Assessing the contribution of financial innovations to the production of implicit services of financial intermediation in Costa Rica

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1. Introduction

The ongoing discussion about the effects of financial innovation has been reinforced by the recent events in financial markets: there is discussion about the impact of innovation on competition, the challenges it poses to financial regulatory authorities or its effect on the transmission of monetary policy. However, there has not been much empirical research to inform the debate.

One line of discussion that has been less prominent is the effect of financial innovation in economic statistics. Partly because of the lack of systematised data on innovation, it has been difficult to incorporate it into measures of production, credit or prices, and that prevents policymakers from having a useful diagnostic tool.

In this study we attempt to make a small progress in that direction in the case of Costa Rica. The financial system of Costa Rica is relatively small and concentrated in a few intermediaries, where State-owned banks play a leading role. However, recent years have seen a drive for modernisation in banking practices that has made product and process innovation more prevalent. This led us to try to gauge how important are product innovations for the provision of intermediation services in Costa Rica.

More specifically, in this study we measure the contribution of product innovations to the output of intermediation services of the State-owned banks of Costa Rica, as measured by a user-cost approach. The remaining sections are ordered as follows: section 2 defines financial innovation and presents previous empirical studies on financial innovation, section 3 explains two methods of measurement for the output of intermediation services, section 4 lays out the methodological aspects of the study and sections 5 and 6 presents results and final comments.

2. Financial innovation

2.1 What constitutes financial innovation?

Frame and White (2002) define financial innovation as "…something new that reduces costs, reduces risks or provides an improved product/service/instrument that better satisfies participants' demands…" within a financial system. Innovations can emerge due to technological changes, as well as a response to increased risk or to new regulations. When defining financial innovation the usual approach is to categorize it into three groups, according to where innovations occur.

[1] The views expressed in this study are those of the author and do not represent the opinion of the Central Bank of Costa Rica.

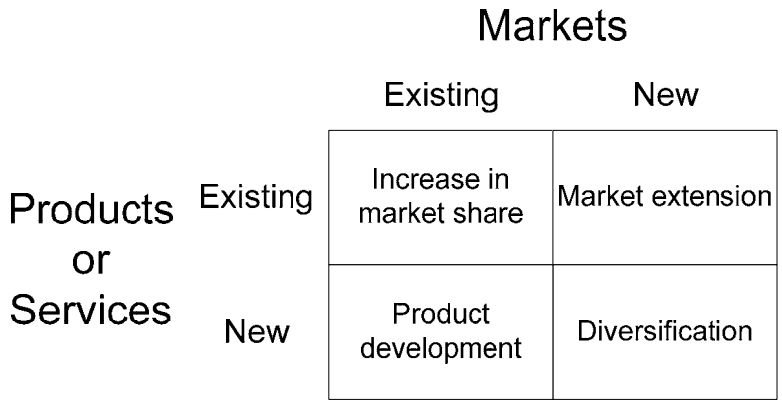
Process innovation refers to new production processes that allow the provision of new or existing financial products and services. Two examples commonly cited are loan tracking systems and credit scoring. Process innovation is usually aimed at increasing the efficiency in the production process, and it is often associated with technological change.

Organizational innovation encompasses new institutions or organizational structures within institutions where the production process is held. This kind of institutional innovation can influence the financial system as a whole, spawning new types of intermediaries. Internet-only banking is a prime example of this type of innovation.

*Product innovation*s are new products or services created to meet market needs, thus constituting a client-focused kind of financial innovation. Product innovations help the intermediaries to differentiate themselves from their competitors, by providing solutions to unattended needs of the customers. Examples of product innovation in finance are widespread: from adjustable-rate mortgages to home equity loans, from variable rate bonds to zero-coupon bonds, financial product innovation has been a staple of the last 30 years. As it has been stated, this paper is focused on this type of innovation. But how to define exactly what constitutes product innovation?

Figure 1

Strategies in product development



Source: adapted from López, Luis; Rodríguez, Luis & Colindres, Antonio (1995). Impacto de la innovación en la banca costarricense. Revista INCAE, VIII (2), pp 69-78.

Innovation is an organizational process that is mainly the result of strategy, so the definition of innovation could be framed in strategic terms. Figure 1 shows options of strategy regarding product development in a firm. The first option is the *increase in market share*, whose objective is selling more of already existing products or services to the current clients. The second strategy, *market extension*, implies introducing existing products or services into new markets, while the third, *product development,* aims at developing and selling new products to current costumers. With the last strategy, *diversification,* the goal is to create new products and introduce them to new markets. Then, these last two strategic options constitute innovation, both of them implying the development of new products.

