"THE MEASUREMENT OF BANKING OUTPUT AND THE TREATMENT OF INTEREST IN THE SYSTEM OF NATIONAL ACCOUNTS"

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MEASUREMENT OF BANKING OUTPUT IN THE SYSTEM OF NATIONAL ACCOUNT

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ABSTRACT

The satisfactory measurement of banking output has eluded statistical agencies since the inception of national income accounting. At the heart of the problem is the treatment of interest. Net interest payments are considered part of the output originating in the paying industries. When applied to the banking sector this practice results in unrealistically low or even negative output and an imputation is carried out to rectify the problem. This thesis identifies the problems surrounding the existing concepts and practices, discusses alternatives that have been proposed and develops a new approach to measuring banking output. The rate of interest is decomposed into a transfer and a service part and economic prices for banking services are constructed. Thus, nominal and real banking output are obtained in a straightforward manner. Empirical work points to the viability of the new approach.

RÉSUMÉ

Depuis l'introduction de la comptabilité des comptes nationaux, les mesures satisfaisantes de la production bancaire ont échappé aux agences statistiques. Au coeur du problème se trouve le traitement de l'intérêt. Les paiements d'intérêt net sont considérés comme étant une partie de la production en provenance des industries débitrices. Cette pratique, lorsqu'appliquée au secteur bancaire, résulte en une production invraisemblablement basse voire même négative. Une imputation est alors utilisée pour résoudre le problème. Cette thèse indentifie les problèmes entourant les pratiques et concepts existants, discute d'alternatives qui ont été proposées et développe une nouvelle approche pour la mesure de la production bancaire. Le taux d'intérêt est décomposé en ses parties transfert et service et nous contruisons des prix économiques pour les services bancaires. Ainsi, la production bancaire nominale et réelle sont obtenues de façon directe. Des travaux empiriques montrent la viabilité de cette nouvelle approche.

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INTRODUCTION

The dynamic relationships between savings, investment and consumption financing, and output have reserved a place for the 'financial sector' even in simple circular-flow-of-income modelling. In the real world, financial intermediaries - especially banks - have long been integral parts of monetary economies. Consequently, the meaningful monitoring of these economies requires quantification of the activities of the banking sector[1]. This need has become more pressing in view of this sector's apparent rapid rate of growth and its expanding involvement in international trade. The need for meaningful measures is especially important for countries such as Switzerland and Luxembourg, given the significance of the banking sector in their economies.

The satisfactory measurement of nominal and real banking output (both gross output and value-added) has eluded statistical agencies since the inception of national income accounting half a century ago. However, some aggregate measures, were necessitated by the desired completeness of the national income accounting framework. This was done in more or less *ad hoc* ways.

At the heart of the problem regarding banking output is the treatment of interest in the national accounts. Since the inception of national income accounting, interest payments have been seen as factor payments for the borrower and as transfer income for the lender. As a result, net interest

[1] *Although there is no denying that differences among financial institutions do exist, from now on reference to 'banking' will be used as a short-cut for all those deposit-accepting financial intermediaries that are subject to the theme of this work.*

payments are part of the output originating in the paying industries. These are non-financial (debtor) industries and have positive net interest payments. Consistency in the closed national income accounting loop requires that the same treatment is also carried out in the financial industries ('banking'). For banks, however, net interest payments are negative, since banks make their money principally through net interest receipts. Thus, adding net interest payments to the banks' output results in unrealistically low or even negative output.

To avoid this problem of excessively low measured output, a value for banking services, equal to the net interest received by banks, is imputed. This is based on the logic that banks and depositors short-circuit the market process and barter 'free' services for foregone interest.

This procedure, although it rectifies the problem of aggregate banking output, means that interest payments are now counted twice, as output of both the paying industries and the banks. Thus, the economy-wide output is overestimated by the value of the imputation. To correct this, a fictitious financial industry is created with the same negative output. Furthermore, the imputed value for the bartered services must be allocated by type of service (loan and deposit) and by sector. The U.N. recommendations and the U.S. practices do not allocate any output to loan services provided by banks. The Canadian practice does, acknowledging the provision of both types of services. However, the way this allocation is done is flawed, since it identifies borrowers

with businesses and depositors with households and ignores the foreign sector.

These are general problems with the way banking output is measured. Several others exist as well, resulting in unsatisfactory output measures.

Banking poses a unique problem for national accounts since no other single industry permeates all facets of the economy to the extent that it does - both in the industrial and the sectoral sense. As a consequence, postulated changes will have widespread repercussions throughout the system. This may explain a good part of the reluctance of statistical agencies to change. The other part is due to the lack of a satisfactory methodological alternative.

The lack of satisfactory output measures have placed several limitations on the work of economists, researchers and policymakers. First, it severely constrains the economic analysis of the activities of financial institutions since output has always been one of the central variables examined in such analyses. Second, productivity studies in the financial sector and studies of economies of scale, economies of scope and the effects of deregulation cannot be meaningfully performed. Third, it has often been cited as the main reason for the inability of governments throughout the world to impose taxes of the value-added type on the services provided by the financial institutions[2] (Sales Tax Reform 1987, Garber and Raboy 1989, Hoffman, Poddar and Whalley 1987).

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[2] *"One of the most difficult subjects concerning value-added taxes is the imposition of such taxes on the financial services sectors. Conventional wisdom has held that, for a variety of reasons, financial services are not conducive to value-added taxation. In the overwhelming majority of countries which currently impose a VAT, most financial services are exempt from the tax" (Garber and Raboy 1989, p. 163).*

For instance, the recent imposition of the Goods and Services Tax (GST) in Canada exempted banks because of this reason (Sales Tax Reform 1989).

In order to remedy the situation, several alternative approaches have been proposed by researchers over the years. One of these approaches identifies the problem in the treatment of the interest and argues that interest payments should be treated, in their entirety, as payments for the purchase of services. Adoption of this approach would necessitate the creation of a productive household sector, since interest payments corresponding to household deposits would be seen as payments for services produced. This is hardly practical, since economic theory and national accounting both view households as the providers of labour and not as direct producers of output.

Another approach, influenced by the practices of the U.S., argues for the inclusion of loan services, together with deposit services, as part of banking output. Although, this would be a positive development in the U.S. practices, it would, more or less, duplicate the Canadian practice. Therefore, it can hardly solve the problem.

Another approach argues that the issue of banking output cannot be properly resolved unless it is placed within a macrotheoretic context, which takes into account the intricacies of the relationship between the commercial banks and the central banks. It argues that the problem arises because of regulation and it would not happen in a freely competitive environment.

A fourth approach attempts to establish the microeconomic foundations

of the production of banks and presents the view that some deposits (e.g. term deposits) are best seen as inputs in the production of other deposit services (e.g. demand deposits) and loans. However, the assignment of input/output status is left on econometric estimation. This means that a certain commodity could change from an input to an output in different periods. Although a useful exercise for some purposes, this does not have practical applicability for output measurements.

A final approach argues that the rate of interest is a composite and that it should be decomposed to its parts, one of which is indeed a transfer and others represent prices for distinct services. But the services identified, such as the time, quantity and geographical transformation of financial capital as well as the functions of money itself, are not quantifiable. The thinking behind this proposed alternative, though, is quite appealing and consistent with the actual workings of banks.

In general, these suggested approaches have not offered any empirical work in order to judge the plausibility of the results they would yield. As a factual matter, adequate measurement of banking output has never been available. Finding a sound and practical conceptual and methodological alternative is important. This is what this thesis sets out to do.

This thesis develops an approach that aims directly at measuring banking output. This is done by identifying the quantities of various categories of loan and deposit services provided by the banks by their outstanding stocks (assets

and liabilities, respectively) and uncovering their underlying prices. These are shadow or econornic prices and come in the form of rates, since the quantity unit is money. Among the building blocks of the model is a view of the rate of interest which lies between the two extremes - the current method that views it as a transfer and one of the proposed alternatives that views it entirely as service payment. We argue that the visible or accounting prices charged by banks, in the form of interest rates and explicit service charges, are composites. They comprise both a transfer part, the "pure rate of interest", and a part that represents the prices for the services provided. The former is a transfer channelled through the banks from the borrowers to the ultimate lenders, the depositors. The latter are prices in the form of rates since the quantity unit is money.

Special attention is paid to the fact that the stock of deposits always exceeds the stock of outstanding loans. This is reflected in the specification of the equation for the deposit service rates and is carried through to the proposed specifications for the pure rate of interest. Then the service rates are estimated and output is derived in a straightforward manner. No need for imputation arises. The estimation of real output, by means of the same methodology, is also straightforward due to the presence of prices. Moreover, the fact that the various economic sectors act in both capacities, as borrowers and depositors, is recognized and the methodological treatment is proposed.

This thesis considers the reality of banks, identifies the problems

surrounding the measurement of banking output, develops a viable alternative, carries out extensive empirical work and analyzes the results. It is organized along the following lines.

Chapter One looks at how financial institutions operate. This is done first through a review of the literature so that various views can be discussed; and second through direct observation and examination of the real state of the affairs of the industry. This results in the outline of an informal model that sets the stage for the development of the formal one.

Chapter Two identifies the so-called "banking imputation riddle", illustrates how it has been dealt with in actual practice and discusses the problems and limitations associated with the existing approach.

Chapter Three surveys and critically evaluates the alternative approaches that have been proposed and explains why none of them can be a viable replacement to the existing practices.

A formal approach is developed in Chapter Four. The approach for the measurement of both nominal and real banking output is developed from "first principles" and presented in a mathematical formulation. It is the first time that a model is so explicitly developed, not as a general guide but as a precise methodology.

Chapter Five contains extensive empirical work that is carried out and examines the plausibility of the results. This Chapter also discusses the analytical findings, compares and contrasts them to existing ones, and points

to innovative ways of analysis by means of the new data. Illustrations are provided.

Chapter Six addresses two issues related to the main work of this thesis, namely the treatment of the central bank in the national accounts and that of the interest on the public debt. Existing and proposed approaches are critically discussed.

Finally, Chapter Seven summarizes the main conclusions. It is followed by the bibliography.

CHAPTER ONE: THE NATURE OF BANKING

In some respects, the level of sophistication of thinking with regards to banking is lamentably elementary compared to other issues economists have long dealt with for other parts of the economy[3]. What are the inputs and what are the outputs? What are the units and what are the prices? "In few topics of economic measurement are the issues so primitive" (Triplett 1991, p. 1).

Considerable research is being done to improve the understanding of the role of financial institutions in the face of a changing environment within which they operate. For instance, banks are under increasing pressure from international competition as traditional depositors and borrowers move to alternative modes of saving and borrowing, corporations increasingly resort to issuing their own debt instruments directly in the market (securitization) and, generally, the dividing lines between various organizational forms of financial institutions become blurred.

At the macroeconomic level of analysis, the central role of commercial banks in their money creation capacity has long been established. Nonetheless, at a more micro level, there has been much controversy among various strands of the literature as to what banks do and what services they provide. Failing to establish a view on what banks produce amounts to failing to measure their output. Several views of what banks do and what they produce have been

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[3] *This is generally a problem in the area of services. Economists have been complacent with the aggregation of "goods and services" and have neglected the special problems posed by and the intricacies associated with services.*

advanced. Drawing analogies from non-financial firms has always been part of the efforts to communicate diverse views, by using commonly understood concepts from the more familiar world of goods. All approaches try to find analogies between specific banking models and models that are typical in non-financial industries.

1.1. What do banks do

In all the essential ways, financial intermediaries operate in the same fashion as any other firm. They employ factors of production, transform them to produce gross output, have intermediate consumption and generate value-added. The peculiarity of the sector's production process lies in that money not only serves as the accounting unit but constitutes the traded unit, too. As in all service-producing industries, identification of individual commodities that account for the value-added is far from trivial. Nonetheless, for practical purposes, acceptable proxies can be defined for the multi-product output of banks at any given level of desired disaggregation.

As an economic system becomes more complex there is a growing need for organizing the division of labour and other resources by the use of money. Financial institutions and capital markets facilitate the flow of credit from savings into consumption and investment. Thus, the lack of self-financing becomes less of a hindrance in initiating either production or consumption. "In a credit-oriented economy, the lack of *owned* resources need not frustrate consumption or production" (Sunga 1967, p. 27).

Financial institutions bring together available funds and pool them to provide loans tailored to borrowers' requirements. Business operations of banks are not different from those of other enterprises. They combine various inputs to produce outputs, compete with each other and other financial institutions and offer a number of services to attract both depositors and lenders. "Accordingly, banks' practices of providing certain services without explicit charges are normal to competitive business operations and there is no justification for 'free' services..." (Sunga 1984, p. 338).

There is no doubt that banks and depositors do barter, in a sense. But what this kind of bartering is suggestive of, is not that banking services are not paid, but that they are paid differently - not by explicit prices but through prices ***hidden*** in the interest spread. There are several good reasons, such as the excessive cost of monitoring detailed transactions by account, the cost of billing and collecting, the tax treatment of interest income as well as the regulation of banks that give neither banks nor depositors any incentive to change their established behaviour[4]. What transpires though, is the outcome of an entirely rational market functioning. In essence, banks and depositors settle for one ***net*** payment rather than two gross ones. From an accounting viewpoint, both revenue and expense sides of a bank's income statement are reduced by the same amount.

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[4] Until 1980, U.S. legislation prevented banks from paying interest on chequable deposits. Under this scenario, banks could not compete for funds through interest rates, but they could through 'free' services. This, however, could explain the provision of free services in the U.S. but not in Canada.

Any proposed method for measuring the output of banks ought to be able to explain both their creation and their presence. A brief digression would help establish a perspective and shed valuable light into today's functions and services of banks, which we ultimately wish to unveil and measure.

1.1.1. Synoptic history

Banks initially sprang by the practical necessity to keep one's valuables safe and subsequently by the convenience of not having to physically carry them to transact in the market place. Depositors were given a receipt for the deposit of their gold or money. Upon demand they could get it back for a fee. That was accomplished by paying the keeper - the goldsmith. The idea of exchanging certificates of deposits (precursors of cheques) was a side effect of the safe-keeping services and was made possible by the "anonymity" quality of money (see Samuelson, Nordhaus and McCallum 1988). These forerunner banks offered, quite clearly, ***deposit services***. The important step that led to the creation of true banks was the observation of the goldsmiths that, on the average, only a small fraction of the deposited stock of money was claimed. They could profit by lending much of it for a price proportional to the loan - interest. (Again the anonymity of money was a major factor). Interest came to reflect the risk assumed for potential default. This gave rise to ***loan services***.

These initial developments led to equally important dynamics which further defined banks. They are still pertinent characteristics of the banking system. Depositors realized that banks were profiting out of their money; and

banks, seeing the profitability of their venture, did not want to rely solely on voluntary deposits but, also, to induce them. Carrying this in mind, we proceed to the functions of the banks.

1.1.2. Bank functions

Much emphasis has been placed on the intermediation function of banks. It cannot be denied that banks do act as intermediaries. But they do more. In general, loans are being re-deposited. This is the money-creation function of banks, the extent of which is denoted by the money multiplier in a system with reserves[5].

We established that banking services can be decomposed into ***deposit services*** and ***loan services***. Moreover, each of these broad categories can be broken down further, to deposit and loan ***commodities*** (products) which would fetch different economic prices. Our approach aims at measurement. Hence, these commodities must be defined in such a way as to be measurable. Other approaches of 'unbundling' describe banking services from a utility point of view. There is no doubt that, in an intrinsic sense, banks do produce the following services:

- **Quantity transformation of financial capital:** Savers save in different quantities than borrowers want to borrow. Either side could be small or large. Practically, individual savings are small and loans are large. Banks match these

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[5] *Indeed, banks could create deposit money even in a societal setting with no interest and no reserves. All that is required is the gap between the stock of deposits and the demand for withdrawals. Both deposits and loans would be charged explicit fees. The latter would have to reflect the risk for default.*

different quantity preferences.

• **Time transformation of financial capital:** The time horizons of borrowers do (need) not correspond to those of the savers. Banks match time preferences by making the process impersonal through the pooling of available funds. A certain borrower does not borrow from a certain depositor. In fact they never meet. The pool of funds remains intact even though individual transactors may get in and out.

• **Geographical transformation of financial capital:** Banks - multi-branch banking, in particular - make funds available for investment financing in areas where savings may be scarce and so they help regional development. "Anonymous" financial capital is not constrained by space.

• **Sectoral transformation of financial capital:** Funds are shuffled among saving and finance-seeking industries. For instance, infant industries can be said to have been financed by mature saving industries. The adequate generation of savings - and subsequently expansion-financing - is not a characteristic of new and capital-hungry industries. In the same vein, intertemporal matching of individuals with high and low time preferences are matched.

• **Accommodation of risk preferences:** These differ among savers and borrowers. The degree of risk aversion of individual savers (be they individuals or businesses) is neutralized by the channelling of funds through banks. No depositor can make his funds with a certain bank conditional upon that bank

not financing certain types of loans. Nor does he have to.

- **Inflation protection:** Money holders, from a liquidity-preference standpoint, can get partial protection for their purchasing power through bank deposits. Nominal rates of interest increase by the rate of inflation and thus bank deposits are far superior to idle cash. This is a distinct service and can be said to have augmented the traditional deposit services offered by banks in inflationary times.

Others argue that the list should also include the functions of money itself, that is, unit of account, medium of exchange and store of value (Mamalakis, 1987).

Services identified on the basis of utility do not render themselves to measurement. They can, however, be measured through consumption - just as goods are. This brings us to another level of aggregation; a level where banking services include all the various categories of loans and deposits that are used to satisfy these intrinsic services and for which different prices can be economically justified, such as consumer loans, mortgages, demand deposits and chequable term deposits.

These shadow or economic prices follow from underlying market demand and supply conditions. For instance, the demand for a certain loan is a function of the interest rate charged, among other variables. But the demand, on the part of the bank, for deposits is an "induced demand", since it depends on the demand for loans, and is a function of the differential between the interest rate

charged on loans and that paid on deposits. This interest rate differential does not remain constant - either in nominal or in real terms - but changes, also reflecting market conditions. Take, for example, a hypothetical situation, characterized by a certain degree of inter-bank competition and a given level of explicit charges, in which the banks' idle reserves exceed an exogenously given reserve requirement ratio (RRR). When the demand for loans increases, banks may initially be in a position to accommodate it chiefly through existing stocks of funds. So, banks are able to extract a higher price from the borrowers. However, if the demand for loans continues to increase as the RRR limit is approached, the banks' demand for deposits increases and results in a higher interest rate paid to attract them. It is highly unlikely for the interest rate spread to remain unchanged throughout the adjustment from one equilibrium point to another since it would require that the demand and supply functions involved in the process have the same price elasticities[6].

A lower level of commodity aggregation can be conceived of, where detailed accounts of the means used by the bank to provide the services at the higher level of aggregation, are viewed as services themselves - the smallest units, such the number of visits to the teller or the ATM[7]. Measurement of

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[6] *Note that the own price elasticity increases as we move from general to specific services, i.e. total deposits vs. demand deposits.*

[7] *Levels of aggregation in measuring output should not be judged on a right/wrong basis. They are best assessed by their practical applicability. This perennial problem touches on philosophical spheres and is related to the desired perspective. For instance, somebody can be thought of as an* ***one-billionth*** *of a community with a population of one billion; as* ***one*** *individual; or as several* ***billions*** *of molecules!*

these 'atomic units' would require counting the number of cheques cleared, book updates, frequency of deposits and withdrawals and the like. Such a level would confuse between ***what*** the buyers want to buy and ***how*** the banks offer it at some point in time - the product versus instrument problem.

