The construction of price indexes for deposit and loan facilities

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[1] The views expressed in this paper are those of the author and do not necessarily represent the views of the Australian Bureau of Statistics.

Introduction

The purpose of this paper is to outline a practical approach for the construction of consumer price indexes for deposit and loan facilities offered by Australian deposit-taking institutions. You will see that the data demands of this model are large. But the reporting burden on the institutions is more apparent than real. This is because most of the information required is routinely prepared by the institutions during their monthly management-reporting cycles.

The total price paid by consumers for financial services of this nature may be broken down into four elements: interest margins, loan-establishment fees, other fees and charges, and indirect taxes. Each of these elements is discussed below. But first one has to classify the institutions' products or their customers' accounts to identify the consumer ones.

Classification of products or accounts into personal and business

Commercial deposit-taking institutions sell their products to persons, businesses and (increasingly) governmental bodies. But for this exercise one wishes to measure price changes affecting personal customers only. So the first thing to do is to classify an institution's products or accounts to separate the personal ones from the others.

In Australia, although each institution is structured differently, there are some similarities. For example, most of the larger institutions have a division that sells exclusively to large businesses and governmental bodies. This division is often known locally as the *Institutional* or *Corporate Bank*. Its products are different to those sold by the retail divisions in that there is much more tailoring of products to the needs of particular customers. Frequently this tailoring takes the form of bundling of primary financial instruments (such as debt securities) with derivative ones (such as swaps). Although it appears likely that the so-called institutional banking divisions do take some conventional deposits and write some conventional loans, there is no compelling evidence that the amounts concerned are material. For this reason it seems reasonable to concentrate data collection efforts on the institutions' retail and credit-card divisions.

However even the retail and credit-card divisions sell to both persons in their domestic capacity and small businesses (i.e. persons in their business capacity). Of course for this exercise it is important to distinguish between the two. There are alternative ways of doing this. One way is to classify the whole product as personal or business depending on which is predominant. Another way is to classify the accounts within each product.

(a)   classification of products

Some institutions prefer to classify whole products one way or the other. This is acceptable if they use an 80/20 rule to do this i.e. if the product manager considers that at least 80 per cent of

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outstandings are attributable to personal customers, then the whole product may be classified as personal. For the most part, the institutions found this easy to do and there were few cases of truly mixed products i.e. products where neither persons nor businesses accounted for 80 per cent or more. In those few cases, the institutions either did the classification again at the sub-product level where homogeneity is better; or they provided their best estimates of the persons-to-business ratios e.g. 70/30, 60/40, 50/50.

(b)   classification of customers' accounts

Using this method each customer account is classified as personal or business based on whether the account manager is a so-called personal banker or business banker. Then the balances of the accounts identified as personal are summed to provide an indicative personal ratio for each product. This ratio is then used to split the time series of product balances and interest into the two categories. But because personal bankers also manage the accounts of small businesses, and business bankers also manage the personal accounts of the directors of the companies in their portfolio, this method should not be used mechanically. Classifying accounts by managing banker is likely to over-estimate the personal share of each product.   For this reason one prefers the institutions doing the classification this way to refine the ratios using the corporate knowledge of their product managers. Generally speaking this review results in lower personal shares.

The classification of accounts may have a superficial attractiveness because of the precision it appears to offer. But experience suggests that the classification of products by an experienced person with common sense is usually the better solution.

Calculating the weight

A household expenditure survey is of no use for calculating the weight of deposit and loan facilities in a consumer price index. This is because annual household expenditure on interest margins is measured indirectly and so is not observable from households. And it is too onerous to ask households to calculate their annual expenditures on the various fees-and-charges and indirect taxes payable on deposit and loan facilities. Weight – as well as measures of price change – may only be calculated from information supplied by the deposit-taking institutions themselves. There are four categories of expenditure in these weight calculations.

(a)   implicit expenditure on interest margins

To work this out one needs to know three things: the yields on consumer products, a suitable reference rate of interest, and the average balances of those products.