To define what can be considered as a new product, we follow Bátiz-Lazo and Woldesenbet (2006). In their study of the dynamics of innovation in British banking, they decided to adopt a broad definition that sees innovation as "…*an idea, product, process, service, hardware or software application that is perceived as new by an adopting organisation or unit."* The idea of the perception of novelty by the intermediary as the criterion to define when an innovation occurs is useful since products or practices already available in some markets could

constitute a relevant departure from current business practices for intermediaries in other markets. Thus, if an intermediary starts offering a product that it did not previously offer, that product becomes an innovation for that intermediary, even if that product already exists.

Furthermore, it is useful to qualify innovations according to degree of novelty. Radical innovations imply significant change in the activities of an organization, whether in its processes, in its structure or in its offer. They might lead to the transformation of firms or industries. Incremental innovations, however, are largely the result of marginal improvements based on existing products or practices of the organization. These improvements are aimed at increasing efficiency and enhancing the competitiveness of the firm in its market.

Since in this study we focus on product innovations, it is more likely that we will be dealing with incremental rather than radical product innovations. The development of product innovations, by its nature, is often an incremental process. New types of bonds, for instance, often represent modified versions of already existing products: bonds in a previously not available currency, zero-coupon bonds, and so forth. The same could be said about different types of mortgages and loans.

2.2 Empirical studies on financial innovation

There are relatively few empirical studies on financial innovation considering how prevalent the talk about its importance is. The majority of studies on financial innovation are of a descriptive nature, and most often deal with issues like the effects of regulation and technological change on innovation, or the profitability of specific innovations, but little is said about the direct effect of innovation on the measurements of output.

A comprehensive review of empirical studies on financial innovation was done by Frame and White (2002). They classified a study as empirical according to two principles:

- whether the article formally presented data and tested hypotheses
- whether the article examined a financial product, process or organization during a time when it was regarded as a novelty.

Up until 2002 they could only find 24 studies that could be considered empirical. Of these, however, none tried to measure the impact of innovation in the measured output of the adopting institution. Product and process innovations were the focus of the majority of the studies, at least 17 of 24.

They organized the studies according to four research categories, with the following findings:

a. **Environmental conditions that encourage innovation.** Two studies were found in this category: one tested the hypothesis that regulatory constraints induce innovation and the other focused on financial patenting.

b. **Customers for and users for innovation.** Seven studies were found. They focused on the implementation by banks of Internet banking and credit scoring, and the use by costumers of electronic bill payments, debit cards and ATM cards**.**

c. **Diffusion.** Three of the five studies found dealt with ATM deployment by banks.

d. **Consequences: Profitability and social welfare.** Twelve studies were found. Of them, five focused on specific product innovations, three focused on process innovations and four on the same organizational innovation.

Frame and White offered several explanations for this dearth of empirical studies: a poor research and development tradition in financial institutions, the lack of industrial organization training, scarcity of patent counts for financial innovations and, most critically, insufficient or nonexistent data.

This last problem is the greatest obstacle for the existence of more empirical studies on financial innovation, particularly on product innovation. The data most widely available for financial institutions does not yield information that can be used directly to make calculations and test hypotheses. In financial statements, bank call reports and other supplementary information provided to regulatory institutions for purposes of supervision, the data is usually presented in an aggregate way, so that information related to innovations cannot be differentiated from information for traditional products.

There are understandable reasons to this: financial intermediaries are not likely to divulge critical information about products or processes that grant them a competitive advantage in their market. In the case of the estimation of output of financial services, for example, the information required would include detailed data about deposits, securities issuance and the amount of interest paid and received. This information might be available in aggregate, but would hardly be published on a regular basis for particular products.

The limitations mentioned above suggest that a more fruitful route of action to obtain detailed data on new products, services or processes could be direct request to the financial institutions. This can include surveys as well as interviews with the authorities of the institutions of interest. The latter is the method we decided to adopt to gather the information required to carry this study, as will be explained in section 4.

3. Measurement of intermediation output

3.1 Measurement of production in financial intermediaries

The System of National Accounts 1993 (SNA 1993) defines financial intermediaries as institutions "…that incur liabilities on their own account on financial markets by borrowing funds which they lend on different terms and conditions to other institutional units." (p139). Financial intermediaries put themselves at risk when channelling funds between lenders and borrowers, and hence the rates of return they receive are generally higher than the rates they pay. With this rate arrangement the intermediaries do not have to charge each customer individually for the services provided.

The calculation of the value of intermediation services faces a critical limitation: most, if not all, financial intermediaries do not charge explicitly for their intermediation services. There are no receipts for sales, no explicit prices to use for measurement because the charge for the service is implicit in the difference between interest rates mentioned above. Fees and other explicit charges may exist in some intermediaries, but they usually represent only a minor component of the total value of the intermediation service.