To approach the issue from another angle, assume that one wants to buy the service of having her money safe at the same time at which she is able to withdraw chunks of it at will, e.g. she wants to buy a demand deposit service. Does she care about the material of the bank's safe or the skills of the night guard? If yes, would these considerations be reflected in her offering price? Maybe yes. But this can be thought of as a packaging problem.

Now, consider a progression of means that allow her to access her money and which contain a progressively higher service component: visits to the bank and personal contact with a human teller (yesterday); use of the closest ATM (today); and home delivery (tomorrow?). The question is whether she would be willing to pay a higher price as we move up the scale. The answer is, probably yes. But that would be indicative not of more ***quantity*** bought but rather of improved ***quality*** of the product - as we conventionally understand it. Also, she would probably be willing to pay more, the more withdrawals she makes within a period. However, all of the above are captured in the price of the demand deposit service itself as prevailing at some point in time rather than through the volume series of the transactions. This price certainly reflects the average amount of such atomic transactions due to the

consideration of production costs, which are known to the bank. (The above do not purport to rule out capturing of these quality changes via some sort of hedonic price indexes).

The preferable level of aggregation, which is measurable and viable over time, is the one that includes those commodities (categories of deposits and loans) that carry different market prices. (Practically, this level of aggregation comprises several layers which are shown in Chapter 5, Table 3). In determining an appropriate level of commodity aggregation parsimonial tactics could help. For instance, according to the aggregation or index-number problem, the value of output obtained changes as we move to more detailed commodities. If in the process of doing so the results do not change significantly, it may be judged safe to stop. Practically, data constraints may come into play as well. In any event, this problem is not specific to banking services.

1.2. Views of banking operations

Over the years several views of the way banks operate have emerged. Some of them result directly in views concerning the treatment of interest and the measurement of output. Others start from a different perspective and their primary purpose is to deal with such issues as the effects of deregulation, economies of scale, economies of scope and to perform productivity analyses. In so doing they touch on the issue of output measurement more than

peripherally[8]; in fact, they need measurements of multi-commodity output. Yet, others are chiefly concerned with the broader regulatory environment surrounding banking and are mainly macrotheoretic.

In our effort to measure banking output, we must first understand how banks operate and what they do. For this, as a first step, we present the diverse views that have emerged in the literature. Then, with their relative insights in mind, we proceed into direct observations about the real state of banking affairs.

1.2.1. Banks as producers of deposit services

Most of the issues dealt with in the origins of the national accounts literature revolved around the treatment of interest and the subsequent interest flows. However, banks were effectively seen as providers of deposit services only (Yntema 1947, A System of National Accounts 1968). Moreover, these services were provided only to households and governments.

Another view of banks that points to the production of deposit services came from the "liquidity" approach. According to this, liquidity is a service provided to depositors who prefer this to alternative, less liquid investments.

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[8] Much research has concentrated on economies of scale and economies of branch versus unit banking, something that requires cross-sectional data on output. Questions such as what would be the effects of industry deregulation on the concentration and the competition in the industry or what products would be affected between banks, insurance and other financial intermediaries have been addressed. Studies of that nature require reliable output measures not only in aggregate form but also by product line. Given the lack of such measures, output has circumstantially been defined as total gross revenue, total assets, or total deposits. Some studies indicated substantial returns to scale in that operating costs declined with output. But, as has been pointed out, these result may be illusory since larger banks have a larger average size of loans and deposits and therefore produce a mix of products essentially different from smaller banks (Benston, Hanweck and Humphrey 1982, Geehan and Allen 1978).

As Bailey (1971) puts it, the bank "in exchange for its services in connection with deposits, and for their comparative liquidity, it receives these deposits at low interest compared with what the depositor could earn on alternative, less liquid assets" (cited in Triplett 1991, p. 3).

The liquidity view explains why deposit services are indeed provided and why they earn relatively low interest. But it cannot explain the SNA banking model because, as it has been observed, the alternative would be that depositors would receive all the interest the borrowers pay. There is no room for "margin" for the banks. This is the reason that led Triplett (1991, pp. 3-4) to say that "depositors own liquid assets...without paying a liquidity premium". This is not the case, though. As we shall show, even in the absence of explicit pricing for banking services, depositors do pay a liquidity premium.

Banks have also been modelled as suppliers of deposit money, a view quite consistent with macroeconomic theories and the realities of money creation. Undoubtedly, banks are part of the money creation function. Models in which banks produce money can be found in Pesek (1970), Towey (1974) and Saving (1977). These models reject the idea that loans can be part of banking output; banks are seen as intermediaries who use monetary deposits to buy real assets (Niehans and Hewson 1976). Deposits are just securities that banks sell and loans securities that they buy. In short, banks are just a collection of financial assets and liabilities. However, the reality of banking points to more than that. As Baltensperger (1980, p. 27) put it "of course, it

is true in a formal sense that a financial firm is nothing but a collection of assets and liabilities. But so is General Motors..."

1.2.2. Banks as producers of loan services

Another strand of the literature, exemplified with the "intermediation model" views banks essentially as acting agents for depositors in order to channel their collective savings. In that context, it is only bank assets that are associated with the production of output. Thus, the whole production is that of loan services. Deposits are but one of the inputs that goes into the production process (Fama 1980, Mester 1987). This, however, does not explain why these inputs do not fetch explicit market prices and why their owners accept this trade if they do not derive any services from it. The authors acknowledge that they agonized over the input/output status of deposits.

1.2.3. Banks as producers of a "bundle" of services

A different view of banking production is offered by Mamalakis (1987). In one interpretation of his work, he approaches the services produced from a utility rather than a consumption viewpoint. Although he only provides general guidelines as to how to banking output could be measured, we shall look in some detail at the insights Mamalakis' work has to offer, since we draw on it later.

He states that "...financial intermediaries do indeed have an output, do use factors of production in producing their commodity type financial services,

do have intermediate consumption and that economic welfare is augmented significantly by the services produced by them" (Mamalakis 1987, p. 170). In fact, banks produce a bundle of services which must be unbundled and measured. (This is why he refers to the traditional approach as the "bundle" approach and his own as the "unbundle" approach). In order to do that, he asserts, the starting point is that we must separate "the theory of interest rates" from "the theory of financial services" and examine the interdependence between the two. The former, he argues, relates to the market for a factor of production whereas the latter relates to the market for a sectoral output and its conditions.

The interest rate, as a term, is a misnomer. It is a composite price consisting of "pure rate of interest", "payments for services", and "unilateral transfers" and "...the interest rate problem in the national accounts exists because we lack a theory on the basis of which we can separate the distinct services contained in the interest rate basket and place them in the accounts where they correctly belong" (Mamalakis 1987, p. 171).

The pure rate of interest is that part earned by and paid to the owners of financial capital; it can be seen as a reward for abstinence - much like Marshall's 'waiting' (1920, p. 34).

According to Mamalakis, the payment-for-service part of the interest rate corresponds to the services of the transformation of financial capital provided by the banks. It is itself a composite price for six distinct services: the time

transformation of financial capital; the quantity transformation of financial capital; the transformation of the space or the location dimension of financial capital; and the functions of money itself, that is unit of account, instrument of transactions and store of value. Each of the above is responsible for a surcharge on top of the pure rate. Furthermore, this surcharge contains a part that represents value-added by the intermediary and another part that represents intermediate consumption.

By "unilateral transfers" Mamalakis refers to that part of debt that has not been used productively, either for consumption or for investment, and cannot be repaid, i.e. bad debts[9]. It is "...the premium paid by the borrower, beyond and above the pure interest rate and the financial intermediation and related charges described earlier, to cover that part of loans which in reality reflects explicit or implicit unilateral transfers and cannot be repaid" (Mamalakis 1991, p. 185).

Mamalakis' work is insightful in many ways. He bridges some of the gap between the thinking in the literature of national accounts and that of the financial firm. His notions of the decomposition of the rate of interest and financial intermediation charges is extremely useful[10]. However, because of

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[9] *For this bad debt he sees three solutions. First, financial adjustments, including bankruptcy and market clearance for firms, households or governments. Second, inflation which converts unproductive debts into unilateral transfers. Third, increase in government debt that would rise as a substitute for the previous two.*

[10] *"The term 'interest rate' should not be used to describe the revenues of the financial system or the charges on loans", he says. He suggests that banks should separate on their bills the pure rate of interest, the financial intermediation charge and the other charges.*

his choice of "commodities", his approach is not practical. As he acknowledges, many of these alleged services are produced "jointly and synchronously" and it is difficult to estimate their contribution to banking output.

1.2.4. Banks as producers of community services

Haig (1986) regards banks as producers of community services; their contribution to output should therefore be measured at factor cost. Implicit service charges would be equal to the difference between the estimated value-added and explicit service charges. Arndt (1984), also sees banks as providing community services such as the creation of money, the holding of deposits, record-keeping, safe-keeping and 'borrower services' such as funding projects and providing signals of creditworthiness.

1.2.5. Banks in a macrotheoretic context

For Rymes, "...regardless of what treatment of interest payments and receipts is followed, a satisfactory measurement of the outputs and inputs of financial intermediaries, in particular banks, without a theory of the role and the significance of central banks or Monetary Authorities in determining the different levels of interest rates on loans and deposits and service charges will *not* be forthcoming" (Rymes 1986, p. 425). He argues that "by the very nature of the problem, the attempted measurement of banking output must recognize that such output can be ascertained only within the confines of a general equilibrium framework of banking and monetary analysis" (Rymes

1989, p. 381). His concern is both with the practised imputation as well as the alternative treatment (Sunga 1967 and 1984 and Ruggles and Ruggles 1982), in that the economic theory behind them is "most unclear".

Banks, together with other financial institutions, perform the principal banking functions of providing fiat circulating notes and coins on demand and a wide spectrum of chequing privileges which ensures that the intermediaries' main liabilities are close substitutes for notes and coin for exchange or "transaction" services. Together with this "banking function", banks also perform the "portfolio or intermediary function". "They assemble supplies of money from households, firms and governments and make a wide variety of loans to different households, firms and governments. While these two functions...are intertwined, their analytical separation is mandatory" (Rymes 1986, p. 428). Given that these two functions of banks are costly, it is only reasonable to assume that banks will levy service charges. "...those liabilities of the intermediaries derive these two services - i.e. the liabilities of the financial intermediaries provide a mechanism whereby owners of the liabilities are thereby able to tap simultaneously and jointly the two services..." (Rymes 1986, p. 429).

The production of these services is a function of labour, capital and the services of high-powered, fiat money or reserves. The services of the reserves stand for the services of the monetary authorities and come in the form of clearing arrangements and deposit insurance and can be obtained only through

such deposits. As Tobin (1982) remarked, they are required to do so even in a world with deposit insurance due to monetary policy which operates through the commercial banking system.

In this setting, Rymes proceeds to examine the link between monetary authorities not paying competitive interest on reserves, the spread between interest on loans and deposits as well as the accompanying fact that explicit service charges are not equal to their marginal costs of production. He does that both from a Neoclassical and a Keynesian perspective.

In the new Neoclassical monetary theory of private and central banking (Fama 1980, Hall 1982) banks are assumed to be competitive and provide both aforementioned services. In this world the non-payment of competitive interest on reserves is seen as a "distortionary tax". In fact, as Rymes puts it, it is "...exactly the same as the Monetary Authority 'taxing' by inflation which reduces the real rate of returns on reserves and would result in the same relative interest rates on loans and deposits and service charges not covering the costs of banking services" (Rymes 1986, p. 435). The above distortions can only be corrected if the authorities pursued a laisser-faire approach of "optimal monetary arrangements".

A key point Rymes introduces is that the overall price level is exogenous to the bank - implicitly stabilized by the monetary authorities. Thus "...the services of banks and the Authorities cannot be determined independently of the price level" (Rymes 1989, p. 336).

In Neoclassical models central banks are costly and distorting. Without them monetary arrangements would be optimal. Then, service charges (as rates) would be equal to the marginal yields of banking and portfolio services and there would be no need for imputation. But, "a central bank, constrained to pay competitive interest rates on reserves and to replicate other competitive conditions, is not a central bank" (Rymes 1989, p. 372).

By contrast, in Keynesian models, the provision of monetary stability by the monetary authorities is not something that can be priced. Given that the provision of services by the banks has as an input the services of the monetary authorities, it follows that banking output cannot really be measured. The stabilization provided by the Authorities directly (and banks indirectly) is a public good. Thus "...the banking service irretrievably contains some of the public good being produced by the Monetary Authorities" (Rymes 1989, p. 379). "Even if legal reserves were zero, it is the access to the Central Bank which matters" (Rymes 1990, p. 407). Therefore, according to Rymes, the Keynesian monetary and banking theory would have it that the banking problem will always be observed in the accounts.

The bottom line is that neither the Neoclassical nor the Keynesian models provide support for the imputation. Although the predictions as to what would happen to the measurement of banking output are not far apart in the two models, the reasons are quite different. The former talks about non-Paretian optima and welfare losses from the regulations and the latter about the welfare-

enhancing provisions of the afforded stability. In Neoclassical models, as deregulation occurs, we should witness a narrowing in the interest rate differential and a move towards higher explicit service charges.

So, Rymes appears inclined towards the view that "the service charges levied by the banks on their borrowers and depositors constitutes the only satisfactory measure of the gross output of banks" (Rymes 1990, p. 410).

This macrotheoretic approach deals with the reserves, which is an essential characteristic of banking, and which has been largely ignored in most other attempts to measure output. Reserves are seen as a cost of doing business. It is determined at the margin by equating the foregone revenue - opportunity cost of holding reserves - with the expected cost of reserve deficiency (see also Baltensberger 1980). Also because of demand deposits, the demand for withdrawals is probabilistic. If it was deterministic the reserves issue would be much simpler. The alternative to reserves would have to be a very careful matching of loan and deposit maturities - since deposits are of lower duration than loans.

Rymes' view of banks has many wider implications that are not examined here[11]. His views were criticized by Scwhartz (1989) who argued that, empirically, banks whose reserves are unregulated are still observed to provide 'free' services.

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[11] *One of them refers to trade in banking services. The Neoclassical position entails that the banking system experiencing less distortion from the central bank would be an exporter of banking services (Rymes 1990). Other implications regard the treatment of central banks in the system of national accounts. These are examined in Chapter 6.*

1.2.6. Banks as producers of loan and deposit services

Through the "production function" approach, Hancock sees banks as providing primarily loan services but considers the provision of some deposit services - to be determined empirically. In her model, and by means of the sign of the user cost of money, she finds demand deposits to be an output. Hancock looks at three factors that affect the stock of demand deposits. First, an increase in the interest rate paid on time deposits which leads to shifting of demand to time deposits. Second, reserve requirements which she regards as pure taxes and which explicitly enter the user cost; banks are more willing to supply demand deposits if reserves are eliminated. Third, the elimination of deposit insurance; this also leads to an increase in demand deposits.

She views banks as being relatively responsive to changes in the prices of the non-financial goods, such as materials and labour, but less so to changes in interest rates or components of the prices of financial goods. She finds that among the financial goods, demands for inputs and supplies of outputs are relatively inelastic. This is indicative of little substitutability between them. Hancock also investigates the behaviour of the bank with respect to monetary and regulatory policy changes and their effects on demand deposits - which she finds to be the only deposit output. It should be pointed out that because two services are not substitutable does not mean that they cannot both be outputs.

Fixler and Zieschang (1991, p. 62) also understand that "the assignment of financial products to input and output categories is an unavoidable aspect

of the measurement of bank output". They point to loan services as certainly being banking output together with some deposit services, to be determined by the sign of the user cost of money functions. According to them, the economic input/output status of a financial product is distinct from its asset/liability or accounting input/output status, which is determined by the attending property right.

Others are more practical. Benston, Hanweck and Humphrey (1982, p. 440), for instance, proposed that "output should be measured in terms of what banks do that cause operating expenses to be incurred". This is equivalent to counting all activities of the banks and identify them with products as long as there is a cost or use of real resources associated with their production. This implies the production of both types of services as well. The problem with this is that it does not provide a comprehensive approach and especially one that is intertemporally viable. Products change and vehicles of delivery change; the latter should not be confused with products, as we argue elsewhere.

Triplett feels that the characteristics of the loan and deposit services may not be captured well by simple counts "just as the provision of health services is not measured adequately in terms of numbers of doctor visits, hospital rooms and so forth" (Triplett 1991, p. 20). He thinks that the difference between interest received and paid by the banks, including the foregone interest, can be

decomposed through a hedonic model[12] where the term of the loan or the deposit, the conditions of repayment and other characteristics could be treated as 'quality changes'.

The Canadian SNA practice and a more recent strand of national accounts literature sees banks as providing deposit as well as loan services (Guide to the Income and Expenditure Accounts 1990, Geehan and Allen 1978, Triplett 1991, Revised System of National Accounts 1992). The way this view is carried out in practice is that generally deposit services are provided only to households and governments whereas loans are only made to businesses. As a matter of fact, all sectors act in both capacities, the non-resident sector included. This is acknowledged in the recently proposed revisions of the U.N. manuals. The new directives state that output should be allocated to "...those to whom the intermediaries lend funds, both resident and non-resident..." and to "...those from whom the intermediaries borrow funds, both resident and non-resident..." (Revised System of National Accounts 1992, p. 39). This thesis also shares the view that banks produce both deposit and loan services.

Alternative views of what banks produce were presented. Drawing on the insights of these approaches and taking into account both the history of the

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[12] *This is so because the full cost of a bank account consists of charges for a bundle of priced and unpriced services. The imputed payments for unpriced services come from the interest the depositor foregoes relative to an account of a similar size where explicit interest is paid. A hedonic index is a useful tool for disaggregating bundles. But unlike other hedonic pricing specifications (Griliches 1971), the total value of the transactions is not known in banking - because of the implicit service charges. In addition, none of the characteristics' prices are known and therefore must be estimated.*

creation as well as the reality of banks, we concluded that both loan and deposit services are produced. There is no such thing as free services produced by the banks. What happens is that part of the overall prices are hidden in the interest spread. For practical purposes, the services produced by the banks can be approximated with the various categories of deposits and loans which carry different market prices.

CHAPTER TWO: THE BANKING ISSUE

After the end of the Second World War, the economics profession was highly influenced by The General Theory (Keynes 1936). It was soon realized that the new paradigm with its emphasis on the macroeconomy, the demand side in particular, required recording and monitoring of its main components. It was in this vein that what is now known as the System of National Accounts (SNA) came to be formulated. Kuznets (1941), prominent among others, pioneered this work. Consequently, the emphasis was placed on aggregates with special emphasis on the expenditure approach to computing aggregate output.

The SNA, by its theoretical construction, is a closed system. Completeness of the accounting framework requires estimates of output by industry so that the expenditure, the income and the value-added sides are all reconciled. Although industrial output measures were not the driving force behind the SNA design, they had to be dealt with. In practice, several conventions had to be adopted and somehow reconciled with or at least be justified on the basis of economic theory. One of those conventions concerned the treatment of interest. We examine this in the next section.

2.1. The treatment of interest

Throughout the history of capitalism, many theorists have dealt with the notion of interest. Of particular concern to them was its role in influencing the level of saving, consumption, investment financing, aggregate output and the

distribution of income (Marshall 1920, Wicksell 1935). National income accountants had to address its practical treatment.

