balance and interest flow data are obtained from selected financial institutions for each of their consumer products and in aggregate. A separate reference rate of interest is calculated for each institution as the mid-point of weighted average borrowing and lending rates. For each institution, a sample of products is selected to represent each of the major product categories. The specific product selected from each group (e.g. the sampled home loan product) is assigned a weight to represent the entire product group (e.g. housing loans). The interest rate margin for each sampled product is calculated from the difference between the product yield and the reference rate (for deposit accounts the interest margin is the reference rate less the product yield, for loan accounts is it the product yield less the reference rate). Because percentages (such as margin rates) are not prices, the latest period margin rates have to be applied to some monetary amount in order to compute the current period prices (the dollar value of the margins). Balances on a series of sampled accounts are used for this purpose. To preserve the quantities underpinning the values of the account balances in the base period, the balances used to derive the dollar values of the margins are updated each period using a four-quarter moving average of the all groups CPI. The FISIM component of the deposit and loan facilities index is calculated by weighting the indexes for the sampled products according to the weight of the product group. To minimise the effect of any short-term accounting anomalies, such as posting effects and adjustments of various types, the ABS constructs three-month moving averages of the average balances and interest flows and derives the required interest rates, reference rates and margin rates from the smoothed data.

Table 1 - Summary of Deposit and loan methodology calculation*

Calculate average interest rate (yield) on deposits (and loans) for each sampled institution	Y_D=(Sum of interest on all deposit products)/(Average balance on all deposit products)	Y_D - yield on deposits Y_L - yield on loans
Calculate mid-point reference rate for each sampled institution	$RR = (Y_D + Y_L)/2$	RR - reference rate
Calculate average interest rate (yield) on each product	$Y_i = I_i/B_i$	I_i - interest on product I B_i - average balance on product i Y_i - yield on product i
Calculate interest rate margin on each sampled product from difference between reference rate and product yield	$M_i = Y_i - RR$ (for loans) $M_i = RR - Y_i$ (for deposits)	
Derive constant balance by indexing base period balance	$B^*_i . CPI_t/CPI_0$	CPI_t - lagged four quarter moving average of the CPI B^*_i - base period balance on product i
Calculate dollar value of interest rate margin (price) by applying interest rate margin to base period balance	$P_i = M_i.B^*_i .CPI_t/CPI_0$	

* All calculations are performed on three month moving averages of data

The weight of the indirect fee component of the Deposit and loan facilities index is calculated in a manner consistent with the methodology.

A fuller description of the methodology, including the methodology used to calculate the direct fees component, can be found in the Appendix (p.34-36) of the June quarter 2008 issue of the CPI or Appendix 4 of *Information paper: Issues to be considered during the 16th series Australian Consumer Price Index (CPI) review* (cat. no. 6468.0).

Impact on the headline CPI

The impact of the Deposit and loan facilities index on the All groups CPI is shown in Graph 1, which compares the published figures for changes in the All groups CPI with changes in the All groups CPI excluding Deposit and loan facilities. The largest difference is observable in the March quarter 2009.