Hence, to obtain the output of intermediation services it is necessary to add the value of any explicit charges and the value of the implicit services of intermediation. Within the framework of the System of National Accounts 1993 the standard measure for these implicit services is the financial intermediation services indirectly measured (FISIM), which are defined as follows:

> 6.125. The total value of FISIM is measured in the System as the total income receivable by financial intermediaries minus their total interest payable, excluding the value of any property income receivable from the investment of their own funds, as such income does not arise from financial intermediation. (SNA 1993, p139)

Since this measure is based on the total interest flows paid and received by the intermediary, it is of little use to identify the contribution of particular financial products. Another method of measurement more in tune with that goal is the user cost approach, which uses balance sheet data detailed by type of asset and liability to obtain estimates of their contribution to the

output of financial intermediation services. This method makes use of a reference rate and is expected to be the standard for the calculation of FISIM in the next revision of the System of National Accounts. We review this approach in the next section.

3.2 User cost of money

The concept of user cost of a financial asset is derived from a framework originally developed for non financial assets. It was later applied to banking by Hancock (1985), Fixler (1993) and Fixler and Zieschang (1999). The exposition presented here follows Fixler, Reinsdorf and Smith (2003).

Assuming a competitive market, the profits from renting out fixed capital assets must be zero. Hence, the amount paid for the rental of an asset must equal the difference between the initial value of the asset and the present value of that asset at the end of the rental period. That is, the user cost of the asset is given by:

$$uc_t = p_t - \frac{p_{t+1}}{1+r_t} \tag{1}$$

where p_t and p_{t+1} are, respectively, the values of the asset at the beginning and at the end of the rental period and r_r is a reference rate of interest.

Depreciation and changes in the asset price from period t to period t+1 can be incorporated in the analysis by assuming that they are reflected in the rate of change of the asset's value. If δ_t is the depreciation rate and π_t is the rate of increase in the asset price, then $p_{t+1} = p_t (1+ \pi_t - \delta_t)$ and expression (1) can be rewritten as:

$$uc_t = p_t\left[1-\frac{(1+\pi_t-\delta_t)}{1+r_t}\right] = p_t\left[\frac{(r_t-\pi_t+\delta_t)}{1+r_t}\right] \tag{2}$$

If the user cost is paid at the end of the period, then expression (2) becomes $uc_t = p_t(r_t - \pi_t + \delta_t)$

This framework can be developed for financial assets as well. The user cost of holding a financial asset must then equal the difference between its current cash value and the present value of the cash flows generated by the asset at the end of the period.

Let us assume a financial asset A with a cash value of V_{At} in period t and a rate of return r_A. In period t+1, thus, income of $r_A V_A$ is received and the asset can be sold for $V_{A\,t+1} = V_A(1+ \pi_t)$. Here, π_t incorporates changes in the asset price as well as expected changes in value associated with creditworthiness if the asset is a debt instrument.

Let us assume also that a rate r_r can be earned on an asset that does not imply any cost or risk to the borrower. This rate represents the opportunity cost of financial capital for the intermediaries, and can be used to discount the future value of cash flows associated with assets. Treating the reference rate r_r as a risk-free rate is the general practice in the literature, including the 1993 System of National Accounts.

The user cost of holding asset A can be expressed as:

$$uc_t = V_{A\,t} - \frac{V_{A\,t}(1+\pi_t) + r_A V_{A_t t}}{1+r_r}$$

which is equivalent to the more tractable expression

$$uc_t = V_{At}\left[\frac{r_r - r_A - \pi_t}{1 + r_r}\right] \tag{3}$$

Expression (3) can be modified to measure the implicit services of financial intermediation associated with assets and liabilities. The first modification is to set π_t to zero, effectively assuming that there are no net holding gains. The main reason to assume this is that the concept of income measured by the national accounts excludes holding gains and losses.

A second modification concerns the moment of valuation of the user cost. Expression (3) assumes that the asset and its user cost are valued at the beginning of the period, while interest flows are received at the end of it. Since interest flows are received and paid throughout the year and, it is more reasonable to value the user cost at the end of the period. The resulting expression for the user cost valued at the end of the period would simply be the difference between the reference rate r_r and the rate of return on the asset, r_A:

$$uc_t = \left(r_r - r_A\right)$$

For assets, the user cost is usually negative, since the rate of return on the asset is typically higher than the reference rate. For liabilities, the reference rate is usually higher than the rate of return, resulting in a positive value for the user cost. In view of this, the user-cost *price* of an asset *i* is defined as the negative of the user cost:

$$p_{A_i} = r_{A_i} - r_r$$

while the user-cost price of a liability *i* is defined as equal to its user cost:

$$p_{L_i} = r_r - r_{L_i}$$

The imputed output *IO* of an intermediary can be expressed as the sum of the user-cost price of each asset or liability times its volume:

$$IO = \sum_i p_{A_i} A_i + \sum_i p_{L_i} L_i \tag{4}$$

Hence, the imputed output of intermediation services can be obtained as the sum of the output derived from each asset and each liability held by the intermediary. This framework allows to measure the amount of imputed output contributed by financial innovations associated with certain assets or liabilities, and to assess its relative importance on the total output of the intermediary.