Interest payments were initially seen as a transfer between the ultimate transactors - the borrowers and the depositors. More precisely, interest was viewed as a factor payment by the borrowing industry - rent for financial capital. This is the corollary of viewing financial capital as a factor of production - in conformity with the way physical capital was seen in conventional production functions. The United Nations Statistical Office clearly places interest in the category of property income along with rents, dividends and royalties. It states that "common types of property income are interest and dividends..." (A System of National Accounts 1968, par. 7.46) and that "interest comprises property incomes in respect of such financial claims as bank and other deposits..." (A System of National Accounts 1968, par. 7.48. See also Goldberg 1985).

National income accountants had to move from the concepts to their practical applicability. To accommodate a somewhat complex and considerably non-homogeneous business accounting practice, one of the most important concepts came to be that of "operating surplus". This is a key concept and is defined to be equal to GDP originating in the industry less labour income (and depreciation in its 'net' form) (A System of National Accounts 1968, par. 7.10). The operating surplus consists of interest and miscellaneous investment income, profits before taxes and the inventory valuation adjustment.

Firms both pay and receive interest. In the end, most non-financial firms are net interest payers. So are the industries that are made up of such firms. Since the operating surplus is considered to be a primary input in the production accounts and factor income in the income and expenditure accounts, interest paid is treated as a factor cost in the derivation of value added of the borrowing industry and as transfer income for the lender. This is necessary in order to avoid double counting of interest - as part of the GDP originating in both the paying and the receiving firms, and by extension, industry[13].

The banking issue is the direct result of how interest has been traditionally viewed and treated. This thesis shall attempt to look ***into*** the rate of interest and identify its components - the focus being on its economic meaning and the ensuing accounting implications.

2.2. The SNA dilemma

The Gross Domestic Product (GDP) originating in an industry can be equivalently arrived at from the income or the value-added approaches. According to the former approach, it is equal to the sum of labour income and property income accruing from the industry's production (gross of depreciation). According to the latter, it is equal to revenues accruing from production (including inventories) less the value of the purchases of intermediate inputs.

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[13] *Business accounting uses different conventions and even concepts than those used in national income accounting. Frequently, adjustments must be made to move from one to the other. For instance, if a firm does not distinguish between operating revenues accruing from its production activities and interest revenue, this interest must be subtracted to arrive at its operating surplus. If a firm reports profits before taxes net of interest paid, this interest must be added back.*

What is important is that according to the above conventions, and given the aforementioned view of interest, net interest paid is part of the GDP originating in the paying industry. This is the beginning of the problem. Accounting consistency in the closed SNA structure requires that the same treatment be carried out in the financial sector. As was mentioned previously, adherence to this view would give rise to an unrealistically low or even negative measure of output.

This can be illustrated as follows:

Let total revenues (R) and total expenses (E) for the banking industry be given by equations (1) and (2) respectively:

$$R = I^l + F \tag{1}$$

$$E = W + M + I^d + \Pi, \tag{2}$$

where I^l and I^d denote interest receipts from loans and interest payments to deposits respectively, F is explicit service charges, W is labour costs, M is purchases of intermediate inputs and Π is profits. Profits are arrived at residually and thus

$$R = E. \tag{3}$$

The GDP originating in the industry (Y) will then be given by:

$$Y = W + \Pi + (I^d - I^l) \tag{4}$$

or equivalently

$$Y = F - M. \tag{4'}$$

Equations (4) and (4') show the equivalence of the income and value-added methods.

As we shall explain later, this simple approach misses the fact that not all interest paid by the borrowers is transferred through the banks to the depositors. The banks retain part of it, as manifested in the differential between deposit and loan interest flows - which is the *raison d'être* of banks.

I^p-I^r is clearly negative. Thus, banking GDP as given by (4) or (4') will be unrealistically low, and possibly negative. In general, the GDP will be negative if the value of the explicit service charges falls short of the value of the intermediate inputs $(F<M)$ or if the absolute value of the net interest paid by the bank exceeds the sum of labour costs and profits $(|I^p-I^r| > W+\Pi)$. The operating surplus will be negative if explicit service charges are less than the value of the intermediate inputs plus labour costs.

An illustration of the problem is provided in Table 1. Starting with a bank's hypothetical income statement, where the revenue and expense sides balance since profits are derived residually, the GDP originating in the bank is calculated via both the income and the value-added methods.

TABLE 1

A bank's income statement: An illustration

Revenues

Interest revenue (from loans)	800
Explicit service charges	200
Total revenues	1,000

Expenses

Labour costs	400
Intermediate inputs	250
Interest expense (on deposits)	250
Profits before tax	100
Total expenses	1,000

GDP originating in the bank

Income method		Value-added method	
Labour income	400	Explicit service charges	200
+ Profit before tax	100	-Intermediate inputs	250
+ Net interest paid	-550		
	-50		-50

The arrival at negative output is clearly troublesome. It prompted Gorman (1969) to say that banks were portrayed as a "leech on the income stream". It could be argued that, for several purposes, the arrival at underreported or negative banking output is not so important. What matters is the consistency of the approach so that the changes can be tracked over time. (This argument has been frequently made for aggregate GDP). However, the level value of banking output would matter for some purposes (e.g. inter-industry comparisons of size and/or productivity). More importantly, with the approach described above, underreporting would not be consistent, since it would be affected every time interest rates change. Moreover, the underreporting would also be distorted by the changing mix in banks' revenues between interest income and explicit charges.

Having explained the nature of the problem, we proceed to see how it has been dealt with.

2.3. The imputation

The situation described above was dealt with on the basis of the following logic (see Ruggles and Ruggles 1956, A System of National Accounts 1968, National Income and Expenditure Accounts 1975, Survey of Current Business 1956, Guide to the Income and Expenditure Accounts 1990). It was assumed that banks do not charge and depositors do not explicitly pay full market prices for the services that banks provide and depositors purchase. Instead, they circumvent the market by bartering services for foregone interest.

In other words, lower interest is paid on deposits than would have been paid if depositors were required to pay fully and explicitly for all the services they purchase[14]. The ensuing recommendation was that this short-circuiting of the market process justifies an imputation for the value of the "free" services provided to depositors.

Moreover, the same logic continues, the net interest received by the banks must be equal to the value of these "free" services as if they took place in the marketplace. It is precisely because of this that the imputation must have a value equal to the net interest received by the banks. In so doing the correct banking output would be obtained. Both the expenditure and the income sides would increase by the same value.

Incorporating the imputation into the basic approach we get:

$$R = I^{l} + F + T \tag{5}$$

$$E = W + M + I^{p} + T + \Pi \tag{6}$$

where T reflects the imputed cost of providing services in kind, on the expenditure side, and their payments of equal value on the revenue side and

$$T = I^{l} - I^{p}. \tag{7}$$

Then, taking (7) into account, GDP originating in the industry will be given by:

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[14] *Of course, by the same token, it could also be argued that borrowers pay more than they would have - but it was not. To us, it seems that both phenomena take place. Who pays what depends on the underlying market conditions at any given point in time, i.e. relative demand and supplies that determine the degree of liquidity.*

$$Y = W + \Pi \tag{8}$$

or

$$Y = (I' - I^d) + F - M \tag{8'}$$

where (8) and (8') reflect the income and value-added methods respectively. In so doing, the problem of very low, zero, or negative output is avoided. Also, this practice effectively nullifies any entries associated with interest payments on the income side.

Continuing with our example, Table 2 demonstrates how the measure of banking output is constructed by following the recommended imputation.

TABLE 2

Bank's income statement

Revenues

Interest revenues (from loans)	800
Explicit service charges	200
Imputed service charges to depositors (= net interest received)	550
	1,550

Expenses

Labour costs	400
Intermediate inputs	250
Interest expense (on deposits)	250
Imputed interest expense to depositors	550
Profits before tax	100
	1,550

GDP originating in banks

Income method		Value-added method	
Labour income	400	Explicit service charges	200
Profits before tax	100	Imputed service charges	550
+ Interest paid		-Intermediate inputs	250
cash	250		
imputed	550		
-Interest received	800		
	500		500

Use of this imputation method is meant to take care of the problem of negative or unrealistically low banking output. However, as is often the case when *ad hoc* procedures are used, solving one problem frequently creates many more. Indeed, several problems, not all of which are well known, arise with use of the imputation described above. We shall discuss them after we present the current treatment of the imputation in the U.S. and Canada.

2.4. Current practices

The U.N. recommendations, motivated by the desire to correct the problem of low or negative banking output, were such that practitioners felt a need to improve on them. This gave rise to different implementations from country to country. The U.S. SNA is more faithful to the U.N. recommendations than is the Canadian SNA. The former first defines the aggregate value of financial services as the net interest earnings of the financial sector plus explicit service charges as defined by (8') above. Then, this aggregate measure must be allocated between intermediate and final consumption and among sectors. Three sectors are recognized; households (H), business (B) and exports (X). The allocation of output in these sectors is done by using available information for F and M and by allocating T in proportion to each sector's share of the stock of total deposits (D). That is:

$$T = T(B/D) + T(H/D) + T(X/D) \qquad (9)$$

with $(B/D) + (H/D) + (X/D) = 1$

with each term on the right-hand side of (9) corresponding to deposit services associated with each sector. However, "by using the volume of deposits as the rule for cross-sectional allocation, the allocation rule does not take into account how credit (loan) services affect the flow of financial services across sectors"

(Fixler and Zieschang 1991, p. 56). In effect T is seen as

$$T = T^d + T^\ell \tag{10}$$

with $T^\ell = 0$

where the superscripts d and ℓ refer to deposits and loans respectiveiy.

This results in output being distributed to the three sectors as

$$Y = Y^H + Y^G + Y^X \tag{11}$$

but because of (10)

$$Y = Y^d + Y^\ell \tag{12}$$

where $Y^\ell = 0$

and where Y^d and Y^ℓ refer to output associated with loan and deposit services, respectively. Thus, output is allocated in its entirety to deposit services; none whatsoever is allocated to loan services. Under such a scenario, as Triplett (1991, p. 4) criticizes, "banks exist to act as agents for the depositors, and for this reason pay out their entire earnings to depositors". Furthermore, the output associated with the business sector is seen as intermediate consumption, whereas that associated with the other two sectors is presumed to be produced entirely for final consumption.

The Canadian SNA goes one step further than the U.S. SNA. It distributes the imputed value of banking services, once arrived upon, between services provided to depositors and services provided to borrowers - recognizing the existence of the provision of services to both types of clients. That is, the sectoral allocation of T recognizes that $T^\ell \neq 0$ and thus $Y^\ell \neq 0$. Furthermore, the imputed value of services to deposit holders are distributed between the personal (H) and the government (G) sectors in proportion to their

shares in total deposits[15]. Thus,

$$T^d = T^d (H/D) + T^d (G/D). \quad (13)$$

The same value that is allocated as final consumption spending of these two sectors on the expenditure side also appears as income on the income side of the accounts under "interest and miscellaneous investment income"[16]. The value of the imputed services to borrowers appears in its entirety as intermediate consumption of the non-financial industries on the production side - distributed according to their estimated bank loan holdings. That is,

$$T^l = T^l (L/L) \quad (14)$$

with L_i representing the loans of the ith industry and L the total outstanding stock of loans.

Consequently, the value-added by these non-financial industries is reduced by the amount of the imputation. The same amount is added on the output of the financial sector ('banking'). The value-added, the income and the expenditure sides of the accounts are all reconciled. The investment income of persons and governments are shown explicitly as components of national income and separate deductions are made for interest paid on the grounds that

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[15] Note that no imputation is made for deposits held by non-residents - or loans made to them. Thus, since no imputed value enters the trade balance, exports can be said to be underestimated in GDP computations. However, they are presumed to be part of the current account - for GNP purposes. "These 'imputed services' are covered as part of interest transactions in the Investment income account of the balance of payments" (Mercier and Nichols 1990, p.17).

[16] The business sector in the income and expenditure sides is not affected. "No adjustment is required for the share accruing to corporations and government business enterprises since intra-sectoral transactions cancel out" (Guide to Income and Expenditure Accounts 1990, p. 57).

it is "unproductive"[17]. The industrial distribution of wages and profits is not affected, but that of interest income is. Output is transferred from non-financial to financial industries for a net increase equal to the imputed value of the deposit services.

The Canadian practice has a definite advantage over the approach recommended by the U.N. and practised by the U.S.. "The techniques used in the CSNA offer an appreciable advantage over the techniques of the United States accounts in that bank services provided to borrowers are explicitly and consistently recognized" (Bernstein 1987, p.14).

Both approaches, though, miss the fact that banks not only produce both deposit and loan service output, but each type of output corresponds to each sector as well. Businesses act both as borrowers and depositors; so do consumers and governments. This will become apparent in the development of our approach in Chapter 4.

The value of the banking output obtained from the U.S. and the Canadian approaches are identical. However, significant differences between the two approaches exist. They become visible only when the economy is split into sectors. Compared to the Canadian procedure, the measure of aggregate output in the U.S. is overstated. This overstatement is equal to the value of the imputed service charges to borrowers. Thus, under the U.S. procedures, more is added on the expenditure side and less (nothing) is subtracted on the

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[17] *The CSNA explicitly distinguishes between "productive" and "unproductive" interest. The former contains interest payments associated with the business sector, mortgages, interest payments on foreign-held public debt and the administrative part of consumer debt and is included in GDP; the latter contains interest payments for the remaining part of the consumer debt and those made to resident holders of the public debt and is not included in GDP (Guide to the Income and Expenditure Accounts 1990, Sunga 1983). Sunga (1963) suggested that the "unproductive" portions should really be treated as intermediate costs.*

production side. The imputed services to borrowers are effectively double-counted, first as distribution of surplus of the borrowing (and paying) industry and second, as banking output. In the Canadian practice these imputed services are still counted as banking output; but they appear as intermediate consumption by the paying industry and not as a distribution of surplus. (For a treatment of the imputation method in the two countries by means of a numerical example, see the Appendix to Chapter 2).

2.5. Real output

No conceptual framework exists for the measurement of real banking output. Often, completely different approaches than those used to arrive at nominal output are used. Furthermore, approaches may change abruptly. This further complicates matters and data comparability.

An early attempt at measuring real banking output at an aggregate level was made by Gorman (1969) in the U.S.. He proposed two approaches: the "liquidity" approach and the "transactions" approach. According to the first, real output was measured as a weighted average of deflated dollars of demand and term deposits. The weights were the base year average rate that the bank earned on its assets less the interest rate it paid on each type of deposit. That is, real output (Q) is

$$Q = (r^t - i^t_d)_b\,(D^d/(1+P)) + (i^t - id_t)_b\,(D^t/(1+P)), \qquad (15)$$

where r^t represents the average rate of return on assets, i^t_d and i^t_t the rate of interest paid on demand and term deposits respectively, D^d and D^t the stocks of demand and term deposits, P the rate of change in the price level and b stands for the base year. These "opportunity costs" were supposed to reflect the "prices" paid by depositors for the services they bought.

With the second approach, real output was measured as a weighted average of the deflated dollar volumes of transactions for the two types of deposits considered, demand and time deposits. The weights in this case were base year foregone interest for each type of deposits.

Gorman's results showed declining labour productivity, something that was criticized as being counter-intuitive (Fabricant 1969). Geehan and Allen (1978) were also critical of the liquidity measure, in that it completely ignored the multi-product nature of bank services. It continued to assume that the bank provides services only to depositors. This, however, was consistent with the U.S. estimation of nominal output. One of the most fundamental criticisms, though, was delivered by Hodgman (1969). Suppose that technological change in banking, he said, produces cost savings which, under competitive conditions, produce an increase in services per dollar of deposits without increases in either the explicit or the implicit charges. This change would not be captured by Gorman's productivity index.

The above notwithstanding, the "liquidity" approach formed the basis of the U.S. methodology until 1975. At that time, the U.S. switched to extrapolating a benchmark value by means of an index of employment in the industry (Survey of Current Business 1976). This, of course, completely ignores any productivity changes. In addition, it breaks whatever consistency existed between the nominal and real output series.

In Canada, Geehan and Allen (1978) viewed banks as multi-product firms that produce a wide variety of services. Thus for them "...the problem of measuring output becomes one of, first, defining, disaggregating, and measuring over time the quantities of final services performed, and second,

establishing weights to be used in combining these services ...into a single index" (Geehan and Allen 1978, p.672). They argued that banks themselves take conscious account of the cost of servicing a loan when they set loan rates and it is this accounting, reflected in bank cost studies of the Canadian Bankers Association, which enabled them (and Statistics Canada) to split the imputed value between loans and deposits. Their main objective was to define and measure the loan and deposit "quantities" and to establish weights that can be used in the construction of a real output index. More specifically, they estimated a "price" for non-loan services consisting of unit cost (c') plus unit profit (π'). This price (p') would be given by

$$p' = c' + \pi' \tag{16}$$

This required the assumption, "as a first approximation", that unit profits are proportional to unit costs. That is,

$$\pi' = f(c') \tag{17}$$

"Alternatively, unit profit could be estimated as a proportion of capital inputs, but data restrictions prevent this" (Geehan and Allen 1978).

Underlying all that, as Bernstein (1987) pointed out, is Black's (1975) model of a world where deposit-accepting institutions operate in an unregulated and competitive environment, where it is possible to bill each customer for the detailed flow of services provided to him. Only in such a world would prices be equal to unit costs, including a normal profit.

The output measure suggested by Geehan and Allen required time series for the quantities of all financial services as well as base year weights. For volumes they used series such as the number of deposits received for different kinds of accounts, new deposits and withdrawals from accounts, cheques

certified and foreign money orders. For weights they needed either unit operating costs or unit cost plus unit profit estimates. "Direct labour costs per unit are calculated on the basis of time studies and wage rates. Indirect labour, overhead, materials, and property expenses are estimated using standard cost accounting techniques...All expenses except interest and allowance for bad debts are fully apportioned to one activity or another..." (Geehan and Allen 1978, p. 673).

Thus the real output of deposit services would be given by:

$$Q^d = \Sigma D_i (c' + \pi')_i \qquad (18)$$

where D represents the time series of the volumes of deposit transactions.

Their measure completely ignored the pooling of risk and the intermediation function of banks. As they acknowledge, however, "the difference in approach reflects national income accounting conventions, rather than the raison d'être of financial intermediaries" (Geehan and Allen 1978, p. 673). They also acknowledged that "...a change in the mix of loans in the size structure of loans within a category ...could produce a change in real output which would not be identified by a cost-weighted index of the number of loans" (Geehan and Allen 1978, p. 674).

For loan services Geehan and Allen (1978) asserted that it would be incorrect to assume that "unit profits are proportional to unit operating costs". Thus, they estimated that part of total output as "...the product of base-year gross margin ... multiplied by the deflated average dollar volume of loans outstanding during the year" (Geehan and Allen 1978, p. 674). Gross margin was defined as the average interest rate earned on each category of loans minus the cost of funds or, equivalently, as cost plus profit per dollar of

outstanding loans. That is,

$$Q^l = \Sigma [i^l_i - (c' + \pi')] (L/(1+P)). \quad (19)$$

This approach has formed the basis for the Canadian estimates ever since.