Product yields may be calculated from detailed average balance sheet and related interest statements. At least for the retail and credit-card divisions of the bigger institutions, monthly average balance sheet and related interest statements are routinely prepared by product, or indeed by sub-product, for the purpose of monitoring product performance.

For this exercise the reference rate of interest is specific to each institution. It is calculated as the mid-point of the average interest rate received on all loans (i.e. including business loans) and the average interest rate paid on all deposits (including deposits made by businesses). This is the so-called *Australian solution*. Striking the reference rate like this from endogenous series largely avoids the problems of negative, very high, very low or volatile margins encountered by other statistical agencies that have used exogenous series as their reference rates.

Because of the divisional structures of the bigger institutions it is not always possible to get an average balance sheet and related interest statement for the domestic books of the licensed entity. Other average balance sheets that are available are for the worldwide group, for the domestic group including subsidiaries such as finance companies, and for particular divisions or groups of divisions of the licensed entity. Fortunately as conventional deposits and loans are wholly or at least predominantly on the books of the retail and credit-card divisions one may strike reference rates using the average balance sheet and related interest statements for those divisions only. But in doing it this way one may be missing such facilities as syndicated loans to big business and non-carded (or quoted) term deposits which are more likely to be on the books of the institutional banking divisions.

The difference between the reference rate and the product yields gives the interest margins on the products. Applying the margins to the average product balances provides the measure of households' implicit expenditure on interest margins.

(b)   establishment fees

These fees are usually payable by customers establishing or applying for most types of loans. They are always recorded separately in the institutions' books. The expenditure on establishment fees is simply the annual value of these fees recorded against home and personal loans, both of which are consumer products.

(c)   other fees and charges

In Australia most of the bigger deposit-taking institutions routinely record their revenue from fees and charges by both type of fee and product. So the job of estimating household expenditure on other fees and charges is as simple as summing the annual values recorded against the products previously classified as consumer ones.

(d)   indirect taxes

In contrast it is surprisingly difficult to get good estimates of annual household expenditure on the indirect taxes payable on deposit and loan products. No institution appears to record these taxes at the ideal level of detail required for this exercise, that is, at the product level. But some institutions do record them in a manner which allows one to make reasonable estimates.

Estimating changes in price

Institutions have so many products that in practice it is not feasible to estimate changes in price for all of them. So, in common with the practice employed generally in the CPI, one selects representative products from each major product group and prices only those. The remainder of this part discusses estimating changes in price for the representative products of each institution.

For this project six product groups were created, three on each side of the balance sheet. These are the liability or deposit groups used: current accounts, savings and investment accounts, and retirement accounts. These are the asset or loan groups used: housing and home-equity loans, personal loans and overdrafts, and credit cards. So, for example, rather than trying to estimate price changes for all the many home-loan products offered by an institution, one is instead trying only to estimate as accurately as possible price changes in a representative home-loan product. This estimate will have a weight reflecting all the housing and home-equity loans offered by this institution.

In concept, the total price of any individual product may comprise up to four elements: interest margins, establishment fees, other fees and charges, and indirect taxes. Of course it is important that the method used to estimate price changes allows for equitable treatment of shifts between these elements. For example, were a decline in margins to be exactly offset by an increase in other fees and charges then it is crucial that the price measure for the product shows no change. As you can see from this example, these four elements of price change are inextricably mixed in the total price paid by consumers for a product and so are not separately publishable.

(a)   interest margins

The same sources and methods which are used to calculate the weight of households' implicit expenditure on interest margins may also be used to make the estimates of change in margins. But for the purpose of calculating price changes it is, of course, important to have series which are free from accounting anomalies such as posting effects and adjustments of various types. These anomalies commonly occur in interest data, especially at half-yearly intervals when the institutions prepare their major reports. For this exercise three-term moving-averages are used to remove the effects of peculiarities in the interest series. Also, to preserve the underlying quantities, each quarter the base period value of the margins is moved forward by movements in the CPI.