4. Methodology

4.1 Intermediaries included in the study

The intermediaries included in the study are the three banks that constitute the sector of State-owned commercial banks of Costa Rica: the Banco Nacional de Costa Rica (BNCR), the Banco de Costa Rica (BCR) and the Banco de Crédito Agrícola de Cartago (BCAC).[2]

[2] Respectively: National Bank of Costa Rica, Bank of Costa Rica and Bank for Agricultural Credit of Cartago.

The reason to circumscribe the study to them is that they comprise the majority of the assets of all banks, as well as the majority of the credit in the financial system. In December of 2007, state-owned commercial banks accounted for 47,6% of the active credits among all 17 banks operating at the time and for 53,5% of all assets (see Table 1). If we consider the totality of the Costa Rican financial system, these shares remain very high: 39,9% and 45,4%, respectively. Thus, gathering information about product innovation on only these three banks is an effective way to cover a significant part of the financial system with relative ease. Besides, these three banks account for 50,7% of the output of financial intermediation services of all banks, according to estimates for 2006. By measuring the effect of product innovation on their output it is possible to assess the effect on the aggregate output of all banks.

4.2 Sources of data

A user-cost framework was employed to calculate the weight of FISIM output derived from product innovations on total FISIM output. For the calculation of total output of the intermediaries selected the data used came from the General Superintendency of Financial Entities. For the calculations of output from the innovations the data was requested directly to the intermediaries.

Table 1

Costa Rica. Share of State-owned commercial banks on selected aggregates. 2006, 2007

	Assets	Active credits	Profits	Output of intermediation services 1/
Share of all banks	53,5%	47,6%	65,3%	50,7%
Share of national financial system 2/	45,4%	39,9%	47,3%	-

1/ Estimates for 2006, all other shares correspond to December 2007.

2/ Includes banks, non-banking financial corporations, cooperatives and foreign exchange bureaus.

Source: General Superintendency for Financial Entities (SUGEF) and Central Bank of Costa Rica

Data for total FISIM output

All Costa Rican financial institutions must submit detailed balance-sheet data to the General Superintendency for Financial Entities (SUGEF) for purposes of supervision. This information can be readily obtained through the SUGEF website. The monthly reports used for this study include data of the stock of assets, liabilities and total equity, as well as the accumulated income and expenses, all of it broken down by counterpart sector of the transaction. Crucially, interest income and expenses can be easily matched with the corresponding asset or liability that generated them. For FISIM calculation we used the accumulated interest income and expenses for the year and the average for the year of the monthly stocks of assets and liabilities.

Data for product innovations

Since financial statements and information submitted for supervision do not include a detailed breakdown of assets and liabilities by product, we opted to obtain data for product innovations by requesting them directly from intermediaries. The requests were made through a series of meetings with officers of the intermediaries. In these meetings we asked to identify new credit and deposit products that met two criteria:

- Have resulted from strategies of diversification and product development, that is, being completely new products rather than modifications of characteristics of already existing products.
- Have been introduced in the last three years (2005, 2006, 2007). An exception was made for a single credit product, introduced in 2004 but with significant importance in the following three years.

We followed the criterion of Bátiz-Lazo and Woldensebet (2006) outlined in section 2: the products should be new to the offer of the intermediary, even if they already exist in other markets.

The information provided included interest flows as well as detailed data on the stock of the asset products and liability products for all three years considered. For the study, we used the accumulated interest flows for the year and the average of the stocks. It was agreed that the information provided would not be published individually by product, but rather presented in an aggregate way, and that neither the innovations nor the intermediaries would be identified by their names.

4.3 Calculation of FISIM output

It must be pointed out that in the national accounts of Costa Rica FISIM is computed as indicated in paragraph 6.125 of the SNA 1993: interest receivable minus interest payable, excluding interest from own funds. The calculation done for the study, hence, is a departure from official estimates, although it might be useful for benchmarking purposes once the new method of FISIM estimation is implemented.

Instruments and transactions included

It was considered that only credit and deposit instruments produced services of intermediation, since it is primarily for these instruments that intermediaries can control interest rates. Furthermore, we excluded transactions between financial intermediaries since they represent services that intermediaries provide to each other which should not be included in the amount of services provided to the other sectors.