Since the benchmark estimates of the previous approach ceased to be available, another attempt was proposed but not implemented. Bernstein (1987) measured the value of deposit services in terms of "margins" per dollar of deposits and per dollar of loans. The deposit margin was defined as being equal to the marginal cost of funds minus interest paid plus commissions and fees. The marginal cost of funds was approximated by the rate paid on deposits which have "...a negligible service component in their costs" (Bernstein 1987, p. 24). That is,

$$Q^d = \Sigma (i^d_{min} - i^d_i) (D_i/1+P) \quad (20)$$

This is also found in Triplett (1991, p. 29): "If banks equalize the marginal cost of funds obtained from time and checking deposit accounts, the value of "free" services provided with checking accounts can be estimated by applying the interest rate earned on time deposits to balances held in checking accounts".

This treatment ignores the different service components of the two accounts. It is preferable to say that the explicit interest paid on an account is a decreasing function of the unpriced services provided. The loan margin that measured the service provided to each dollar of outstanding loans was defined to be equal to the average interest rate on loans minus the cost of funds plus the service fees on loans minus the average loan loss rate. That is,

$$Q^l = \Sigma [(i^l_j - i^d_{min}) + f_j - l] (L/1+P) \quad (21)$$

with f representing the estimated explicit charge rates for the i loans and l the

expected average loss rate.

Other countries, such as the U.K., also use combinations of volume series, such as the number of cheques cashed and deflated deposit dollars with the use of general price indexes or various labour input indexes to approximate output movements.

2.6. Problems and caveats of the imputation method

Aggregate output is overestimated by the amount of the imputation. This is so because all net interest paid, economy-wide, has already been counted as the contribution to overall output by all other non-financial industries - which is, of course, equal to the net interest received by the banks. It is the very rationale for the treatment of interest, as the distribution of operating surplus, that was supposed to avoid double-counting between industries in the first place that leads to this double-counting now. It seems that the architects of the treatment of interest in the national accounts did not think of the complete circular-flow-of-income loop, inclusive of banks which, by the nature of their business, are net recipients of interest income. This new "inconvenience" of double-counting that stems from the carrying out of the imputation was addressed by the recommendation to create a fictitious industry within the financial sector, which would be allotted the same but negative output[18].

The gross output of banks, equal to the imputation plus explicit charges, had to be allocated among industries and sectors. Oddly enough, it was

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[18] *This is what prompted Fixler and Zieschang (1991, p. 65) to say that "The current U.N. System of National Accounts is rather schizophrenic in first calculating the value of net interest for gross output, but then lumping the entire amount into intermediate consumption of the banking sector so that none of it escapes to final sales".*

recommended that it be allocated in its entirety to deposit services. Financial services offered by the banks to borrowers, a most fundamental aspect of banking, was completely ignored. As we shall see in the next chapter, this gave rise to a branch of literature with a view of banks and their output that took the other extreme form, namely that the banks provide only loan services and not deposit services, and is diametrically opposite to the approach recommended by the U.N.. Moreover, this recommendation gave rise to the next complication.

Although the imputation spelled out in the U.N. System of National Accounts (1968) was universally adopted by statistical agencies - certainly in principle - the way it was actually carried out in practice has been different among countries - we have already seen specific differences between the Canadian and the U.S. approaches. This hinders international comparability of statistics.

Both the recommended and practised methods identify individuals and governments with depositors. In addition, The Canadian SNA identifies businesses with borrowers. These practices miss the fact that individuals and governments are not only depositors but also borrowers; similarly, businesses are not only borrowers but also depositors. Deposit services are therefore not allocated to businesses; instead, they are treated as final rather than intermediate consumption. Yet, the individuals pay also for borrowing which is not taken into consideration on the income and the expenditure sides of the national accounts, since imputed services are arrived at only through sectoral allocation of the deposit stocks. This introduces several distortions in many parts of the accounts.

Additional distortions, independent of those mentioned above, are introduced in the industrial output. The national accounts contention that "intra-sectoral transactions cancel out" (Guide to Income and Expenditure Accounts 1990, p. 57), may be true for the aggregates on the expenditure side but they are certainly not true for the industrial distribution of the output associated with the imputation. Thus, the output of all non-financial (paying) industries is overestimated. To the extent that business depositors are in the same sector as the banks, the allocations discussed above, although they net out within the sector, do affect the industrial distribution of output. The bias introduced in the output of each industry depends on the degree of its relative indebtedness compared to its production.

In the Canadian SNA, a permanent bias is introduced by the proportional allocation of deposit and loan output on the basis of their respective stocks. It is a fundamental aspect of banking, as shall become evident during the development of our model in chapter four, that the stocks of deposits always exceed the stocks of outstanding loans. Consequently, given the high rate of growth in the relative share of explicit charges as well as considerable asymmetry in these charges in favour of loans, the output allocated to deposits will always exceed the output allocated to loans. The value of the loan services under no circumstances can exceed the value of the production of the deposit services.

Although the absolute level of savings of the household sector would be left unchanged since both consumption expenditures and household investment income are increased by the imputation by the same amount, the measured rate of savings would be reduced (Rymes 1989). The larger the imputation, the

smaller the rate of savings. The same is true for government savings. However, the savings of the business sector are not affected.

The allocation of output to the various parts of the structure of the accounts, such as consumption expenditures and exports on the expenditure side, and intermediate consumption in the input-output tables, has been problematic and also distorted. For instance, no imputation is made for deposits held by non-residents to give rise to exports of banking services. So, the personal (and unincorporated business) and the government sectors are "inflated" by those imputations - both on the income and the expenditure sides.

These practices left open the question of real output by not providing an approach that would somehow correspond to the approach for the estimation of nominal output. This further hindered not only international but also intertemporal comparability of measures since different countries had to devise more or less *ad hoc* measures - and even these had to change periodically.

The above have consequences for the relationship between production accounts and the financial flow accounts. More specifically "...it is impossible to integrate these two accounts at the present time with production accounts defining output inclusive of payments for capital employed regardless of ownership, while financial accounts trace flows on the basis of returns to capital provided. Obviously the two should match so that investment income coincided with investment, and payment with loan liability; at present neither is true" (Sunga 1967, p. 27).

Finally, the measurement of output is highly sensitive to the mix of banking revenues. Whenever the bank revenue mix between explicit and implicit pricing changes, it distorts the allocation of output between deposits

and loans in the Canadian SNA. Although this fact has passed largely unnoticed from critics of the existing system, it is quite severe. For example, starting from some initial allocation between deposit and loan output, and a given distribution of total bank revenue between explicit charges and net interest, the value of output allocated to deposits and loans will change if the proportion of explicit charges increases even though total output may be the same. More specifically, if explicit services are applicable only on deposits, any increase in explicit services will increase the output of deposits given that the ratio of deposits over loans remains unchanged. If both loans and deposits are subject to explicit charges, and if they both increase proportionally, it is loan output that will increase[19].

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[19] *The deposit output is equal to explicit charges plus the percentage of deposit stocks over deposits plus loans times the imputed interest.*

APPENDIX TO CHAPTER TWO

The following tables present the first comprehensive, detailed and integrated analytical treatment of all the basics involved in the accounting of the banking problem as well as comparisons between the existing and proposed treatments. A simple numerical example is adhered to throughout. A full-sectored, three-firm, with one firm as a bank, economy is examined.

For the sake of simplicity the example assumes that businesses are the borrowers and households are the depositors. The decomposition of the rate of interest to a transfer part and implicit prices is not affecting profits. There are no explicit charges.

Table A1.1 presents the would-be situation in the absence of any imputation given the treatment of interest as a transfer. Tables A1.2 and A1.3 depict the situation under the U.S. and the Canadian imputation practices, respectively. Table A1.4 shows what would be obtained if the results from our method were applied. Finally, Tables A1.5, A1.6 and A1.7 provide a full account of the computation of GDP under all three approaches, that is the expenditure approach, the income approach and the value-added approach.

Starting with the figures in Table A1.1 the U.S. method modifies the bank's accounts by adding the imputation, which is equal to the net interest received, in both sides. On the cost of production side, this imputed value represents the interest that the bank would pay to the depositors (their foregone interest) which is reflected on the gross value-of-production side, by

the equal payments depositors would have paid to purchase these services. All these are shown in Table A1.2.

In the Canadian practice the imputation is split between borrowers and depositors, recognizing the provision of both types of services. Thus, the part which is allocated to loan services is reflected in the purchase of services by the two non-financial firms, reducing their value added. The interest received by the banks for loans is lowered by the imputed services to loan services. This is why the Canadian procedure (Table A1.3) produces a lower aggregate output compared with the U.S. method.

In our approach there is no imputation (Table A1.4). The interest paid on deposits is the pure interest paid by borrowers and is channelled to the depositors, through the bank. The rest represents payment for services.

TABLE A1.1

(NO IMPUTATION)

*Costs of production**		*Gross value of production+*	
		FIRM 1	
Imports of materials	*20*	*Sales to firm 2*	*50*
Wages and salaries	*90*	*Sales to consumers*	*70*
Interest paid on loans	*10*	*Sales to government*	*20*
Profits	*30*	*Inventories*	*10*
Total	*150*	*Total*	*150*
		FIRM 2	
Purchases from firm 1	*50*	*Sales to firm 2*	*10*
Wages and salaries	*70*	*Sales to consumers*	*160*
Interest paid on loans	*30*	*Exports*	*30*
Profits	*50*		
Total	*200*	*Total*	*200*
		BANK	
Purchases from firm 2	*10*	*Interest received from loans*	*40*
Wages and salaries	*5*		
Interest paid on deposits	*20*		
Profits	*5*		
Total	*40*	*Total*	*40*

* *It includes profits as a residual*

\+ *It includes interest received by the bank*

TABLE A1.2

*(U.S. IMPUTATION)**

Costs of production		*Gross value of production*	
		BANK	
Purchases from firm 2	*10*	*Interest received from firms*	*40*
Wages and salaries	*5*	*Imputed deposit services*	*20*
Interest paid on deposits	*20*		
Imputed interest on deposits	*20*		
Profits	*5*		
Total	*60*	*Total*	*60*

**Only the bank is affected, the accounting of firms 1 and 2 remains identical to that in table 1.*

TABLE A1.3

CANADIAN IMPUTATION

Costs of production		*Gross value of production*	
		FIRM 1	
Imports of materials	*20*	*Sales to firm 2*	*50*
Wages and salaries	*90*	*Sales to consumers*	*70*
Interest paid on loans	*8*	*Sales to government*	*20*
Imputed loan services	*2*	*Inventories*	*10*
Profits	*30*		
Total	*150*	*Total*	*150*
		FIRM 2	
Purchases from firm 1	*50*	*Sales to the bank*	*10*
Wages and salaries	*70*	*Sales to consumers*	*160*
Interest paid on loans	*27*	*Exports*	*30*
Imputed loan services	*3*		
Profits	*50*		
Total	*200*	*Total*	*200*
		BANK	
Purchases from firm 2	*10*	*Interest received from loans*	*35*
Wages and salaries	*5*	*Imputed loan services*	*5*
Interest paid on deposits	*20*	*Imputed deposit services*	*15*
Imputed interest paid on deposits	*15*		
Profits	*5*		
Total	*55*	*Total*	*55*

TABLE A1.4

*SUGGESTED APPROACH - NO IMPUTATION**

Costs of production		*Gross value of production*	
		BANK	
Purchases from firm 2	*10*	*Interest received from loans*	*20*
Wages and salaries	*5*	*Loan services*	*5*
Interest paid on deposits	*20*	*Deposit services*	*15*
Profits	*5*		
Total	*40*	*Total*	*40*

**Only the bank is affected. The accounting of firms 1 and 2 remains identical to that in Table A.3.*

TABLE A1.5

TOTAL GDP VALUE

SUM OF INCOMES APPROACH			
		W + I + P =	*TOTAL*
TRANSFER	*FIRM 1*	*90 10 30*	*130*
	FIRM 2	*70 30 50*	*150*
	BANK	*5 -20 5*	*-10*
	TOTAL	*165 20 85*	*270*
SERVICE	*FIRM 1*	*90 30*	*120*
	FIRM 2	*70 50*	*120*
	BANK	*5 5*	*10*
	HOUSEHOLDS	*20*	*20*
	TOTAL	*165 20 85*	*270*
U.S.	*FIRM 1*	*90 10 30*	*130*
	FIRM 2	*70 30 50*	*150*
	BANK	*5 0 5*	*10*
	TOTAL	*165 40 85*	*290*
CANADA	*FIRM 1*	*90 8 30*	*128*
	FIRM 2	*70 27 50*	*147*
	BANK	*5 0 5*	*10*
	TOTAL	*165 35 85*	*285*
OURS	*FIRM 1*	*90 8 30*	*128*
	FIRM 2	*70 27 50*	*147*
	BANK	*5 0 5*	*10*
	TOTAL	*165 35 85*	*285*

TABLE A1.6

TOTAL GDP VALUE

SUM OF FINAL EXPENDITURES APPROACH								
		C	+ *I*	+ *G*	+ *X*	- *M*	=	*TOTAL*
TRANSFER	*FIRM 1*	*70*	*10*	*20*		*20*		*80*
	FIRM 2	*160*			*30*			*190*
	BANK							*0*
	TOTAL	*230*	*10*	*20*	*30*	*20*		*270*
SERVICE	*FIRM 1*	*70*	*10*	*20*		*20*		*80*
	FIRM 2	*160*			*30*			*190*
	BANK							*0*
	TOTAL	*230*	*10*	*20*	*30*	*20*		*270*
U.S.	*FIRM 1*	*70*	*10*	*20*		*20*		*80*
	FIRM 2	*160*			*30*			*190*
	BANK	*20*						*20*
	TOTAL	*250*	*10*	*20*	*30*	*20*		*290*
CANADA	*FIRM 1*	*70*	*10*	*20*		*20*		*80*
	FIRM 2	*160*			*30*			*190*
	BANK	*15*						*15*
	TOTAL	*245*	*10*	*20*	*30*	*20*		*285*
OURS	*FIRM 1*	*70*	*10*	*20*		*20*		*80*
	FIRM 2	*160*			*30*			*190*
	BANK	*15*						*15*
	TOTAL	*245*	*10*	*20*	*30*	*20*		*285*

TABLE A1.7

TOTAL GDP VALUE

SUM OF VALUE-ADDED APPROACH				
		GROSS VALUE PRODUCTION	*VALUE OF INPUTS*	*TOTAL*
TRANSFER	*FIRM 1*	*150*	*20*	*130*
	FIRM 2	*200*	*50*	*150*
	BANK	*0*	*10*	*-10*
	TOTAL	*350*	*80*	*270*
SERVICE	*FIRM 1*	*150*	*30*	*120*
	FIRM 2	*200*	*80*	*120*
	BANK	*40*	*30*	*10*
	HOUSEHOLDS	*20*	*0*	*20*
	TOTAL	*410*	*140*	*270*
U.S.	*FIRM 1*	*150*	*20*	*130*
	FIRM 2	*200*	*50*	*150*
	BANK	*20*	*10*	*10*
	TOTAL	*370*	*80*	*290*
CANADA	*FIRM 1*	*150*	*22*	*128*
	FIRM 2	*200*	*53*	*147*
	BANK	*20*	*10*	*10*
	TOTAL	*370*	*85*	*285*
OURS	*FIRM 1*	*150*	*22*	*128*
	FIRM 2	*200*	*53*	*147*
	BANK	*20*	*10*	*10*
	TOTAL	*370*	*85*	*285*

* *Not including interest received by the bank.*

CHAPTER THREE: PROPOSED ALTERNATIVES[20]

It seems that the application of the existing methodology for measuring the output of the banking sector as well as the ensuing imputation were introduced by Yntema (1947) and employed the same year in the U.S. National Income and Product Accounts (NIPA). This practice found its way into the U.N. manuals. There is evidence to support that several objections were voiced immediately after its introduction and several more voices joined over the years. In fact, the first one seems to have appeared the very same year from Warburton (1947), who noted that the national income estimators treat bank interest received, which constitutes the bulk of their sales receipts, as negative expenses and argued that a better approach would recognize that "...the market value of the services in the banking industry, as expressed in its sales receipts, is as clear cut as in any other industry..." (cited in Triplett 1991, p. 5).

The use of gross revenues as a measure of gross output in the banking industry has been used again in several studies - especially those which dealt with regulatory issues and explored issues such as economies of scale and economies of scope (see Geehan and Allen 1978).

Kuznets (1941, p. 74) furnished an early explanation for the treatment of interest in the national accounts: "If the payment is to the enterprise as a producer, the net income to which it gives rise may be considered to originate in the receiving

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[20] *This Chapter contains an intuitive discussion of the various alternatives that have been proposed. A technical exposition is provided in the Appendix to the Chapter.*

enterprise. But if the payment is to the enterprise purely as an owner, the net income to which it gives rise obviously originates in the paying enterprise".

We can distinguish five different broad groups of criticisms. One came from within the national accounts and proposed to treat interest as a payment for a service rather than a transfer; this is identified with Sunga (1967, 1982, 1984 and 1987) and we shall call it "the interest-as-service-payment approach".

A second originated basically in the U.S. from researchers who argued for the inclusion of loans as productive services produced by the bank (Triplett 1991).

A third is based on the microeconomics of the bank as a production unit and which comes in several variants (Fama 1980, Hancock 1985, Fixler and Zieschang 1991); we shall call it the "production function approach".

A fourth one, which is called by its proponent "the unbundling approach", argues that the rate of interest is a composite price for a bundle of services as well as a transfer part and proposes its decomposition to reflect the services produced by banks (Mamalakis 1987).

Finally, a macrotheoretic approach, with implications well beyond the measurement of banking output, was proposed by Rymes (1985, 1986, 1989, 1990). We shall refer to it as "the Rymes approach"[21].

3.1. The interest-as-service-payment approach

The first and best known alternative to the U.N. approach is identified with

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[21] *We shall limit ourselves in this section to discussing the parts of these approaches which are pertinent to the imputation and the measurement of output. These parts of the above approaches that relate to the way banks operate were addressed in more detail in the previous Chapter.*

Sunga (1967, 1982, 1984, 1987)[22]. However, Speagle and Silverman (1953), Ruggles and Ruggles (1982) and others also expressed similar views. Criticizing the imputation, Sunga (1984, p. 390) said that "it is difficult to perceive, however, how the synthetic reallocation of the service charge is economically more meaningful than that resulting from the interplay of actual transactions in the market...". He expresses the strong view that interest represents in its entirety payment for services[23]. He argues that "...the lending of money arises from the stretching out of the production and consumption process, and the interest charges constitute a charge for the administrative services and risk involved. This is somewhat analogous to the charges for hiring out the right to command real goods and services" (Sunga 1967, p. 26) and to the hiring of machines or the purchase of other services[24].

If the view of interest as payment for services was adopted, output would originate in the industries supplying rather than the industries using the financial capital. "The amount of production created by specific industries would be different from what is now the case, even though total production would be relatively

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[22] Interestingly, Sunga first introduced his approach early in the 1960s when he was working for the Department of Finance. He repeated and extended his critique twenty years later from within Statistics Canada.

[23] This was referred to by Chant (1986) as a "forward looking approach", in that if interest is viewed as a payment for a service all payments in the chain from the households to the firms are unimportant in terms of value-added. In contrast, the existing imputation approach moves "backwards" since after it counts interest as a factor payment, all further payments in the chain from the firms to households are netted out.

[24] He goes on to say that a similar case is made for the treatment of rents with the exception of imputed net rent, where it is contended that economic risk is incurred only when production is undertaken for sale and there should be no entrepreneurial return where the production is for the use of the owner-producer (Sunga 1967).

unchanged, apart from the removal of imputations" (Sunga 1967, p. 27).