(b)   establishment fees

Home-loan-establishment or application fees present special measurement problems in Australia. This is because of the propensity of Australian lenders to compete in the market for home loans by waiving and discounting establishment fees. To overcome this problem one may measure the price change in the average fee paid by consumers each month. Generally speaking Australian institutions and their mortgage-processing subsidiaries keep good records of fee waiving and

discounting. This is so that they can monitor the fee revenue they are foregoing by this practice. So for the bigger Australian institutions it has not been difficult to prepare a monthly time series of average home-loan-establishment fees paid by consumers.

In contrast, waiving and discounting of application fees for personal loans, although it does happen, is not a big problem at the moment in Australia.

(c)   other fees and charges

Most of the bigger deposit-taking institutions in Australia do not store detailed price and quantity information about their other fees and charges. This makes it impossible to compute a price index for other fees and charges using what may be called a census approach. But one may use a random sample of customers' accounts for this purpose.

To facilitate the sampling of accounts, detailed instructions were provided to the institutions. These are the main ones.

*   Each of the accounts selected in a particular sample must be subject to exactly the same fees and charges i.e. should be chosen from the same sub-product.

*   They should discard any dormant accounts in the file and then randomly select from the remainder. (For this exercise a dormant account is defined as one that has no customer-initiated transactions in a six-monthly period.)

*   They may use either branch (BSB) codes or postal codes as the filter to restrict account selection to capital-city residents. For those institutions wishing to use postal codes the ABS has a concordance between Australian postcodes and capital-city statistical divisions.

*   To avoid bias, they should read the whole file during the selection process.

*   They should supply details of customers' banking transactions -- and running balances -- over a twelve-monthly period.

*   They should make the selected accounts anonymous by deleting the customers' names and addresses, and replacing their account numbers with other identifiers.

*   Finally the institutions should supply the account data as comma separated value (CSV) flat files.

As you will appreciate this was very much a learning experience for both parties. And there are some things that one will do differently on a future occasion. For example, my colleagues and I found that it is useful to have both narratives and transaction codes (*trancodes*) in the reported data. Also, although the institutions were supposed to supply the narratives seen by customers on their statements, on occasion they delivered what may be called *technical narratives*. These

are very difficult to interpret. Another thing is that in the context of credit-card products, one should avoid using the word *narrative* loosely. Narratives are the merchants' names (*Jim's Mexican Restaurant*) and there are presumably untold millions of unique ones. For ease of processing it is far better to ask for *transaction descriptions*. Then the thousands of merchants' names in the file collapse to *credit card purchase*. Also, running balances are difficult for some institutions to supply because they are not stored but rather are calculated as required. For these institutions opening balances are a better alternative. Lastly, there are many possible data sources within the bigger institutions for information about customers' account transactions. From experience, the statements system is one of the better ones.

To process the sample accounts my computing colleagues built a system that emulates the institutions' mainframe charging systems. The transactions in the randomly selected confidentialised accounts are the input data for the system. Each quarter these transactions are revalued to current period prices using a four-quarter moving average of the Australian CPI. The system metadata are the charging and rebate rules for each sampled product or sub-product in each period. The appropriate rules are then applied to the file of revalued transactions period by period. The outputs of the system are the other fees and charges paid in a year on each sampled account in each period.

(d) indirect taxes

In Australia, indirect taxes on deposit and loan facilities are almost entirely taxes on the flows (financial transactions) rather than the stocks (balances or outstandings). In practice one measures price changes in these taxes using exactly the same sources and methods as for other fees and charges. That is, period-specific tax rules are created in the purpose-built system and run against the file of revalued transactions. In this case the outputs are the indirect taxes paid in a year on each sampled account in each period.

Linking

Discontinuities in the data series are caused by events such as corporate mergers, the introduction of new fees and charges, and securitization of home loans. Valid measures of price change are made by ensuring that adjacent periods are on exactly the same basis. So, for example, if an institution were to securitize a parcel of home loans one would find out the value of the deal. That value is then deducted from previous periods so that several periods are on the same basis. The change in price is then worked out from the adjusted series.

Concluding remarks

My colleagues and I are presently preparing experimental estimates using the sources and methods described in this paper. Although early indications are encouraging, at this stage it is too soon to say with certainty that this paradigm is viable for the continuous production of official statistics.