Reference rates

For the internal reference rate we used the weighted average of the effective rates on loans granted and deposits taken by all the institutions of the national financial system of Costa Rica (see Annex 1) with all sectors in the economy**.** This average rate is equivalent to:

$$r^* = \frac{\text{accumulated interest flows from loans and deposits}}{\text{average of monthly stock of loans plus deposits}}$$

This reference rate fell slightly from 6,33% in 2005 to 6,29% in 2006 and more noticeably to 5,20% in 2007. However, it is consistently below the effective rates for asset instruments and consistently above the effective rates for liabilities, thus preventing the estimation of negative FISIM. Besides, the 2005-2006 FISIM estimates obtained by using this reference rate resulted in a growth rate (11,2%) close to that of the official estimate of FISIM for the intermediaries considered (13,0%). This reference rate is similar to the reference rate used

by the Australian Bureau of Statistics, which uses the mid-point between the average interest rate on loans and the average interest rate on deposits.

Another reference rate considered was the annual average of the daily rate in the interbank money market of Costa Rica. However, this rate was not adopted because of its volatile behaviour and the short-term character of Costa Rica's interbank market. FISIM estimates using this reference rate resulted in a growth rate for 2005-2006 significantly higher that the official estimate for the intermediaries included (34,9% versus 13,0%).

Of the transactions with non-resident sectors, only those that result in exports of FISIM should included. However, for the years considered no loans were granted to or deposits were taken from non-resident sectors, and hence there was no calculation for imputed FISIM exports.

Taking into account the elements described above and using the user cost framework described in section 3, we carried out calculations for the total output of FISIM and for FISIM output stemming from the product innovations. The results are discussed in section 5.2.

5. Results

5.1 Product innovations

Table 2 presents a summary of the information about product innovations in the intermediaries included. Since anonymity was agreed, we do not identify the banks or their products by name.

For the period 2005-2007 the three banks considered reported a total of 11 credit and deposit product innovations. Of these, six product innovations belong to a single bank, four to another and a sole product innovation was reported by the third bank. Most of these innovations are credit instruments: of the 11 innovations, eight are credit products and only three are deposit products.

The credit products comprise, essentially, personal loans for consumption and loans for housing. All three banks reported to have started a program of personal loans for consumption (1A, 1B and 1C) whose characteristics differ from those of traditional loans. For example, the minimum amount of the loans is lower, fewer requisites are asked and the loans are approved more quickly. This kind of loan is common in the informal sector and was first adopted with success by non-banking financial institutions. According to the officers from the banks, these loans target primarily low-income workers who are traditionally outside the financial system because of cultural restrictions. Very often a segment of the population in need of a loan is put off by what they perceive to be very restrictive requirements in formal financial entities. An additional credit innovation aimed primarily at consumption is offered by Bank C, and consists in early withdrawals of the Christmas bonus which must be paid once the bonus is received.

Loans for housing comprise the remaining four credit innovations. Bank B offers a loan denominated in a virtual currency, which is indexed by inflation (2B). It proved to be a genuinely innovative product for the conservative Costa Rican credit market. The stock of 2B loans grew steadily since its introduction in 2004 until reaching a maximum in February of 2007, when it started a continued descent. The three other credit products, offered by Bank C, were housing loans with innovative conditions. However, these last three product innovations were short-lived: as of June of 2008 they are no longer part of the offer of Bank C, and were replaced by a single credit product with two options of interest rate.

Only three deposit innovations were reported and two of them are deposits in Euros. Bank B offers these deposits since February of 2005 and Bank C since January of 2007. In 2007, Bank B held more than 90% of the deposits of the two banks and is the only one to pay any

interest on them. In the last quarter of 2007 there was a marked increase in the volume of deposits denominated in Euros, reflecting a significant appreciation of the local currency with respect to the US Dollar.

The other deposit innovation is savings deposits with specific purpose, in this case, travel expenses. Once the deposit attains a certain pre-established level the depositor can withdraw the amount saved. Although introduced in 2005, during this year the total of these savings deposits remained relatively low compared with the much higher levels attained from January 2006 on, when the bank started to promote the product more widely.

5.2 Total FISIM calculation

Tables 3, 4 and 5 present the estimates of total FISIM for the three banks considered. Each table presents information for all assets and liabilities, including those which do not enter FISIM calculation. Column (1) presents the average for the year of the monthly stock of each line, and column (2) contains the accumulated interest income or expense for the year. In column (3) the average rate of interest for the assets and liabilities entering FISIM calculation is then computed as the interest in (2) divided by the stock in (1). The user cost price of each asset and liability is calculated in column (4) as the average rate of interest minus the reference rate, for assets, or as the reference rate minus the average rate of interest, for liabilities. Finally, in column (5) the imputed intermediation output derived from each line is computed as the user cost price times the average balance.