Acceptance of this view of interest - which, incidentally, has never been adopted[25] - would necessitate the creation of a productive (versus consumptive) household sector, for the SNA to balance. Sunga (1983) himself acknowledged that one option would be to regard interest as a production and revenue generating business activity of both households and the government sector. This could be done, as he said, by creating a "household industry" within the financial industries. But this would lead to other more serious problems than the imputation itself. That is, "...if the earning of interest by households is to be considered a business transaction, it could reasonably be argued that the earning of wages and salaries in return for labour services could also be considered as a business transaction" (Kuznets 1941, p. 36).

There has always been an understandable reluctance to admit such a sector in output calculations. In mainstream economic theory, households have been viewed as the consumption decision-making units and suppliers of labour services and not as direct producers of output. This could lead to households being viewed as producers and not as consumers and would mark a fundamental departure from mainstream

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[25] *Interestingly, as Sunga (1983) points out, experts preparing the revisions for the 1968 SNA in the U.N. at one stage proposed abandoning the imputation altogether "In view of the practical difficulties involved in the imputation of bank service charges...Actual service charges would, however be recorded in the production account of banks. On practical grounds also, surcharges on hire-purchase or instalment sales to households are not to be decomposed into interest and service charge elements. The entire surcharge would be treated as a service charge" (A System of National Accounts, Proposals for the Revision of SNA, 1952, E/CN 3/320, 9 February 1965, Statistical Commission, Thirteenth Session, p.150, recited in Sunga 1983, p. 390).*

economic theory and associated national accounting practices[26]. (An account of the implications of such an approach can be found in the numerical example of the Appendix to Chapter 2).

3.2. The U.S. approach

Another approach appeared in the literature as early as 1958. Many were uncomfortable with that the U.N. recommendations - and particularly the practice in the U.S. - did not recognize the value of finance, that is the production of loan services. Speagle and Kohn (1958) raised concerns. Also, in the same year the National Bureau of Economic Research (1958) said that "what is needed is a thorough review...of the treatment of financial intermediaries in the national accounts with a view to developing an alternative...procedure that would conform more closely to the realities of the activities of these enterprises" (cited in Triplett 1991, p. 5).

It is interesting to see the U.S. efforts regarding the search for an alternative approach from the perspective of someone not familiar with the Canadian procedures. Triplett (1991), for example, argues that "banks' production of uncharged depositor services ought indeed to be one component of banking output, but why should depositor services (and explicit fees) be the only component? What about bank services to borrowers" (Triplett 1991, p. 4)? He goes on to say that "...the lending

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[26] *Kuznets himself was aware of that more than half a century ago: "...classifying each wage earner as a separate economic enterprise whose primary purpose is to render labour services at the highest possible price...the net value of products turned out by a factory would have to exclude wages...Instead we would have to add the net value of products of the various enterprises called wage earners. This net value would equal not the full amount of wages received...but wages minus the cost of products wage-earning enterprises buy from other enterprises and consume in the process of producing labour power...No purely analytical or empirical consideration can invalidate this extension of the concept of enterprise: it is largely a terminological question" (1941, p.37).*

activity of banks, that is their provision of finance as a productive service to borrowers, is definitionally excluded from the national accounts measure of banking output" (Triplett 1991, p. 6). And he wonders: "Do borrowers negotiate loans to obtain record-keeping services, rather than to obtain finance? Why should the provision of finance to borrowers not be an output of the banking services? If finance does not provide productive services, as the national accounts model of banking assures, why should banks earn revenue from loans? Why, in other words, should banks' sources of revenue not be as good an indicator of what they produce and sell as are revenue sources of a coal mine or a laundry" (Triplett 1991, p. 5)?

He proceeds to suggest that, logically, the existing practices can be justified only on the basis of the following: i) the view of the economic role of finance that "only a very conventional national accountant or a Marxist would dare to suggest" (quoted from Ruggles 1983); ii) a view of value added largely at odds with the one that stems from the economic theory of production; and iii) the view of property income that "...seems obsessively concerned with old debates about the functional distribution of income" (Triplett 1991, pp. 6-7).

As we have already explained, though, this push for the inclusion of loan services in banking output, although it would certainly be a marked improvement in the U.S. practices, would not solve the banking problem. It is already the practice in Canada.

3.3. The production function approach

Authors like Fama (1980) and Mester (1987) stress the intermediation function

of banks and the provision of loan services. Their views of banks are discussed in the next chapter. However, with respect to banking output they take the other extreme view compared to the U.S. practice; that only loan services and no deposit services are produced by the banks. Banking output is defined solely on the basis of bank assets (loans); liabilities (deposits) are generally viewed as inputs. Mester (1987) distinguished between activities to process financial inputs (deposits) and activities which are described as outputs (loans). "Output is best measured by the dollar value of earning assets of the firm, with inputs being labour, capital and deposits" (Mester 1987, p. 430). She specified three types of deposit inputs (passbook, NOW accounts and certificates) and three types of outputs (two types of loans and other assets).

This led Triplett (1991, pp. 10-11) to say that "in almost every aspect of bank output measurement, the bank production function and national accounts literatures are wonderfully disjoint. What is considered in the one is ignored completely in the other. What is measured as the primary output on the one is excluded definitionally or by oversight in the other. What is controversial in the one is conventional knowledge in the other".

What we have called the "production function approach", however, is exemplified by Hancock (1985) and Fixler and Zieschang (1991). Proponents of this approach invariably use profit functions and cost functions to uncover the underlying services. This branch seems to have started with the "user cost of money" notion introduced by Donovan (1978) and Barnett (1980). The user cost of money focuses on the economic rather than the accounting cost to the bank. The approach was

carried one step forward by Hancock (1985), who derived an estimable model of production of the financial firm (deposit-taking intermediary).

In Hancock's work banks are viewed as maximizing a variable profit function. This is used to derive demand and supply schedules for monetary and non-monetary goods, the input/output status of which is not known *a priori*. This is left to econometric estimation. Some deposits are found to be inputs and some are found to be outputs. Furthermore, the composition of goods between inputs and outputs may change over time. This renders the approach inapplicable for practical purposes. Triplett (1991, p. 25) states that in Hancock's work "...data are employed in a decidedly ad hoc manner"[27].

Fixler and Zieschang (1991) also offer a variation of the production function approach, which they call the "assets approach". As in Hancock's model, the sign of the user cost of money equation will be used to determine the input/output status of a good - especially deposits. However, no empirical work was carried out by Fixler and Zieschang.

3.4. The unbundling approach

This approach was advanced by Mamalakis (1987) in a much-cited study. He offers valuable insights into the nature of the imputation and the treatment of interest. Mamalakis criticizes the literature that sees interest either only as a factor payment (having the national accounts in mind) or only as a payment for a service (Sunga's approach). He views interest as a "basket" that contains not only both of the above

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[27] *Hancock was also criticized for that the direct interest on demand deposits underestimates substantially their cost to the bank.*

but also a third type which he refers to as "unilateral transfers"[28]. In his words "...the interest rate wears many hats...one as a factor-service, the second as a commodity-type service and the third as a unilateral transfer" (Mamalakis 1987, p. 171). He sees the decomposition of the gross rate of interest into its constituent parts as the key to "unbundling" banking services.

The recommendation that stems from the "unbundling approach" is that a part of the net interest receipts of the banks are indeed output. Another part is not. Mamalakis devotes much time to the meaning, treatment and decomposition of the rate of interest, based on his views of what financial institutions produce, which are services defined from some utility point of view, as we discussed in Chapter 1. He seems to stress the banks' intermediation function and does not explicitly refer to the value of deposit services.

3.5. The Rymes approach

The fourth approach in our taxonomy has been proposed by Rymes (1985, 1986, 1989, 1990). Rymes places the bank within the overall monetary economic environment, placing particular emphasis on the role of the central bank and its interaction with commercial banks. He views not the treatment of interest but the regulation of banks (the reserve requirement, in particular) as the cause for the banking riddle and the imputation that follows. He argues that the imposed caps on explicit charges and the presence of reserve requirements on which the central bank does not pay competitive interest distort the market mechanism. From a Neoclassical

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[28] *This is basically synonymous to what is found in actual banks' accounting statements and is commonly known as "provisions for losses".*

point of view, this would result in non-optimal monetary arrangements. From a Keynesian perspective, valuable, albeit non-measurable, services are provided.

Rymes' main conclusion is that banking output cannot be measured, in any meaningful way, independent of the macroeconomic setting, the monetary authorities in particular and the regulatory environment within which the commercial banks operate. As a practical measure, however, the way to measure banking output would be through explicit service charges only.

In a somewhat related vein, not with respect to the analytical treatment of the banking environment but as far as bottom-line conclusions are concerned, Haig (1986) performed an analysis of banks and found that the costs of banks cannot fall unambiguously on either depositors or borrowers. He concluded that banks provide a communal service and argued that, for national accounts' purposes, they should be treated in the same way as the government is. Their output would then be measured at factor cost. Implicit service charges would be estimated as the difference between estimated value added and explicit service charges, where estimated value added is the sum of labour costs and capital consumption allowances.

An assessment of these proposed alternatives is given in the section that follows, together with the reasons that the SNA practices have not changed.

3.6. A critique of the alternative approaches

The 'banking dilemma' has been described by many as one of the most controversial issues in national income accounting. It is a unique case of something that is generally acknowledged to be in need of improvement and yet it has not

changed; neither has it generated sufficient noise in either the academic or the rest of the user community for change. There are two good reasons for the apparent indifference: the reluctance of statistical agencies in view of the complexity of the task; and the lack of a plausible and viable alternative. We shall discuss these in turn.

As we said earlier, banking poses a unique problem in the national accounts, in that it permeates every facet of them. Practically all sides of the accounts have to be modified to varying degrees. As was pointed out quite early by Bowman and Eisterlin (1958) when they criticized the U.S. National Income and Product Accounts, the main reason for the continuation of the existing practices all these years has been that the more realistic depictions of banks conflict with rules adopted elsewhere in the national accounts, principally with respect to the interest flows. Also "...the arguments that have been put forward to justify a change...in the measurement of banking output...amount often to little more than the assertion that a change in the treatment of interest is necessary to solve the banking problem" (Haig 1985, p. 426).

By now, the national accounts have developed to be gigantic and complicated bureaucratic structures. Second, not all of their component parts are produced at the same source. Third, few people have complete knowledge of the "intimate details" that are behind the overall picture. Fourth, it is only recently that an interest has emerged in industrial output statistics, statistics by commodity and other types of "microdata". Fifth, to the credit of the national accounts, they cannot change to something that is either vaguely formulated or improperly understood.

The national accounts change infrequently. That it took the U.N. statistical

office one quarter of a century to revise its manuals serves as evidence. However, as Ruggles and Ruggles put it (1982, p. 13), "if the macroeconomic accounting system is to function as an aggregation of microeconomic accounts, some reconsideration of the treatment of financial intermediaries is needed".

The viable alternative has not presented itself. All of the attempts we discussed before have significant drawbacks. Sunga's approach cannot be implemented, since it necessitates the creation of an output-producing household sector. This would be a radical departure from well entrenched concepts both in the national accounts and in economic theory. It would create more problems than it would solve.

The approach that advocates the inclusion of loan services as an integral part of banking output would not constitute an improvement in the case of Canada, where loan services are already recognized as outputs.

The approach that dismisses deposit services output would be a step backwards. Moreover, it is at odds with the history of the very creation of banks, as we argued in the Chapter 1.

The "production function approach" requires econometric answers to what constitutes inputs and what outputs in the production process of banking. This approach is bound to produce results, then, whereby the status of a good would interchange between being an input and being an output at different time periods. This is hardly practical; nor is it something that any statistical agency could realistically live with and defend.

The promising approach suggested by Mamalakis suffers from the following: i) it has not passed the stage of offering more than some general guidelines - valuable as they may be; ii) the specific interest rate decomposition that it requires cannot possibly be done in practice, since the banking services "produced" cannot be isolated and measured; iii) no empirical results were offered to allow judgement of the plausibility of any results.

The "Rymes approach" does not render itself to actual application. Although there can be little doubt that regulation affects the way banking is carried out, it cannot be thought of as being the cause for the imputation in the same sense that the treatment of interest is. It may be a necessary but certainly it is not a sufficient condition. After all, many other industries are regulated and the same question has not even been asked. Computation of these industries' output, notwithstanding the 'contamination' from the regulated environment, does not seem to pose any unusual problem. If there is reluctance to improve the way banking output is measured because of the pervasive effects of the change in the treatment of interest in the structure of the national accounts, much more is required under the "Rymes approach" - a complete overhaul of the SNA.

The approach that views the provision of banking services essentially as a public good that should be measured at factor cost, is also not practical. This is so because in such cases (e.g. the provisions of services by the government) information of a different kind than the cost of the provision of the service is not available. This is not the case in banking. In addition, this proposal cannot deal with international

trade in services; if a country is a large exporter of banking services, we cannot continue to assume the provision of communal services. Yet, even if it was true that it is not possible to allocate the costs of production between deposit and loan services, it does not necessarily mean that their value-added cannot be allocated.

The problem with the imputation, besides the distorted figures, is the principle behind it. The argument that "free" services are provided by the banks, and consequently must be considered as part of GDP, is problematic. It can be made virtually for all industries and violates accounting consistency. "...this treatment raises further questions as to wny services are not recorded for other industries as well" (Sunga 1967, p. 27). An imputation for unpriced banking services is no more necessary than in other industries. "...many industries do not make explicit charges for each and every service they render to customers. Airlines don't charge different fares for non-smoking areas; toilets are "free" in many public places; barbers don't charge for their sprightly conversation..." (Rymes 1985, p. 86).

This Chapter identified the banking imputation problem and portrayed the exchanges and debates that it has triggered over the years. Also, the problems that stem from the imputation as well as proposed alternatives were critically evaluated.

Finding a sound and practical method to measure output in banking remains important. Failure to do so first constrains economic analysis of the activities of financial institutions. Second, the problems feed into industry performance data, presenting potentially misleading pictures to rely on . Third, it hinders the development of policies. Fourth, productivity studies cannot be conducted. Fifth, in the tax policy

context, it prevents taxation with the value-added type tax. It was recognized that the tax would have to be levied not only on explicit charges but also on the interest received by banks on loans and that paid on deposits for both transactions and portfolio services to be taxed. "A first step in any quantitative analysis of the size, growth and productivity of the financial sector must be the understanding of the problems involved in these measurements" (Chant 1986, ch. 3, p. 3.1). Many theoretical approaches have been advanced to either provide justification to the imputation or to suggest a new one. However, none has been seriously attempted in practice.

APPENDIX TO CHAPTER THREE

This appendix provides a formal treatment of the alternative approaches discussed in this Chapter.

1. In terms of the simple model presented in Chapter 2, Sunga's approach would yield the same value for the output originating in the banking industry as that given by Equations (8) and (8'). That is,

$$Y = W + \Pi \qquad (1)$$

$$Y = (I^{f} - I^{d}) + F - M \qquad (1')$$

where Y is GDP, W is wages and salaries, Π is profits, I^{f} and I^{d} are interest paid on loans and received from deposits, respectively, F is explicit service charges and M is the value of intermediate purchases.

Under Equation (1), labour costs and profits would be identical with those derived under the imputation. Under Equation (1'), the gross value of production as well as the value of intermediate inputs would be less than those under the imputation method by the value of the imputed services (net interest received by the bank). However, the value of the output would be the same. The fictitious industry would not be required to balance the aggregate output. All interest received by the banks would be seen as sales of services to the borrowers. As a consequence, these interest payments would be treated as purchases of intermediate inputs by the paying industries and would reduce their value-added. On the other hand, all interest payments to depositors (notably households) would have to be treated as sales from the depositors and purchases of intermediate inputs by the banks to be used in their

own production process. Thus, households would have to be seen as the producing sector of these services[29].

2. In the production function approach, Hancock starts off with a financial firm that maximizes variable profits (revenues minus variable costs) as

$$\pi^*(V, x_K) = \max_x \; V*x \tag{2}$$

where V contains the prices of all goods, inputs and outputs, x contains the quantities of all goods - with the kth good being capital, which is fixed in the short run.

This profit function is assumed to be linearly homogeneous in prices. Thus, it can be expressed in its normalized version as

$$\pi(\upsilon, x_K) \quad with \quad \pi = \frac{\pi^*}{V_I}, \; \upsilon = \frac{V}{V_I} \tag{3}$$

with I being the numeraire good. Differentiation yields the functions for the supplies of outputs and the demands for inputs:

$$x_i = \frac{\partial \pi(\upsilon, x_K)}{\partial \upsilon_i}, \quad i=1, \ldots, K-1, \; i \neq I \tag{4}$$

Equation (4) can also be expressed in relative form, that is through the relative expenditures on a good if it is an input, or its relative contribution to revenues if it is an output. Estimation of $\pi(\upsilon, x_k)$ requires user costs and prices. These are derived from an intertemporal model of financial production, in the sense that the holding cost for inputs and the revenues from outputs are assumed to be contracted for in the beginning of the period and paid or received at the end of the period.

The holding costs of assets and liabilities are derived separately. Thus, the cost

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[29] *A serious implication of the view of interest as payment for a service would be that interest payments by the governments should be included in final sales of the financial sector. More on that in Chapter 6.*

of holding one dollar of assets (h) is specified to be:

$$h_i = r_i + c_i + s_i - d_i, \quad i = L \ldots L+A \tag{5}$$

where r is the interest rate on loans, c the rate of capital gains, s the service charge expressed as a rate and d a rate capturing both the provisions for losses and the insurance premium for the $L+A$ loans.

The revenue from each liability dollar (also h) will be given by

$$h_i = r_i + Rk_i - s_i + d_i, \quad i = 1 \ldots L-1 \tag{6}$$

where R is the discounting rate, r is the interest rate paid on deposits, d the deposit insurance premium, s the service charge rate and k the reserve requirement (which is seen as a tax) for the $L-1$ deposits.

Then the real user cost of the services of a financial asset, and that per dollar of the services of a liability, will be given by (7) and (8) respectively

$$\frac{U_i}{P} = \frac{R - h_i}{1+R} = 1 - \frac{1 + r_i + c_i + s_i - d_i}{1+R} \tag{7}$$

$$\frac{U_i}{P} = \frac{h_i - R}{1+R} = -1 + \frac{1 + r_i + Rk_i - s_i + d_i}{1+R} \tag{8}$$

with P being a general price index.

R is obtained so that it will "...satisfy the feasibility condition that variable profits are nonnegative each year" (Hancock 1985, p. 864). So, Hancock uses the highest of the available interest rates which satisfies this feasibility condition.

The signs of the user costs will be used to classify goods as inputs or outputs. More specifically, if $U<0$ the good is an input whereas if $U>0$ the good is an output. This stems from the monotonicity assumption of the variable profit function, which implies that variable profit is increasing in output prices and decreasing in input prices. Then, Hancock regressed the relative shares of six goods (dependent variables)

against their prices and quantities according to (4)[30]: loans, demand deposits, cash, time deposits, materials and labour. She found that loans and demand deposits are outputs, since variable profit increases when their prices increase, and that cash, time deposits, labour and materials are inputs, since variable profit decreases as their prices increase. She states that "...it is possible to implement a model of production including monetary and other financial goods, in addition to the more conventional physical resources of labour, capital, and materials" (Hancock 1985).