Graph 1 - A comparison between published figures for changes in the All groups CPI and changes in the All groups CPI excluding Deposit and loan (D&L) facilities
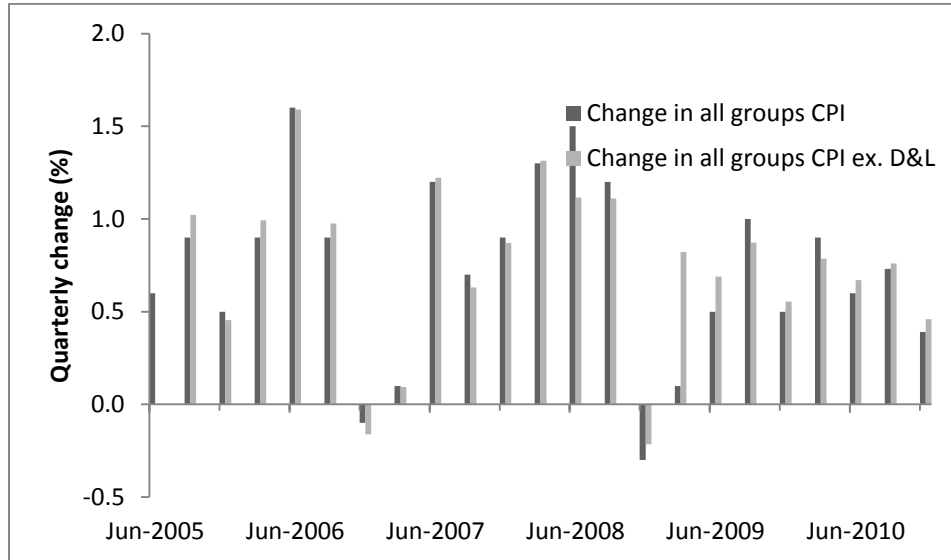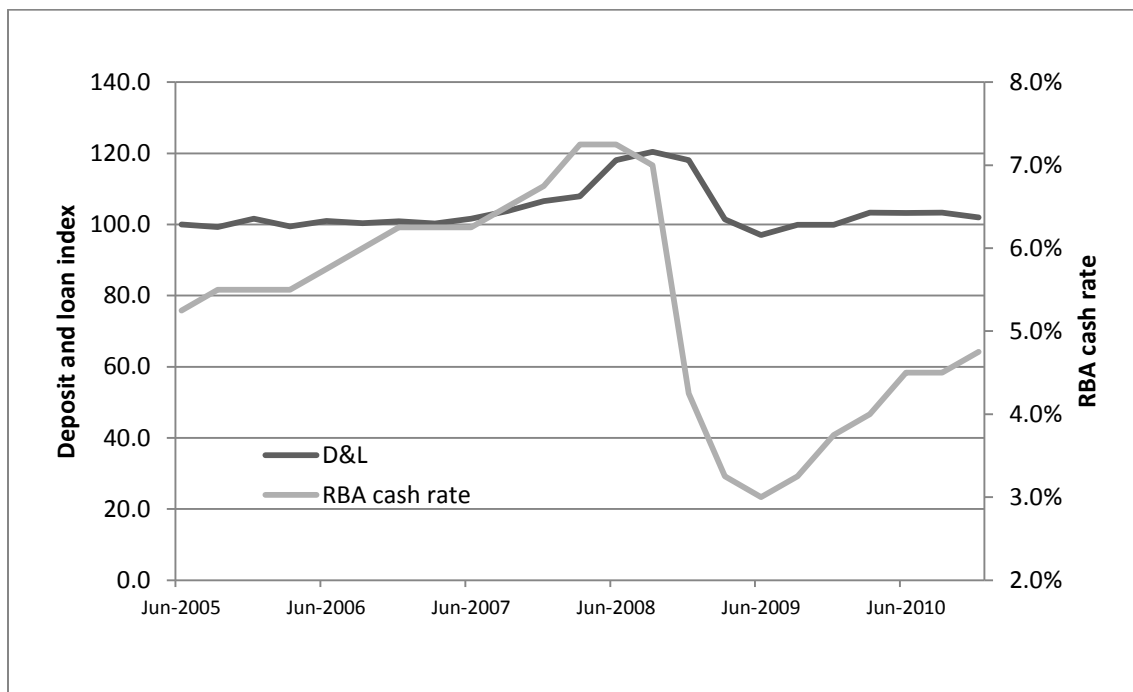

Source: ABS Catalogue no. 6401.0

Volatility and correlation with the RBA cash rate target

The volatility of the index and correlation between the Deposit and loan facilities index and the RBA cash rate target is evident from Graph 2. Movements as large as +9.5% in the June quarter 2008 (in part the result of a correction) and -14.1% in the March quarter 2009 have been observed. The correlation coefficient between the change in the Deposit and loan facilities index and the change in the RBA cash rate in the previous quarter is 0.9.