The user cost price of loans fell consistently during the period: from 2,01% in 2005 to 1,41% in 2006 and 0,85% in 2007. This reflects a similar downward movement in the average interest rate and the reference rate. Total services of intermediation derived from loans fell from 20 507.3 millions of colones in 2005 to around 16 500 millions of colones two years later.

Table 2

Costa Rica. Product innovations in State-owned commercial banks. 2005-2007

	Product	Type	Characteristics	Year of introduction
Bank A	1A	Credit	Personal loan for consumption	2007
	1B	Credit	Personal loan for consumption	2006
Bank B	2B	Credit	Loan denominated in a virtual currency indexed to inflation	2004
	3B	Deposit	Deposits in Euros	2005
	4B	Deposit	Savings deposits with specific purpose (travel)	2005

Table 2 (cont)

Costa Rica. Product innovations in State-owned commercial banks. 2005-2007

	Product	Type	Characteristics	Year of introduction
Bank C	1C	Credit	Loan for consumption, pre-approved by client profile	2005
	2C	Credit	Early withdrawal of a percentage of the Christmas bonus	2007
	3C	Credit	Loan for housing, stepped rate	2006
	4C	Credit	Loan for housing, fixed payment	2006
	5C	Credit	Loan for housing, capitalizable	2007
	6C	Deposit	Deposits in Euros	2006

Source: own elaboration with data from BNCR, BCR and BCAC.

The user cost price for demand deposits, the most important deposit instrument, remains between 4,5% and 5% . The rate for time deposits, however, falls steadily from 2,69% in 2005 to around 2% two years later. Nonetheless, total imputed services of intermediation derived from deposit instruments grew from around 87 500 millions of colones in 2005 to more than 113 000 millions in 2007.

As expected, total FISIM estimates obtained through the user cost approach are lower than official estimates calculated as the difference of interest received and paid: the user cost estimates for 2005 and 2006 represent 71% and 70% of current estimates of FISIM. User cost estimates grow 11,2% from 2005 to 2006, close to the 13,0% growth of official estimates, and 8,1% from 2006 to 2007.

5.3 Imputed output from innovations

Table 6 presents the calculation of FISIM derived from the product innovations reported by the three banks considered. As requested by the intermediaries, we aggregated the stocks for the credit and deposit instruments as well as the interest flows derived from them.

The main result is that the weight of output derived from product innovations on total imputed output is relatively low, although it is growing. Output stemming from the 11 product innovations reported represented only 2,4% of all output in 2005, 3,1% in 2006 and in 2007 it more than doubled to 7,3%. It is clear that the vast majority of the services of intermediation of these three banks are provided through traditional financial products and that the contribution of innovation to that provision is marginal. It is difficult to assert just how low these weights since we could not find comparable empirical studies. However, we did expect to see a rising importance of innovation output on total intermediation output, as effectively occurred. Considering that these three banks comprise more than 50% of total implicit services of intermediation for the financial system, it is likely that the weight of implicit services of intermediation derived from product innovations would remain low for the system as a whole.

The upward trend in the weight of output derived from innovations is due to the fact that it grew much faster than total imputed output in the period considered. In 2006 and 2007, FISIM derived from innovations grew 42,1% and 1,58 times, respectively, compared to 11,2% and 8,1% for total intermediation output.

It must be noted that these estimates do not include any fees or other explicit charges associated with the product innovations. These charges might constitute a significant source of income for the intermediaries, as suggested by data received from one of the informants. According to data from Bank B, in 2007 fees income represented around 17% of interest income from a credit innovation. Hence, total intermediation services from product innovations would be significantly underestimated if only FISIM output were considered in the measure.

Credit innovations contribute more than 95% of the imputed intermediation output for all innovations. It is important to single out that user cost prices for credit innovations are consistently higher than user cost prices for total loans. In 2007 this difference is most notable, as the user cost price of credit innovations is more than 4% while that price remains below 1% for total loans. If the user cost price of a financial product is positive, it helps to increase profits. In this sense, it could be argued that the user cost prices of credit innovations suggest a higher potential for profit than traditional products, which is consistent with the idea that firms innovate to gain a competitive edge and increase profits.

The user cost prices of deposit instruments show a noticeable anomaly: in 2005 that price was negative, resulting in a small negative imputation of FISIM from deposits. This is due to the high amount of interest paid reported by one of the informant institutions for one of the credit innovations.[3] The data in question was verified again by the informant, and deemed correct. Hence, we used the information as presented. User cost prices for deposit instruments rose form 4,6% in 2006 to 4,92% in 2007. However, output derived from these deposit instruments more than doubled.