Except for the linear homogeneity and the monotonicity properties, the profit function was also assumed to be convex. This means that the Hessian matrix must be positive semidefinite (Hancock 1985). Hancock used that to measure the elasticity of transformation for any pair of goods. In general, monetary goods were found to have very low substitutability with the exception of the cash and demand deposits pair.

3. In their work, Fixler and Zieschang, start with the "fundamental accounting identity" for financial firms that take homogeneous deposits and make homogeneous loans.

$$r_d z_d + w'y^F = r_l z_l + s_d z_d \qquad (9)$$

where r_d is the deposit interest rate, z_d the dollar level of deposits, s_d the service charge expressed as a rate, r_l the interest rate earned on loans, z_l the stock of

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[30] *More specifically the specification of the regression used was:*

$$\frac{v_i x_i}{\pi} - \alpha_i + \sum_{j=1}^{5} \beta_{ij} \ln v_j + \beta_{iK} \ln x_K$$

Capital was treated as fixed. In fact, Hancock (1985) noted that the financial technology is relatively inflexible, implying that interest rate increases must be severe to restrict monetary production.

outstanding loans, w the vector of the prices of non-financial inputs into the bank's production and y^f the vector of the quantities of these non-financial inputs. $w'y^f$ can be decomposed to include purchases of intermediate materials, labour as well as the profits as a residual. User costs for liabilities are determined as:

$$u_d = [(r_d - s_d) - (1-k)\rho] \tag{10}$$

while user costs for assets as

$$u_l = (\rho - r_l) \tag{11}$$

where k is the reserve requirement ratio and ρ the bank's opportunity cost of money.

The firm's maximization problem becomes

$$\underset{x}{MAX}[p'x \mid (x, y) \in T] \qquad \text{with } x' = [x^i_d, x^i_l],\ i = NF, F, C, G, X, \tag{12}$$

and where the subscripts d and l refer to deposits and loans, y a vector of inputs and x is a vector containing the quantities of all loans and deposits for all sectors. More specifically NF stands for the non-financial sector, F for the financial sector, C for households, G for government and X for exports.

If user costs vary in sign across products, (12) defines an economic variable profit function

$$\pi(p, y) = p'x^* \tag{13}$$

which can be detailed as

$$\pi(p, y) = \sum_i [p^i_d x^i_d + p^i_l x^i_l] - \sum_i [r^i_l z^i_l - (r^i_d - s^i_d) z^i_d] + \rho [(1-k^i) z^i_d - z^i_l] \tag{14}$$

showing the economic rather than the accounting revenue for each sector. They derive a value for ρ,

$$\rho = \frac{[(\bar{r}_d - \bar{s}_d) + \bar{r}_l}{2-k} \tag{15}$$

which is a weighted average between the break-even rate on loanable deposit funds

$(r_d - s_d)/(1-k)$ and the loan rate r_l. Variable profits are for the banks the equivalent of gross revenues for non-financial enterprises.

4. On a step-by-step approach, Mamalakis decomposes the interest rate into the following components:

$$\begin{aligned} i &= i_1^{\,i} + i_2^{\,t} + i_3^{\,q} + i_4^{\,L} + i_5^{\,u} + i_6^{\,n} + i_7^{\,w} + i_8^{\,z} \\ &= R_1^{\,i} + [R_2^{\,t} + R_3^{\,q} + R_4^{\,L} + R_5^{\,u} + R_6^{\,n} + R_7^{\,w}] + R_8^{\,z} \end{aligned} \qquad (16)$$

where i stands for the gross rate of interest, $'$ for the pure (transfer) rate of interest, the superscripts t, q and L for the service charges associated with the time, quantity and location dimensions of financial capital respectively, the superscripts u, n and w for the service charges associated with the unit-of-account, instrument-of-transactions and store-of-wealth functions of money and the superscript z for those service charges associated with unilateral transfers - which includes provisions for bad loans. R stands for the revenues of the financial form associated with each of the above.

He argues that, theoretically, each component should be measured separately even though, as he acknowledges, it may not be practicable.

5. In Rymes' model banks accept homogeneous deposits and give out homogeneous loans. Their production function, except for labour and capital, includes the services of real high-powered money, fiat money or reserves. "The services of the reserves stand for the services of the Authorities and can be obtained only through such deposits" (Rymes 1989, p. 363). The production technology exhibits constant returns to scale. The bank takes the price level, the service charges and all interest rates as given and knows confidently the steady-state rate of inflation. Then a

competitive bank maximizes profits[31] according to

$$\Pi_B = [\delta_M - (i-p)]\frac{M}{P} + \frac{RL}{P} + (i_H - p - \delta_H)\frac{H}{P} - WL_B - \delta K_B + \lambda_1\left[\frac{M}{P} - \left(\frac{L}{P} + K_B + \frac{H}{P}\right)\right] + \lambda_2\left[\frac{M}{P} - \frac{M}{P}\left(K_B, L_B, \frac{H}{P}\right)\right] + x \qquad (17)$$

with respect to L/P, M/P, K_B, L_B and H/P,

where δ_M is the service charge paid by the depositors expressed as a rate, i the deposit nominal rate of interest, p the rate of the commodity price change (where the expected price change is equal to the actual), P the overall price level, M/P the commodity value of bank deposits, L/P the commodity value of bank loans, R the competitive rate of return to capital earned on loans, i_H the nominal interest rate paid by the monetary authorities on bank deposits or reserves with them, δ_H the service charge paid by the bank to the authorities expressed as rate, W the commodity rental on labour, L_B and K_B the flow of labour and the stock of capital used by the bank respectively, δ the rate of depreciation on the commodity stock of capital, x the lump-sum changes in high-powered money created by the Authorities and λ_1 and λ_2 two parameters.

The first order conditions for the above maximization problem are:

$$\frac{W}{\delta_M - (i-p) + R} = \frac{\partial_{M/P}}{\partial L_B}(K_B, L_B, H/P),$$
$$\frac{R+\delta}{\delta_M - (i-p) + R} = \frac{\partial_{M/P}}{\partial K_B}(K_B, L_B, H/P),$$
$$\frac{R - (i_H - p - \delta_H)}{\delta_M - (i-p) + R} = \frac{\partial_{M/P}}{\partial_{H/P}}(K_B, L_B, H/P) \qquad (18)$$

The services of labour and capital acquired by the bank can be measured by their

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[31] *This for the "transaction services" provided by the banks as distinct from the "portfolio or store of value services" which are also provided by banks.*

marginal physical products only if bank deposits earn the competitive rate of return, $i-p=R$. Also, the price of the other input in the production process, the services provided by the monetary authorities, can be measured by their marginal product only if the authorities pay competitive interest on the bank's reserves, that is, $i_H-p=R$. If these conditions prevail the denominators in the first order conditions are all reduced to δ_M. These are then the conditions required for Paretian efficiency in the provision of these (transaction) banking services. Under competitive conditions the price of banking services will be equal to the marginal costs of their provision and profits will be zero. This entails that

$$[\delta_M-(i-p)+R]\frac{M}{P}=(R+\delta)K_B+WL_B+[R-(i_H-p)+\delta_H]\frac{H}{P} \tag{19}$$

so that if $R=i-p=i_H-p$ then

$$\delta_M\frac{M}{P}=(R+\delta)K_B+WL_B+\delta_H\frac{H}{P} \tag{20}$$

On the other hand, the representative agent maximizes utility as

$$W=\int_0^{\infty}U(C_t)\,e^{-\rho t}dt$$

subject to the following budget constraint

$$C(t)=C[K(t),\tilde{L}(t),\frac{M}{P}(t)]+(i-p-\delta_M)\frac{M}{P}(t)$$
$$+WL_B(t)-\dot{K}(t)-(\frac{\dot{M}}{P})(t) \tag{21}$$

The utility function is well-behaved with $U'>0$ and $U''<0$. ρ is the constant rate of time preference, $C(t)$ represents consumption, $K(t)$ and $(M/P)t$ are investments in commodity and real bank deposits, $C[K(t), L(t), (M/P)(t)]$ is the gross output of the flow of consumption goods as a function of the services of the stock of capital, labour and the stock of real bank deposits, $WL_B(t)$ are wages paid by the bank and $i-p-\delta_M$ is the deposit nominal rate of interest less the steady-state rate of inflation and the

explicit service charges. The steady-state optimum solutions to the maximization problem are

$$\frac{\partial_C}{\partial_K}(K, L, \frac{M}{P}) - \delta - \rho - R_K$$

$$\frac{\partial_C}{\partial_{M/P}}(K, L, M/P) - \delta_M + i - p - \rho - R_M \tag{22}$$

Then, if the monetary authorities pursue optimal money supply policies, $i-p=\rho$ and all service charge rates would be equal to the marginal products of the services of real reserves and bank deposits. But if the authorities behave as a monopolist, and they set $i-p<\rho$, then they introduce a distortion tax.

The implications for the measurement of output are that under optimum monetary policy arrangements where $i_M-p=R$,

$$\frac{\partial_C}{\partial_{M/P}}(K^*, \tilde{L}, M/P^*) - \delta_M = 0 \tag{23}$$

holds. The price of bank deposit services would be equal to their marginal product and no imputation would be needed. If monetary arrangements are not optimum then

$$\frac{\partial_C}{\partial_{M/P}}(K, \tilde{L}, M/P) - \delta_M + R - (i-p) \tag{24}$$

holds. In that case, the value of the marginal product of banking services would be equal to the difference between the competitive net real rate of return and the real rate of interest paid on bank deposits (or $R+p-i$) plus the service charge rate. This would be precisely equal to the current imputation method; the imputed nominal gross output for banks would be given by

$$[R+p-i+\delta_M]M \tag{25}$$

In the theoretical case of complete deregulation there would be no interest rate

spread and all services would be explicitly charged - since all deposits would be loaned. Rymes summarizes: "...the greater the departure of money supply policies from optimum, the greater, other things being equal, will be the banking imputation. The greater the banking imputation, the lower would be the 'after imputation' rate of saving of households and governments" (1989, p. 381).

CHAPTER FOUR: A NEW APPROACH TO MEASURING OUTPUT

Analytically, two sets of relationships developed, and continue to exist, between banks and their clients: one vis-à-vis the depositors; and another vis-à-vis the borrowers. Banks ***produce*** and ***sell*** services of safety and convenience (chequing privileges and the like), which depositors are willing to ***buy*** and ***pay*** for[32]. Not only these services have not ceased to be sought by depositors and produced by the banks but, on the contrary, they have been augmented due to the enhanced sophistication in the actual carrying out of transactions as well as the presence and experience of inflation. On the other hand, there are deposits, such as term deposits, that can be best seen as investment funds. Indirectly, however, these deposits also enjoy the benefits of the safekeeping services and the chequing conveniences. The difference in the service content between these two types of deposit services is expected to show as a differential in their respective prices. The above are ***non-intermediation or deposit services***. There also exist ***intermediation or loan services*** provided by banks. This is the only way that the banks can pay the interest on deposits.

There are two streams of payments taking place between banks and depositors: a direct and visible one, identified with the explicit service charges and the interest paid on deposits; and an indirect or invisible one, which reflects the value of the services that depositors buy and the transfer of funds from the borrowers to them, through the bank. Analogously, the visible flow of funds

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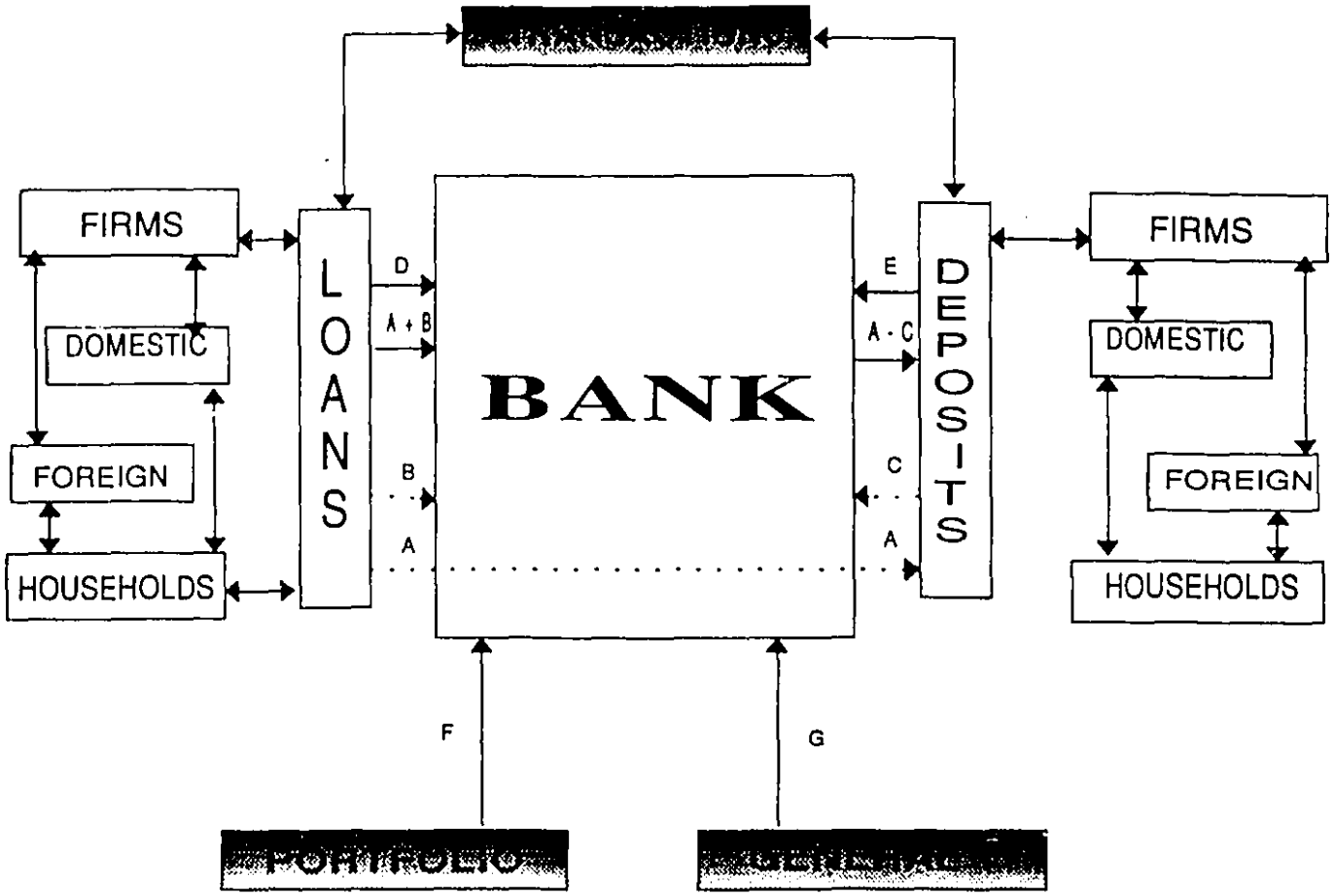
[32] *Bear in mind that safety is provided up to the legislated maximum limit and that until recently there was no interest paid on demand deposits.*

between banks and borrowers, the interest charged and the explicit loan service charges, hides invisible transactions, the transfer of funds to the depositors and the implicit payment for the loan services. These relationships can be seen in Chart 1. The market mechanism fetches the relevant prices which, most sensibly, are net - to economize on transaction costs, among other advantages mentioned earlier.

The preceding analysis refers to what we shall call ***pure banking or transaction services***. However, it should not be forgotten that banks produce other services too. Specifically, two different sets can be distinguished: ***portfolio services***, that refer to the brokerage activities of the banks, retailing of RRSPs, mutual funds and even insurance, the underwriting of share issues and the like; and ***general services***, defined as any other service that could be offered by a non-financial firm, such as rentals of safety boxes and whatever tomorrow may bring. (For a schematic overview see Chart 1). This thesis is concerned with the banking services per se, transaction services.

The above discussion culminates in a model of the financial firm that provides the framework required to measure output. The objective is to arrive at a procedure which has adequate theoretical backing and is practically applicable. The aim of the approach that follows is to uncover the underlying ***prices*** of the financial services produced by the banking industry. If its basic thrust is accepted it can fill the gap that exists in this area.

CHART 1



A: pure interest (transfer)
B: implicit loan charges
C: implicit deposit charges
D: explicit loan charges
E: explicit deposit charges
A+B: interest received
A-C: interest paid
F: charges for portfolio services
G: charges for general services

TRANSACTIONS OUTPUT

$Q^t = (A+B) - (A-C) + D + E =$

$= B + C + D + E$

TOTAL OUTPUT

$Q = Q^t + Q^p + Q^g$

$= B + C + D + E + F + G$

(Lettered solid lines represent visible flows and dotted lines invisible flows)

4.1. The new approach

Let the nominal value of banking output be given by:

$$(P*Q)_t = \sum_{j=1}^{\lambda+\delta} (s_t^j S_t^j), \tag{1}$$

where $(P*Q)$ denotes nominal gross output, S is a vector containing the quantities of the $\lambda + \delta$ services produced, s is the vector of the corresponding ***economic prices*** per unit of service and t is the time subscript. (The notation uses upper-case letters for level variables and lower-case letters for rates throughout the exposition).

It is analytically helpful to separate the two categories of transaction services, that is, loan and deposit services:

$$(P*Q)_t = \sum_{l=1}^{\lambda} (P*Q)_t^l + \sum_{d=1}^{\delta} (P*Q)_t^d = \sum_{l=1}^{\lambda} (s_t^l L_t^l) + \sum_{d=1}^{\delta} (s_t^d D_t^d), \tag{2}$$

where s^l and s^d are the two constituent sub-vectors of s and L^l and D^d are the two constituent sub-vectors of S. There are ℓ loan and d deposit services. The vectors s and S and their sub-vectors are constrained to be positive.

Thus the nominal value of gross banking output will be given by the sum of the products of all the quantities of the services produced and their corresponding economic prices - just as nominal gross output of any other industry is obtained. The services produced are the various categories of deposits and loans which carry different economic prices because of different service content - in the value-added sense.

The quantities of these financial services are assumed to be proportional to the stocks of assets and liabilities of similar term. Thus, they will be

represented by the dollar amounts of loans and deposits[33], taking into account their term structure. For example, two loans of identical dollar amounts and with the same interest rate, contracted for repayment over two different periods, represent different quantities of services. The 'prices' observed in banking services are the accounting prices, that is the interest rates quoted and the explicit service charges prevailing at some point in time.

Consistent with earlier analysis in this thesis, part of the interest rate charged by banks on loans is a transfer and is directed, through the bank, to the ultimate lenders, the depositors. This transfer would take place in the presence or the absence of the banks. Several names have been suggested to describe this transaction such as "reference rate" and "risk-free interest". We designate it as the ***'pure rate of interest'***.

The remaining part of the interest rate paid by borrowers represents, in rate form, a payment for the services provided by the bank. Moreover, explicit charges for the loan are also part of the economic price. Thus, in the case of loan services, the following pricing equation is obtained:

$$i_t^l + f_t^l = i_t + s_t^l \qquad (3)$$

with i^l being the vector of interest rates for the ℓ types of loan services, f^l the vector of the explicit charges expressed as rates per unit of loan services, i the pure rate of interest, and s^l the vector of economic prices that correspond to the value-added of loan services.

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[33] The issue concerning the "provision for loan losses" is examined in the Appendix to Chapter 4.