Graph 2 – A comparison between the Deposit and loan facilities (D&L) index and the RBA cash rate target

Source: ABS Catalogue no. 6401.0and RBA

Sensitivity to interest rate changes and data errors

To illustrate the effect of interest rate levels on the Deposit and loan facilities index, Table 2 shows a simplified example with only two deposit and two loan products. The average yield on deposits is calculated by assuming equal balances on both deposit accounts and is therefore a simple average of the two deposit product interest rates. Loans are treated likewise. The reference rate is calculated by taking the mid-point of the average yield on deposits and the average yield on loans. The interest rate spread is the difference between the average yield on deposits and the average yield on loans. Margins on the deposit and loan products are the difference between the product yield and the reference rate as described above. The dollar margin is then determined by multiplying the percentage margin by the indexed base period balance. The total margin is determined from the weighted sum of the product margins.

11

In period 2, if symmetric increases of 1% are applied to all period 1 product yields, the reference rate increases by the same amount (1%) and the spread between deposit and loan yields remains constant. The interest rate increases cancel out in the calculation, leaving the percentage margins on all products unchanged. In this case, the ABS methodology delivers an index that only changes with the change in the lagged four-term moving average of the CPI (due to the indexation of base period balances). This is illustrated in the second panel in Table 2. This demonstrates that, if interest rates change symmetrically across all products, increases in interest rate levels will *not* change the level of the index.

Table 2 - Example of symmetric and asymmetric yield increases

	Period 1					Period 2 symmetric yield increases					Period 2 asymmetric yield increases				
	Yield (%)	Margin (%)	Weights	Indexed base period balance	Margin ($)	Yield (%)	Margin (%)	Margin change (%)	Indexed base period balance	Margin ($)	*Yield (%)*	*Margin (%)*	*Margin change (%)*	*Indexed base period balance*	*Margin ($)*
Deposit 1	0	5.75	0.3	100	575	1	5.75	0	100.6	578.5	*0*	*6.5*	*0.75*	*100.6*	*653.9*
Deposit 2	3	2.75	0.2	100	275	4	2.75	0	100.6	276.7	*4*	*2.5*	*-0.25*	*100.6*	*251.5*
Loan 1	7	1.25	0.4	100	125	8	1.25	0	100.6	125.8	*8*	*1.5*	*0.25*	*100.6*	*150.9*
Loan 2	13	7.25	0.1	100	725	14	7.25	0	100.6	729.4	*14*	*7.5*	*0.25*	*100.6*	*754.5*
Average yield on deposits		1.5					2.5					*2*			
Average on loans		10					11					*11*			
Reference rate		5.75					6.75					*6.5*			
Spread between yield on deposits and yield on loans		8.5					8.5					*9*			
Total dollar margin		350					352.1					*382.3*			
Index		100					100.6					*109.2*			
Change in lagged four term moving average CPI							0.6					*0.6*			

On the other hand, if yields on loans increase more than yields on deposits, the spread between average interest rates will widen, which (in most cases) leads to an increase in the index. This example is illustrated in the panel 3 of Table 2 (in italics) where yields on all products except deposit 1 (the transaction account with zero interest) increase by 1%. The yield on deposit 1 remains unchanged. The margins on most products increase, leading to an increase in the index above the change in the lagged four-term moving average of the CPI. This demonstrates that, in general, the methodology will deliver an increase in the index (above the balance indexation) if yields on loans increase more than yields on deposits. This is appropriate if the spread between deposit and loan yields are widening purely as a result of bank behaviour. If however, banks are increasing loan interest rates to compensate for increasing costs of whole sale funding that are not captured by the ABS reference rate, a price increase in the indirect fees will be estimated inappropriately. To take increases in costs of wholesale funding into account would involve a major change to the current model and possibly the use of multiple reference rates. In addition, there is currently uncertainty about how the cost of funds should be calculated. The ABS is investigating this issue but given current international debate this will require some time to resolve.