[3] The average rate of interest for this instrument (not presented) was 12% in 2005, whereas in subsequent years it dropped to 1,7% and 0,2%.

Table 3

Costa Rica. Imputed gross output of intermediation services for State-owned banks, user cost approach. 2005

Millions of colones

	(1) Average balance	(2) Interest income / expense	(3)=(2)/(1) Average rate of interest	(4) Average user cost price *a/*	(5)=(4)x(1) Imputed gross output
Assets	2.809.981,96				
Cash and banks					
Cash balances	43.823,39				
Demand deposits in Central Bank of Costa Rica	274.736,54				
Checking accounts and demand deposits: national financial institutions	3.685,28	10,01			
Checking accounts and demand deposits: foreign financial institutions	80.787,39	744,69			
Other, cash and banks	37.577,80				
Investment securities and time deposits					
Time deposits	45.752,03	1.315,97			
Investment securities, Government and Central Bank of Costa Rica	866.753,48	45.033,03			
Other investment securities	219.809,09	4.889,81			
Loans	1.022.521,44	85.232,93	8,34	2,01	20.507,32
Accounts receivable	33.428,32				
Bank premises and equipment	98.195,08				
All other assets	82.912,11				

Table 3 (cont)

Costa Rica. Imputed gross output of intermediation services for State-owned banks, user cost approach. 2005

Millions of colones

	(1) Average balance	(2) Interest income / expense	(3)=(2)/(1) Average rate of interest	(4) Average user cost price *a/*	(5)=(4)x(1) Imputed gross output
Liabilities	2.554.395,88				
Obligations with the public					
Demand deposits	1.234.008,42	18.157,62	1,47	4,86	59.955,12
Other demand obligations	12.839,10	586,31	4,57	1,76	226,41
Time deposits	1.015.193,84	36.950,42	3,64	2,69	27.311,35
Other obligations with the public	79,92	0,91	1,13	5,20	4,15
Obligations with the Central Bank of Costa Rica	608,26	47,59			
Obligations with financial entities	197.797,62	2.368,15			
Other liabilities with non financial entities	93.868,72	48,35			
Total equity capital	255.586,07				
TOTAL IMPUTED GROSS OUTPUT					108.004,35

a/ Reference rate: 6.33.

Source: own elaboration with data from SUGEF, BNCR, BCR and BCAC.

Table 4

Costa Rica. Imputed gross output of intermediation services for State-owned banks, user cost approach. 2006

Millions of colones

	(1) Average balance	(2) Interest income / expense	(3)=(2)/(1) Average rate of interest	(4) Average user cost price *a/*	(5)=(4)x(1) Imputed gross output
Assets	3.445.574,62				
Cash and banks					
Cash balances	54.590,00				
Demand deposits in Central Bank of Costa Rica	402.746,72				
Checking accounts and demand deposits: national financial institutions	3.439,55	30,63			
Checking accounts and demand deposits: foreign financial institutions	59.211,47	1.441,84			
Other, cash and banks	36.496,58				
Investment securities and time deposits					
Time deposits	54.150,48	3.304,81			
Investment securities, Government and Central Bank of Costa Rica	748.118,57	40.624,66			
Other investment securities	475.473,99	13.402,60			
Loans	1.360.560,59	104.819,68	7,70	1,41	19.240,41
Accounts receivable	36.179,00				
Bank premises and equipment	120.613,85				
All other assets	93.993,82				

Table 4 (cont)

Costa Rica. Imputed gross output of intermediation services for State-owned banks, user cost approach. 2006

Millions of colones

	(1) Average balance	(2) Interest income / expense	(3)=(2)/(1) Average rate of interest	(4) Average user cost price *a/*	(5)=(4)x(1) Imputed gross output
Liabilities	3.106.522,50				
Obligations with the public					
Demand deposits	1.498.635,02	19.854,45	1,32	4,97	74.409,69
Other demand obligations	14.001,28	518,61	3,70	2,59	362,07
Time deposits	1.229.468,68	51.240,53	4,17	2,12	26.093,05
Other obligations with the public	847,09	6,82	0,81	5,48	46,46
Obligations with the Central Bank of Costa Rica	478,16	23,10			
Obligations with financial entities	235.464,85	3.453,69			
Other liabilities with non financial entities	127.627,42	13,77			
Total equity capital	339.052,12				
TOTAL IMPUTED GROSS OUTPUT					120.151,69

a/ Reference rate: 6.29.

Source: own elaboration with data from SUGEF, BNCR, BCR and BCAC.