An analogous equation for the pricing of deposit services can be specified. However, before this is done a fundamental aspect of banking must be considered; the stock of deposits always exceeds the stock of outstanding loans, i.e.

$$\sum_{d=1}^{\delta} D_t^d > \sum_{t=1}^{\lambda} L_t^t \qquad D^d, L^t > 0. \tag{4}$$

Inequality (4) may be the direct effect of having reserve requirements or it may be caused by the banks' own concern about liquidity[34]. What matters for our purposes are the implications that the gap entails, irrespective of its cause. Its existence must be recognized and taken into account in output measurements because of its effect on prices. The bank has to transfer the pure rate of interest to each and every dollar deposited although it collects it only from each dollar loaned. All the interest flows associated with the pure rate of interest will be passed on to the depositors. However, because of (4)

$$\sum i_t L_t^t \neq \sum i_t D_t^d \tag{5}$$

but instead

$$\sum i_t L_t^t - (1-k)\sum i_t D_t^d \tag{6}$$

This means that the pure rate of interest transferred to a dollar of deposits will be smaller than the pure rate of interest collected from a dollar of loans. How much smaller would depend on the excess of the stock of deposits over the stock of loans at each time period. More precisely,

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[34] *In fact, beginning in November 1991 new rules were put in place by the Bank of Canada for the elimination of cash reserve requirements and yet the gap persists.*

$$k_t = 1 - \frac{\sum L_t^l}{\sum D_t^d} \tag{7}$$

which means that k is equal to the gap between the stocks of deposits and loans expressed as a percentage of the stock of deposits.

Taking this into account the price paid for deposit services will be given by:

$$i_t^d = f_t^d = i_t = (ki)_t = s_t^d \tag{8}$$

where i^d is the vector of interest rates for the d types of deposit services, f^d the vector containing the explicit charges on these services expressed as rates per unit, i the pure rate of interest, and s^d the vector of the economic prices that correspond to the deposit services.

Now, expressing equations (3) and (8) in terms of the economic prices, we get:

$$s_t^l = i_t^l + f_t^l - i_t \tag{9}$$

$$s_t^d = (1-k)i_t - i_t^d + f_t^d \tag{10}$$

This set of equations states that the economic price for a unit of loan service is equal to all accounting payments made by the borrower for the service less that part of the interest rate that represents a transfer to the saver. The economic price for a unit of deposit services equals the difference between the pure rate of interest that the depositor ought to receive for each dollar deposited and what he actually gets plus the explicit fees charged -in the form of rates per dollar[35].

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[35] *Of course, it can be legitimately argued that it is the lender who receives (1-k)i, and it is the borrower who pays (1/(1-k))i.*

Pricing equations (9) and (10) reveal something quite important: unlike the pricing of most other goods and services, banks have the power of manipulating the components of the economic prices (fees plus interest part) and thus change the ***impression of prices*** without necessarily changing the overall prices. They can even increase prices while decreasing one of the accounting prices (i.e. explicit charges). Furthermore, these pricing equations have the distinct capability of accommodating the changing composition between explicit and implicit pricing practised by banks[36]. This has assumed additional importance lately due to the alleged relative increase in the revenues of banks generated through explicit charges. From the one extreme case of zero interest spread, where all services are priced explicitly, to the other extreme case of zero explicit charges, where all revenues are generated through the interest spread, to any combination in between, these equations can yield the same price.

Substituting (9) and (10) into (2) we obtain:

$$(P*Q)_t = \sum_{l=1}^{\lambda} (i_t^l + f_t^l - i_t) L_t^l + \sum_{d=1}^{\delta} [(1-k) i_t - i_t^d + f_t^d] D_t^d \qquad (11)$$

This provides the nominal gross output for each loan and each deposit service as well as the aggregate nominal gross output for total loan and deposit services.

Aggregate nominal gross banking output can be obtained either from (11)

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[36] *As we discussed in chapter one, this important dimension in measuring banking output cannot be accommodated by current practices. Furthermore, none of the approaches discussed has explicitly dealt with this "detail".*

or, in a more simplified form, from (12).

$$(P*Q)_t - \sum_{l=1}^{\lambda} (i_t^l + f_t^l) L_t^l - \sum_{d=1}^{\delta} (i_t^d - f_t^d) D_t^d \qquad (12)$$

By the definition of k the last term is zero and drops out of the equation.

It is interesting to see how the aggregate nominal gross output provided by (12) compares to the aggregate nominal gross output that would be obtained with the existing imputation method. By aggregation we obtain:

$$(P*Q)_t - (I_t^l - I_t^d) + (F_t^l + F_t^d). \qquad (13)$$

Equation (13) provides the formula for the estimation of aggregate nominal gross banking output. Two important observations emerge from it. First, it justifies the imputation carried out in the SNAs since net interest received by the banks is added to explicit charges to arrive at gross output. However, the similarities end there. Output for loans is not given by $I^l + F^l$ and output for deposits cannot be obtained as $-I^d + F^d$. Instead, they will be obtained as the products of the economic prices and their respective quantities. Second, as a practical matter, it points to the significance in the treatment of k. More specifically, k ought to be the actual gap between stocks of deposits and loans (and not the RRR as could be the case in a theoretical study); as well, it would be an economy-wide k and to the extent that banks (by design or by happenstance) realize different ks the value of the output at the level of an individual bank will depend upon the bank's actual k value.

Value-added in this approach can be obtained by simply subtracting intermediate purchases from gross output.

It can now be demonstrated that the model is flexible to accommodate any allocation of output - being it inter-sectoral or inter-industrial[37]. To illustrate:

Let there be a vector

$v = /C \quad B \quad G \quad X \quad M/$

where the sectors are defined as on the expenditure side output, that is, *C* stands for the household (and unincorporated business) sector, *B* for the business sector, *G* for the government sector and *X* and *M* for the export and import sectors, respectively. Then equation (2) can be re-written as:

$$(P*Q)_t - \sum_{t-1}^{\lambda} \sum^{\nu} (s_t^t L_t^t)^{\lambda} + \sum_{d-1}^{\delta} \sum^{\nu} (s_t^d D_t^d)^{\lambda} \qquad (14)$$

Equation (14) will produce the output of loan and deposit services that correspond to each sector, in contrast to current practices where these outputs are not captured.

Summing up all categories we get:

$$(P*Q)_t - (C_t^t + C_t^d) + (B_t^t + B_t^d) + (G_t^t + G_t^d) + (X_t^t + X_t^d) - (M_t^t + M_t^d) \qquad (15)$$

which shows explicitly the output associated with each sector and decomposed into both loans and deposit services.

The inter-industrial allocation of output can be obtained analogously. All that is required is the substitution of industries for the sectors in vector *v*. The rest follows suit. Purchases of both loan and deposit services by industries

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[37] *Practically, it is difficult to allocate output value to imports since this would require foreign data.*

would be identified - to correspond to the industries' dual capacity as borrowers and depositors. They would be treated as purchases of intermediate inputs in their production processes. The conceptual framework is there and the constraints are reduced to data availability.

4.2. Estimation of the pure rate of interest

Determination of these service rates requires the prior (or simultaneous) determination of the rate of pure interest. i, is determined by the overall credit market conditions and by the degree of competition among banks. It changes over time but it remains constant across industries primarily because of the anonymity property of money that leads to the indistinguishability of what deposit finances what investment. These are decisions left to the individual banks. (Even investment deposits are not made conditional on the funds being invested in one rather than the other industry).

Econometric estimation of i through the specification of some conventional production function is potentially possible but is undesirable for statistical measurements. It would also have to be based on a restrictive set of assumptions. An alternative estimation is proposed instead.

A range can be established within which the rate of pure interest would lie. The constraints stem from the positivity conditions of the loan and deposit service rate vectors (equations (3) and (8)), that is,

$$s_t^l \geq 0 \rightarrow i_t \leq i_t^l + f_t^l) \tag{16}$$

$$s_t^d \geq 0 \rightarrow i_t \geq \frac{(i^d - f^d)_t}{(1-k)_t} \tag{17}$$

Combining (16) and (17) we obtain:

$$i_t^l + f_t^l \geq i_t \geq \frac{(i^d - f^d)_t}{(1-k)_t} \tag{18}$$

Equation (18) defines a range within which the pure rate of interest must lie. This range depends on ***all*** observable accounting prices (interest and fee rates for both loans and deposits) as well as on k.

It should be re-iterated that this condition is to be taken in the average sense and not to be expected to hold for each individual service. The reason is that banks do not charge for each service separately but as a bundle. It would take an enormous amount of calculations - and costs - for the bank to analyze the profitability of each individual product line. This may give rise to cross-subsidization of service products - knowingly or unknowingly. This cross-subsidization is not expected to last or be systematic for individual services. On a category-by-category basis (especially for (17)) the inequality depends particularly on k[38].

Proposed values for such a pure rate of interest in other work (see Fixler and Zieschang 1990) would translate in our model to:

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[38] *A necessary condition for profit maximization is:*

$$(i_t^{l^*} + f_t^{l^*})L_t \geq (i_t^{d^*} - f_t^{d^*})D_t \Rightarrow \frac{i_t^{l^*} + f_t^{l^*}}{i_t^{d^*} - f_t^{d^*}} \geq \frac{D_t}{L_t} \Rightarrow i_t^{l^*} + f_t^{l^*} \geq \frac{i_t^{d^*} - f_t^{d^*}}{(1-k)_t}$$

where l^* is the loan service with the minimum interest and fee rate sum and d^* is the deposit service with the maximum interest rate and fee rate sum. The gap between D and L (k) may be such that the above condition cannot hold for certain deposit services at some point in time.

$$i_t = \frac{(i_t^l + f_t^l) + \frac{(i_t^d - d_t^d)}{(1-k)_t}}{2} \tag{19}$$

This would effectively allocate the total value of output equally to loan and deposit services. Our proposed method would be given by a weighted i - the weights being total loans and total deposits, consistent with the earlier assumption of proportionality between the quantity of services and the dollar amounts of stocks. That is, in our framework, i could be obtained as:

$$i_t = \frac{(i_t^l + f_t^l)L_t + \frac{(i_t^d - f_t^d)D_t}{(1-k)_t}}{(L+D)_t} \tag{20}$$

Of course, in the event that strict positivity was assumed for the s^t vector, i would be given by:

$$i_t = \frac{\min(i_t^l + f_t^l)L_t + \frac{(i_t^d - f_t^d)D_t}{(1-k)_t}}{(L+D)_t} \tag{21}$$

and would fetch a lower i. That is, the pure rate of interest would be calculated on the basis of that loan service which has the smallest accounting price.

A case can be made for using the interest and fee rates of a specific bank. This would narrow the range the most.

4.3. Real output

The notion of real banking output has always been something of an enigma. Its estimation has not attracted the attention that issues such as regulation, economies of scale, and unit versus multi-branch banking have -

issues whose research, ironically, depends crucially on real output measures. *Ad hoc* measures had to be used each time. Moreover, the real output of the banking sector serves as a prime example of the need to disassociate constant-dollars from physical quantities.

Over the years, many different notions have been practised and/or proposed with not much success. These include deflated total assets, total liabilities or gross revenues - to mention a few. As we discussed in Chapter 2, Gorman (1969) proposed an approach that would yield real output as a weighted average of deflated demand and term deposits, the weights being either the base-year interest rate spread between average interest rates on loans and each type of deposit ("liquidity approach") or the foregone interest for each type of deposit ("transactions approach"). This proposed methodology totally ignored loan services. (For other anomalies see Geehan and Allen (1978) and Hodgman (1969). The above notwithstanding, this method was used in the U.S. until 1975 when it was replaced by employment as a proxy for real output - something that does not allow for productivity changes, of course.

Another suggestion has been to construct price indexes for the existing explicit charges and monitor them over time. This may be a good idea for other purposes but not for the estimation of real output. There are numerous problems. Some of them are: many services are not priced explicitly at all; the service pricing may revert at any time to more implicit and less explicit

depending on regulations, market conditions and bank strategies; not all banks have comparable service charges for the same service to permit the construction of meaningful price indexes; banks may impose charges on services irrespective of the cost of these particular services, simply because their demand elasticities are quite low, whereas they do not explicitly charge for other, more demand-elastic, services.

In Canada, Geehan and Allen (1978) proposed an approach based on the "lowest level of aggregation", that is working with volume series of the transactions performed within each service provided. For deposit services they derived a 'price' equal to unit cost plus unit profit under the assumption that unit profit is proportional to unit cost. For loan services, base-year gross margins (defined as the average interest rate less the cost of funds, i.e. cost plus profit per dollar of loans) were multiplied with the deflated dollars of loan categories - the assumption being that unit costs are invariant to the size of the loans. This approach has the advantage of recognizing both loan and deposit services. But it requires data which, we believe, best characterize the instruments of the delivery of services rather than services themselves, and are not intertemporally viable. Currently, unit-cost factors are applied to the stocks of several loan and deposit categories.

The estimation of real output in our model is straightforward - given the estimation of service rates. Generally, deflation involves either dividing current-period values by a price index or evaluating current-period quantities at base-

period prices. The former does not suit the case at hand given that our prices are rates and are not expected to grow indefinitely with inflation in an index-number sense[39]. Therefore, base-period prices will be used. There are problems associated with the choice of a base-year, but they are not unique to banking. In the empirical work in Chapter 5, we shall utilize 1986 as the base-year, to conform with current practices in Canada.

However, before this is done, another adjustment must be made because of the peculiarity of the units used. In banking, the quantities are dollars; this means that they "change" over time with respect to their purchasing power. Consequently, they must be deflated by relevant price indexes so that they reflect real balances[40].

Thus, real output is given by:

$$Q_t = \sum_{j=1}^{\lambda+\delta} \sum_{h=1}^{2} \left(s_t^{jh} \frac{S_t^{jh}}{P}\right) - \sum_{t=1}^{\lambda} \left(s_b^{t} \frac{L_t^{t}}{P}\right) + \sum_{d=1}^{\delta} \left(s_b^{d} \frac{D_t^{d}}{P}\right) \qquad (22)$$

where the subscript b denotes the base period and P is a general price index. This 'double deflation' is necessary in order to convert nominal loan and deposit balances to real balances. Thus, relative purchasing powers are reflected before real output estimation takes place. In practice, more than one general

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[39] Their movement is expected to reflect the relative prices of different service products, the substitutability among products as well as demand and supply conditions in the credit markets. In other words, buyers know the value of a $1 of service at any given point in time and they take that into account through their demand function. So do banks by adjusting their supply function accordingly. These service rates will reach their highest level in the event of the disappearance of the interest rate spread.

[40] This falls within the group of reasons that differentiate constant-dollar output from "volume" as a proxy for "real" output.

price index may be used depending on whether or not the convertibility to real balances is sought for funds intended for final consumption purposes or for intermediate purchases.

One important and valuable consequence of the approach developed in this chapter is that a different methodology is not required to arrive at real output. Straightforward deflation is brought about by the existence of prices in the form of service rates.

4.4. Summary and Conclusions

A formal approach for measuring nominal and real gross banking output was developed. Pricing equations to uncover the hidden economic prices of deposit and loan services provided by banks were specified. Their specification relied on and made use of existing and observable accounting prices used by banks in the form of quoted interest rates and explicit charges, as well as a fundamental aspect of "transactions" banking, the excess of the stock of deposits over that of loans.

The model for the measurement of banking output requires both income statement and balance sheet information - to reconcile the arguments as to which one is more appropriate to measure banking output. This approach arrives at the same aggregate nominal banking output as the imputation method. As such it does not affect economy-wide output measures. However, that is where the similarities end. According to the model, no need for imputation arises, there is no need for a counter-balancing "dummy" industry,

and a meaningful and clearly understood distribution of output for all sectors and industries can be obtained. We showed how the model is flexible enough to accommodate any allocation of output - being it inter-sectoral or inter-industrial. A range for the pure rate of interest was established and two such rates were proposed. The appropriateness of the same methodology for deflation purposes was also shown.

The approach was developed in sufficient detail so that it does not serve as just another general guideline on how banking output should be measured, but provides clearly all the steps necessary for actual measurement. What remains to be done is to subject the approach to empirical work. To this we proceed next.

APPENDIX TO CHAPTER FOUR

A somewhat unclear issue in measuring banking output has been the treatment of the 'provisions for losses' item (and the deposit insurance premia) reported by banks. Let us clarify it.

In the modelling of theories of the financial firm, it has been suggested that provisions for losses, as a rate, be subtracted to arrive at the user cost of funds (see Hancock 1985). Translating this to our model, it would suggest that the true economic prices should be given by:

$$s_t^l = (i_t^l + f_t^l - m_t) - i_t \qquad \text{(A2.1)}$$

and $$s_t^d = (1-k)_t i_t - (i_t^d - f_t^d + n_t) \qquad \text{(A2.2)},$$

m and n being the rates of provisions for losses and deposit insurance premia, respectively. The implication of that would be that nominal output would be given by:

$$(Q^*P)_t = (l_t^l - l_t^d) + (F_t^l + D_t^d) - (M_t + N_t) \qquad \text{(A2.3)},$$

M and N being the level variables for m and n. Under this scenario, output would be lower than that obtained in our model by the values of provisions for losses and insurance premia. However, this is incorrect. The explanation lies on the specification of i^l and i^d.

Loan services, any way they are conceived, are provided to ***all*** loans irrespective of whether their recipients may default. That is, although some loan services go unpaid, they have been produced - in the output sense. In the aggregate, these losses do not represent a 'shock' to the banks but, on the contrary, are fully expected. It is precisely because of this that they are taken into account in the accounting price

by augmenting it*. This is done in such a way as to maintain the same nominal output value - through a lower 'quantity' and a higher 'price'. For example, assuming that the bank produces 500 units of services and that the market would fetch a price of $2 per unit. The value of nominal output would be $1000. Anticipating that 100 units will not be paid, the bank sets the market price. Nominal output remains unchanged at $1000 which equals price ($2.50) times output paid for 400 units. Good customers pay for bad ones.

Those who argue differently have in mind the ***actual*** rate of interest charged by the banks. Its calculation would necessitate the subtraction of the provisions for losses from total loans, i.e.

$$i_t^l = I_t^l / L_t^{paid},\ L_t^{paid} = L_t - M_t \qquad \text{(A2.4)}$$

However, the service rate that would be arrived at on the basis of this specification would not represent the true economic price and thus would not be appropriate for deflation. (In the example above it would uncover the $2.5 price). By defining i^l as a statistically ***derived*** interest rate, i.e.

$$i_t^l = I_t^l / L_t \qquad \text{(A2.5)},$$

as in our model, the true economic price is unveiled ($2 in our example).

In fact, this is the only way to arrive at interest rates from balance sheet and income statement data. The same arguments hold true for the treatment of the insurance premia).

** Note that these prices would be higher by a factor compensating not only for the interest lost but for the principal amount as well. These factors would be modified each period according to the relationship between provisions for losses and actual losses - chiefly depending on recent past history.*

CHAPTER FIVE: EMPIRICAL APPLICATION

Due to the seriousness of the changes implied by the new approach, empirical work must be carried out in order to put it to the ultimate test. The proposed approach may have a strong theoretical backbone and may be practical. But how does it actually perform? What sort of results does it yield? The practical applicability of the approach, as a viable methodological tool, must be judged against the plausibility of the measures it produces. For this reason, extensive quantitative work was performed. The methodology was found to perform very well and the results were quite satisfactory. A description of the data, the methods used and the results obtained follows. As well, analytical findings are discussed.