Sensitivity analysis also showed that errors on products with large balances, small margins or large weights have the greatest impact on the index. While some products (with yields far from the reference rate) are insensitive to data errors, for some product groups, data inaccuracies greater than 1% were found to have a measurable impact on the headline CPI. This highlights the need for extremely accurate data. The impact of aggregation on the index, particularly in unstable economic times, emphasises the requirement that these data are also reported for individual products. The differences between sampled and census indexes also imply that a more reliable index will be obtained if data is available on all products. Although current data is reasonable, in order to produce an index robust under all economic conditions the ABS is negotiating further with data providers.

Treatment of fixed rate products

The impact of fixed rate products on the Deposit and loan index was assessed by calculating an index from a subset of the data both including and excluding the effect of fixed rate products. The two indexes, were remarkably different. The large impact that fixed rate products can have on the index in times of interest rate volatility occurred when fixed rate product yields moved very differently from the reference rate. Alternative treatments of fixed rate products such as using a reference rate matched to the product maturity can reduce both the volatility and impact on the index of fixed rate products. Treatment of fixed rate products is a subject of international debate in which the ABS is involved and it would be premature to reach a conclusion prior to consensus of the international community.

Sampling strategy

The same data subset was used to investigate the effect of sampling: a single product; the three dominant products, and all products within each product group (a census of products). The three sampling strategies led to measurable differences in the index. This indicates that the current sampling strategies may produce an index that is not representative of all products. To avoid these issues the ABS is aiming to produce output using a census index containing all products.

Frequency of lower level weight updating

Low level weight updating (below the expenditure class level) is common practice in the CPI. A comparison was done between updating the relative weights of product groups annually and retaining the original weighting pattern. Longer delays in reweighting are expected to have a bigger effect. More frequent linking can cause other issues. The ABS recently adopted procedures for routine annual weight updates for the Deposit and loan facilities index.

Forecasting, independent estimation, detail and aggregation

Graph 3 shows a comparison between the published series and the result obtained when the ABS methodology is applied to publicly available data. Average nominal (rather than transactional) interest rates are available from the RBA website by product group (although these are not split by institution). End of month balance data by financial institution is available from the Australian Prudential Regulation Authority (APRA) website. These monthly data are aggregated for total household deposits and household loans are aggregated by credit cards, housing loans and other loans. The two series show both clear similarities and differences. One major source of difference is due to the level of aggregation.