Table 5

Costa Rica. Imputed gross output of intermediation services for State-owned banks, user cost approach. 2007

Millions of colones

	(1) Average balance	(2) Interest income / expense	(3)=(2)/(1) Average rate of interest	(4) Average user cost price *a/*	(5)=(4)x(1) Imputed gross output
Assets	4.065.044,15				
Cash and banks					
Cash balances	66.711,89				
Demand deposits in Central Bank of Costa Rica	487.935,72				
Checking accounts and demand deposits: national financial institutions	3.915,56	26,07			
Checking accounts and demand deposits: foreign financial institutions	49.397,86	837,30			
Other, cash and banks	46.433,86				
Investment securities and time deposits					
Time deposits	58.370,88	2.034,92			
Investment securities, Government and Central Bank of Costa Rica	679.744,74	26.502,23			
Other investment securities	440.662,71	10.216,95			
Loans	1.938.497,39	117.300,36	6,05	0,85	16.498,49
Accounts receivable	40.902,38				
Bank premises and equipment	138.775,79				
All other assets	113.695,37				

Table 5 (cont)

Costa Rica. Imputed gross output of intermediation services for State-owned banks, user cost approach. 2007

Millions of colones

Liabilities	3.657.208,43				
Obligations with the public					
Demand deposits	1.936.078,42	13.187,52	0,68	4,52	87.488,56
Other demand obligations	17.470,38	243,61	1,39	3,81	664,85
Time deposits	1.257.048,91	40.161,38	3,19	2,01	25.205,16
Other obligations with the public	934,64	9,62	1,03	4,17	38,98
Obligations with the Central Bank of Costa Rica	434,62	10,22			
Obligations with financial entities	284.694,96	3.966,26			
Other liabilities with non financial entities	160.546,50	24,63			
Total equity capital	407.835,72				
TOTAL IMPUTED GROSS OUTPUT					129.896,04

a/ Reference rate: 5.20.

Source: own elaboration with data from SUGEF, BNCR, BCR and BCAC.

Table 6

Costa Rica. Imputed gross output of intermediation services for product innovations from State-owned banks. 2005–2007

Millions of colones

	2005					2006					2007				
	Average balance	**Interest income/ expense**	**Average rate of interest**	**Average user cost price**	**Imputed gross output**	**Average balance**	**Interest income/ expense**	**Average rate of interest**	**Average user cost price**	**Imputed gross output**	**Average balance**	**Interest income/ expense**	**Average rate of interest**	**Average user cost price**	**Imputed gross output**
Assets															
Credit innovations	104.702,25	9.306,04	8,89	2,56	2.678,38	159.959,02	13.590,06	8,50	2,21	3.528,64	207.125,50	19.831,4	9,57	4,37	9.060,87
Liabilities															
Deposit innovations	1.279,79	156,14	12,20	-5,87	-75,13	3.728,71	62,93	1,69	4,60	171,60	9.827,42	27,05	0,28	4,92	483,97
Imputed output from innovations					**2.603,26**					**3.700,24**					**9.544,85**
Total imputed output for the banks					**108.004,35**					**120.161,69**					**129.896,04**
Weight of output from innovations					**2,4%**					**3,1%**					**7,3%**

Source: own elaboration with data from SUGEF, BNCR, BCR and BCAC.

6. Concluding remarks

The results of the study show that the banks considered rely heavily on traditional products for the provision of their intermediation services. This reflects the conservative character of State-owned banks in Costa Rica, and might indicate the weight of innovation output across the whole financial system. However, given that in the Costa Rican private financial intermediaries traditionally have been more innovative, it would be only natural to extend the scope of the study to include data on product innovations from a more heterogeneous group of intermediaries. The success of such endeavour, as in this study, depends critically on the disposition of the intermediaries to provide information.

Although it is still low, the importance of innovations on total intermediation output grew steadily during the period considered. Several intermediaries have reported that new products were planned to be introduced during 2008, like loans specific for payment of tuition costs and several deposits with specific purpose. Hence, it is likely that such upward trend continues, because the drive for innovation in the Costa Rican financial system persists.

Annex 1

Costa Rica. Institutions of the National Financial System. 2007

	Number of institutions	Share of active credits	Share of total assets
State-owned banks			
State-owned commercial banks	3	39.9%	45.4%
Banks created by special laws	2	10.1%	10.8%
Private banks	12	33.8%	28.7%
Savings and credit union of the National Teachers Association (ANDE)	1	2.2%	1.8%
Non-banking financial institutions	7	2.1%	1.6%
Savings and credit cooperatives	31	8.8%	7.6%
Mutual savings institutions (from the National Financial System for Housing)	2	3.2%	4.1%
Exchange bureaus	3	0.0%	0.0%

Source: General Superintendency of Financial Entities of Costa Rica

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