Graph 3 – Comparison of published Deposit and loan index and replication using publicly available data
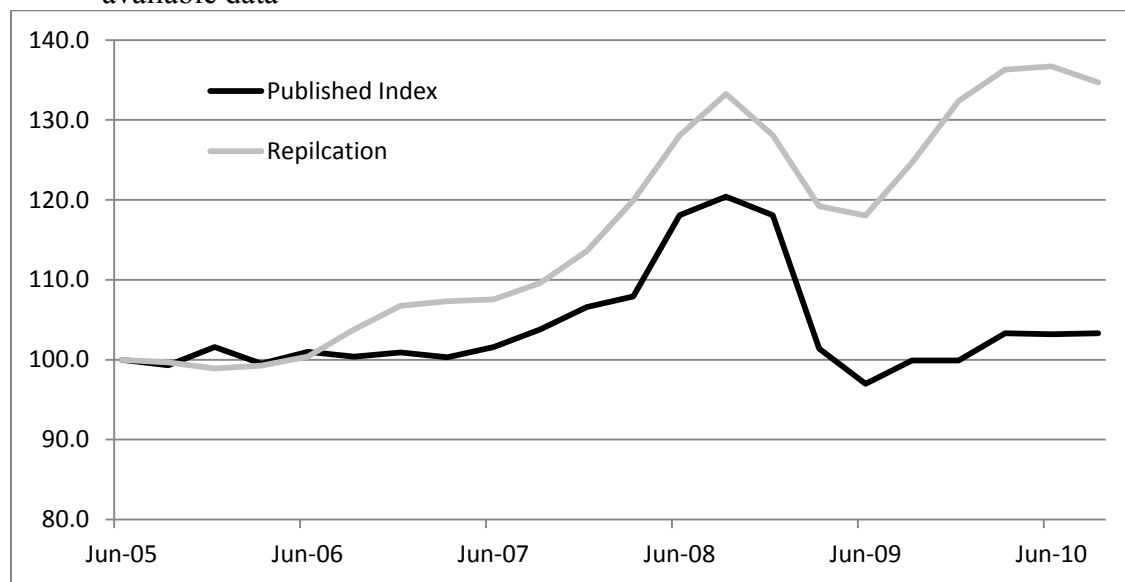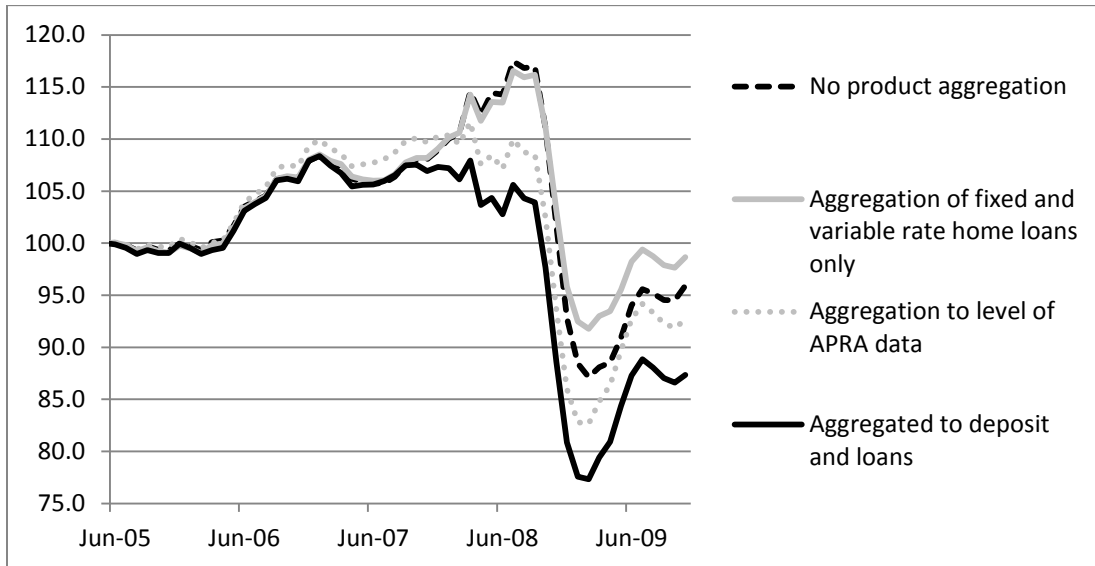

Source: ABS, APRA, RBA.

The CPI is a fixed basket index i.e. the quantities are fixed in a base period and are re-priced each quarter. The current Deposit and loan facilities methodology achieves this by repricing indirect fees on sampled products (the finest level of detail available). The publicly available data, however, is aggregated to a higher level. This causes difficulty for comparison as price changes calculated on aggregated datasets are subject to bias from compositional shift. For example, the measured average interest margin for a grouping of products that combines both home loan products and credit cards may vary from period to period depending on the relative balances on home loans and credit cards rather than any change in individual margins. If products are aggregated such that homogenous items are grouped, e.g. all home loans products, the effect may be minor. When dealing with heterogeneous groups with very dissimilar prices, e.g. across product groups such as home loans and credit cards, compositional shift will be much more significant. The impact of compositional change can be seen in Graph 4 where completely disaggregated data for a sample data set is compared with the same dataset in which: a) only fixed and variable rate loans are aggregated, b) data is aggregated to total household deposits and household loans are aggregated by credit cards, housing loans and other loans (as in our publicly available dataset), and c) all deposit data is aggregated as is all loan data. The obvious difference

14

between these series indicates that that an accurate index can only be assured if data are disaggregated to the finest level of detail.

Graph 4 - Comparison between data processed at four different levels of aggregation.

Source: ABS