5.1. Sources and methods

The methodology for measurement, articulated by the formulation of the new approach, requires both balance sheet and income statement data for banks. The data used here come from the survey of financial institutions run jointly by the Industrial Organization and Finance Division (IOFD) of Statistics Canada and the Office of the Superintendent of Financial Institutions (OSFI), which acts as the regulator for banks in Canada. They are census data and cover booked-in-Canada transactions of domestic banks (schedule A)[41] by both residents and non-residents in both domestic and foreign monies. Thus,

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[41] *Schedule A are multi-branch banks of which no single individual or organization can hold more than 10% of equity and whose non-resident ownership is not allowed to exceed 25%.*

all transactions represent domestic value added. Annual income statement data for fiscal years ending in October and which cover the period from 1983 to 1990, were collected. From the balance sheet side, the date on the average balances of assets and liabilities rather than end-of-year stocks were collected and used, since interest revenues (expenses) are generated (paid) continuously.

It would have been preferable to have the average balances adjusted for ***term***, since loans and deposits of different maturities represent different quantities of services, as discussed in Chapter 4. Even though the rates of interest may be the same, the interest flows are not. However, no such data are available. Depending on the period of time over which loan and deposit interest rates are fixed, the interest rate spread may or may not accurately relate to value added over a specific period. The lack of term adjustment may introduce some bias and limit the comparability of the results over the short-term. That it is problematic to compare short-term changes in banking output was also noted by Chant (1986). This, however, will be a caveat of the existing imputation method as well as any methodological approach put forth so long as the practical problem of data unavailability is present.

The survey makes data available at a considerable level of detail. Breakdowns by type of asset and liability as well as by type of depositor and borrower exist. Consistent with the analysis in Chapter 1 and the presentation of the approach in Chapter 4, our estimation will rely on the former. However, our framework can accommodate inter-industrial or other allocation so long as

matching data from balance sheets and income statements exist - or can be constructed.

The interest revenue reported by banks does not contain interest from loans only; it contains also income from lease receivables. This represents value-added by the banks and is included in our total loan data.

On the other side of the ledger, the interest expense of the banks includes not only interest paid on deposits but also interest on bank debentures and other interest bearing liabilities such as advances from the Bank of Canada. Only interest on deposits is considered here as relating to the transactions output of the banks. Interest on debentures is attributed to the portfolio services of the banks, while interest paid for advances from the central bank represents output produced by the Bank of Canada. Thus, they are excluded from the net interest income of the commercial banks.

Finally, from the non-interest income of the banks, fees for safety boxes are taken as indicative of the general service output produced by banks and Canadian Savings Bonds commissions, as well as commissions and fees for security investment services, are assigned to portfolio output. Thus, the explicit charges and fees used here are net of these items. Unrealized foreign currency translation gains and realized foreign exchange trading profit are not part of "transaction" output and therefore are not considered here.

Data by type of asset and liability can be disaggregated at various levels. In their most disaggregated form they create as many categories as reported

in the survey. In fact, four sub-categories for each type of loans and deposits can be distinguished on the basis of the residency of the transactors and the currency used: transactions by residents in domestic currency; by residents in foreign currency; by non-residents in domestic currenc : by non-residents in foreign currency. It would be too far-fetched to try to justify different economic prices for each of these types of transactions[42]. At the other extreme, only two categories need be distinguished: total loans and total deposits, each with an average price for all the component categories.

Practically, the level of desired disaggregation will be established by data availability and the degree of discretion in justifying different economic prices per category. For instance, it could be justified that the price of a deposit service that provides chequing privileges to the depositor is higher than one that does not; but the price for a loan service to a shoe or garment manufacturer should be the same, assuming identical performances - and thus risk - of the two industries at some point in time. Moreover, for the allocation of the output value of a certain category between domestic consumption and exports, there is no *a priori* reason to assume different prices.

Thus, empirical work was carried out for three levels of aggregation. These are shown in Table 3 at the end of this section. Level I contains only total loans and total deposits. In Level II, loans are decomposed into

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[42] *Moreover, in the case of the data at hand, many individual series contain minuscule amounts - or even zeros. Thus, interest rates cannot be calculated. (Because of their sheer bulk, these data are not appended).*

mortgages, loans to individuals, loans to businesses and other loans, while deposits are decomposed to demand deposits, personal deposits and non-personal deposits. Finally, Level III contains several more specific types of loans and deposits that correspond to those in Levels I and II, such as residential and non-residential mortgages and chequable and non-chequable deposits. From now on, we shall refer to Level I as "the high level of aggregation", to Level II as "the middle level of aggregation" and to Level III as "the low level of aggregation".

The distribution of real output would be computed by evaluating average balances by type of service at base-year service rates. It should be emphasized that the choice of the level of the desired disaggregation does not affect the measurement of nominal output; but, as in all deflation cases, it does affect real output - due to the well-known index-number problem.

Results will be presented for the three levels of aggregation and two pure interest rates. Specifically, for those rates of pure interest given by Equations (20) and (21) in Chapter 4.

The indexes used to obtain real balances, a necessary step in the estimation of constant-dollar output, are the Consumer Price Index (CPI), which monitors the prices of items destined for final consumption, and the Industrial Product Price Index (IPPI), which monitors the prices of intermediate inputs purchased by businesses. As explained in Chapter 4, the reason behind this correction is the changing purchasing power of dollar balances. Then, logically,

the CPI should be used to adjust balances intended for final consumption (actual or foregone) while the IPPI is a good choice for balances intended for purchases of intermediate inputs.

Thus, loans to individuals were deflated by the CPI, loans to business by the IPPI while mortgages and other loans by a weighted average of the two indexes - the weights being loans to individuals and all other loans, respectively. These indexes are shown in Table 4.

Finally, the available data on the interest received and the interest paid by type of loan and deposit correspond exactly to their respective stocks of assets and liabilities. However, this is not the case for explicit fees charged. Their allocation, especially for the lowest level of aggregation, was done in a somewhat discretionary manner. For services explicitly recognized as loans or deposits, such as service charges on mortgages and on personal deposits, the allocation of explicit fees is straightforward. For more detailed services, both within the loan and deposit categories, when exact information was not available the allocation of fees was done basically in proportion to average balances. A list of all the fees, their 1990 values and the exact procedures followed for their allocation are provided in the Appendix to Chapter 5.

TABLE 3

LEVEL I	*LEVEL II*	*LEVEL III*
LOANS	*mortgages*	*NHA-insured residential*
		other residential
		non-residential
	individuals	*personal*
		credit cards
		other
	business	*business*
	other	*day, call, short*
		banks
		provinces
		lease receivables
DEPOSITS	*demand*	*individual pcas*
		banks
		governments
		other
	personal	*chequable daily*
		chequable other
		non-chequable daily
		non-chequable other
		fixed
	non-personal	*chequable (banks)*
		non-chequable (banks)
		fixed (banks)
		chequable (government)
		non-chequable (government)
		fixed (government)
		chequable (other)
		non-chequable (other)
		fixed (other)

TABLE 4

PRICE INDEXES

	CPI	IPPI	COMPOSITE (estimate)
1983	88.5	92.3	91.7
1984	92.4	96.5	95.8
1985	96.4	99.2	98.7
1986	100.0	100.0	100.0
1987	104.4	102.8	103.2
1988	108.6	107.2	107.5
1989	114.0	109.4	110.4
1990	119.5	109.7	111.9

Sources: Statistics Canada, "The consumer price index", cat. 62-001 and "Industry price indexes", cat. 62-011.

Our estimated composite price index was constructed as follows:
[(CPI*Lind) + (PPI*Loth)]/(Lind + Loth),
where Lind stands for loans to individuals and Loth for all other loans.

5.2. Estimated Series

Starting from raw data and following the new approach, nominal and real output estimates were obtained for each service. They were aggregated, first at the level of total loan and total deposit output, and second at the level of total output. In addition, nominal and real output indexes were constructed for each service for easier reference and comparison purposes. The raw data, the derived interest rates, fee rates, rates of pure interest, service rates as well as the estimated nominal and real output can be found in Tables 5 and 6. More specifically, results based on the pure rate of interest given by Equation (20) in Chapter 4 (also referred to as interest 1) and for the three levels of aggregation can be seen in Tables 5.I, 5.II and 5.III, respectively. Those based on the lower rate of pure interest given by Equation (21) (also referred to as interest 2) can be found in Tables 6.I, 6.II and 6.III for each of the three levels of aggregation. Average balances, interest flows and fee flows are shown in millions of dollars throughout the tables.

In the remainder of this section, we provide a guide through the tables and the estimated series and discuss some of the findings. Empirical findings are analyzed further in section 5.3.

Table 5.I shows the raw data and the estimates obtained for the high level of aggregation and the pure rate of interest given by equation (20). It can be seen that interest rates, both charged on loans and paid on deposits, declined in the mid '80s, but increased afterwards. By 1990 they exceeded

their 1983 levels. This movement was matched precisely by the movement of the pure rate of interest. The ratio of the interest rate on loans over that on deposits started at 1.48 in 1983, reached a high of 1.66 in 1987 and obtained a low of 1.38 in 1990. This is indicative of a narrowing in the interest rate spread. Fee rates increased over the period under consideration.

k decreased steadily over the same time period, since the gap between the stocks of loans and the stock of deposits has narrowed substantially. In 1983 less than 82 cents were loaned for every dollar deposited; this increased to almost 94 cents in 1990. This is the result of the relative deregulation of the industry in the last half of the decade. Service rates per dollar of loans were found to be higher than service rates per dollar of deposits. Although service rates for both loan and deposit services increased, the difference between the two has become smaller in recent years.

Our estimates show that total output, both nominal and real, increased. The annual rates of growth have not been stable as the indexes for total nominal and real output reveal. Furthermore, loan service output was found to exceed the output associated with deposit services. This is due to the presence of prices. The service rates for loans are sufficiently higher to more than compensate for the fact that the stocks of loans fall short of the stocks of deposits. This is a result that could not be obtained under the existing methods of output measurement, since output is allocated proportionately to the stocks of loans and deposits and the latter always exceeds the former.

Not only the real output of loan services exceeds the real output for deposit services, but the gap between the two appears to be widening. For instance, real output for loan services accounted for 59% of total real output in 1990, up from 53% in 1983.

It is also interesting to observe from the indexes that the rate of growth of nominal output for deposit services exceeds the rate of growth of the loan services output, whereas the opposite holds true for real output. In fact, most of the growth in total real output comes from loan services, as real output for deposit services declined between 1986 and 1989 and increased marginally in 1990. These findings are consistent with the narrowing of the gap between the stocks of loans and deposits.

TABLE 5.I

LOANS	average balances (million $)	DEPOSITS
172563.8	1983	211328.1
173157.0	1984	214356.6
179139.2	1985	220214.1
194910.1	1986	233501.1
195745.0	1987	237756.2
217497.0	1988	250042.4
247256.7	1989	263984.2
273431.7	1990	291274.9
	interest flows (million $)	
21330.2	1983	17602.3
20976.5	1984	18131.7
20855.1	1985	17432.3
21654.9	1986	16664.6
20297.7	1987	14881.7
24181.1	1988	16932.9
30644.9	1989	22826.7
35361.0	1990	27235.0
	fees (million $)	
826.0	1983	743.2
883.2	1984	849.2
959.2	1985	940.9
1073.1	1986	1099.7
1252.6	1987	1284.3
1474.2	1988	1493.8
1483.3	1989	1703.2
1566.5	1990	1835.7
	interest rates (estimates)	
0.123608	1983	0.083294
0.121142	1984	0.084587
0.116418	1985	0.079161
0.111102	1986	0.071368
0.103695	1987	0.062592
0.111179	1988	0.067720
0.123940	1989	0.086470
0.129323	1990	0.093503
	fee rates (estimates)	
0.004787	1983	0.003517
0.005101	1984	0.003962
0.005354	1985	0.004273
0.005506	1986	0.004710
0.006399	1987	0.005402
0.006778	1988	0.005974
0.005999	1989	0.006452
0.005729	1990	0.006302

(cont'd...)

TABLE 5.I

L/D(= 1-k)	D + L		k	i (estimates)
0.816568	383892	1983	0.183432	0.111496
0.807799	387514	1984	0.192201	0.111620
0.813477	399353	1985	0.186523	0.105388
0.834729	428411	1986	0.165271	0.096577
0.823301	433501	1987	0.176699	0.087811
0.869840	467539	1988	0.130160	0.092836
0.936634	511241	1989	0.063366	0.106957
0.938741	564707	1990	0.061259	0.113305

LOANS	service rates (estimates)	DEPOSITS
0.016898	1983	0.01127
0.014622	1984	0.00954
0.016385	1985	0.01084
0.020031	1986	0.01396
0.022283	1987	0.0151
0.025121	1988	0.01901
0.022982	1989	0.02016
0.021747	1990	0.01916

nominal output (estimates)

	index		index	
2916.0	74.7	1983	73.1	2381.1
2531.9	64.9	1984	62.8	2045.3
2935.2	75.2	1985	73.3	2387.7
3904.2	100.0	1986	100.0	3258.9
4361.8	111.7	1987	110.2	3591.1
5463.7	139.9	1988	145.8	4752.5
5682.4	145.5	1989	163.3	5322.3
5946.2	152.3	1990	171.3	5582.0

real output (estimates)

	index			index
3767.9	96.5	1983	3332.7	102.3
3618.8	92.7	1984	3237.8	99.4
3634.8	93.1	1985	3188.3	97.8
3904.2	100.0	1986	3258.9	100.0
3800.9	97.4	1987	3178.5	97.5
4051.8	103.8	1988	3213.4	98.6
4484.4	114.9	1989	3231.9	99.2
4896.4	125.4	1990	3401.9	104.4

(cont'd...)

TABLE 5.I

TOTAL OUTPUT

			(estimates)	
nominal	index		real	index
5297.1	73.9	1983	7100.6	99.1
4577.2	63.9	1984	6856.6	95.7
5322.9	74.3	1985	6823.1	95.3
7163.1	100.0	1986	7163.1	100.0
7952.9	111.0	1987	6979.4	97.4
10216.2	142.6	1988	7265.2	101.4
11004.7	153.6	1989	7716.3	107.7
11528.2	160.9	1990	8298.3	115.8

Sources: OSFI/IOFD Survey of Financial Institutions

Our estimates were derived as follows:
interest rates: I^f/L and I^d/D
fee rates: F^f/L and F^d/D
$k = (D-L)/D$
$i = [(i^f + f^f)L + (i^d - f^d)D/(1-k)]/(L+D)$
service rates: $s^f = i^f + f^f - i$ and $s^d = (1-k)i - i^d + f^d$
nominal output: s^fL and s^dD
real output: $s^f_b(L/P)$ and $s^d_b(D/P)$
total nominal output: $s^fL + s^dD$
total real output: $s^f_b(L/P) + s^d_b(D/P)$

Table 5.II presents the results for the middle level of aggregation and for the pure rate of interest given by Equation (20). The aggregate nominal output is identical to that in Table 5.I. Total real output, however, is higher at this more detailed level of aggregation and exhibits a smoother growth pattern as revealed by the index for total real output. This is the result of higher growth of real output for loan services, since the real output that corresponds to deposit services generally declined, with minimal growth in 1990.

Interest rates for loans to individuals were found to be higher than loans to businesses and mortgages. Interest rates paid on non-personal deposits were a little higher than those paid on personal deposits, whereas the interest rates paid on demand deposits were considerably lower. These findings are complemented with similar findings for the service rates. Loans to individuals were charged more than loans to businesses and much more than mortgages. With regard to deposits, demand deposits carried much higher service charges than did personal and non-personal deposits. All these findings are consistent with the thinking and analysis about the service content of the various services.

On the loan side, nominal output for business loans was the largest component, whereas that for mortgages was quite low. However, a different story is revealed in real output estimates. Real output of loan services to individuals was the top category, followed by mortgages and loans to businesses. These findings point to that output does not merely depend on the sheer bulk of money balances, since it reflects the behaviour of service rates.

Notice that the service rates for mortgages plummeted after the base year (1986) reflecting the increased competition in this segment of the market (when trust companies, insurance companies and others started to compete more), those for loans to individuals have remained constant, whereas those for loans to businesses have doubled. Thus, a good part of the growth in the nominal output of business loans reflects higher prices. This, however, is not passed through to estimates of real output.

On the deposit side, once again output - real output, in particular - is not necessarily closely linked to average balances. In both nominal and real terms, output for demand deposits exceeds output for personal deposits, which, in turn, exceeds output for non-personal deposits. Although personal deposit balances are higher, the service rates for demand deposits are much more higher, reflecting higher service content.

TABLE 5.II

LOANS					average balances	DEPOSITS			
mortgages	individ	business	other	total	(million $)	demand	personal	non-pers	total
31278.6	25513.7	108022.6	7750.9	172563.8	1983	24671.3	107106.3	79550.5	211328.1
35367.1	27666.1	103254.3	6869.5	173157.0	1984	22210.3	111718.7	80427.6	214356.6
38784.7	30778.0	102468.4	7108.1	179139.2	1985	22185.2	120015.9	78013.0	220214.1
45732.0	34511.6	108020.9	6645.6	194910.1	1986	22743.4	129644.7	81113.0	233501.1
55090.7	43598.1	90584.9	6471.3	195745.0	1987	23028.3	137241.4	77486.5	237756.2
69346.2	50117.2	91778.2	6255.4	217497.0	1988	24348.8	147427.9	78265.7	250042.4
82493.0	56106.3	101091.1	7566.3	247256.7	1989	24884.0	164536.1	74564.1	263984.2
97949.8	60197.7	108208.6	7075.6	273431.7	1990	25122.7	190895.6	75256.6	291274.9

					interest flows				
mortgages	individ	business	other	total	(million $)	demand	personal	non-pers	total
4104.3	3865.3	12465.3	895.3	21330.2	1983	724.9	9075.9	7801.5	17602.3
4234.0	3741.6	12156.4	844.5	20976.5	1984	667.9	9356.5	8107.3	18131.7
4732.8	4108.5	11234.5	779.3	20855.1	1985	533.6	9648.8	7249.9	17432.3
5212.5	4516.7	11259.6	666.1	21654.9	1986	486.6	9684.1	6493.9	16664.6
5937.1	5313.5	8508.6	538.5	20297.7	1987	324.2	8931.3	5626.2	14881.7
7341.2	6129.7	10083.6	626.6	24181.1	1988	437.1	10469.3	6026.5	16932.9
9103.4	7692.3	13024.4	824.8	30644.9	1989	628.7	15079.5	7118.5	22826.7
11266.3	8885.0	14440.9	768.8	35361.0	1990	730.7	18933.3	7571.0	27235.0

					fees				
mortgages	individ	business	other	total	(million $)	demand	personal	non-pers	total
39.9	240.0	519.8	26.3	826.0	1983	227.3	191.6	324.3	743.2
28.0	277.8	552.4	25.0	883.2	1984	257.1	229.7	362.4	849.2
31.8	314.7	585.9	26.9	959.2	1985	277.5	267.4	396.0	940.9
29.1	358.6	658.3	27.1	1073.1	1986	321.7	329.5	448.5	1099.7
33.3	468.4	716.8	34.2	1252.6	1987	370.6	416.2	497.5	1284.3
45.8	570.0	820.8	37.7	1474.2	1988	439.0	481.7	573.1	1493.8
40.9	592.5	812.9	37.1	1483.3	1989	491.2	529.7	682.3	1703.2
45.7	632.7	855.3	32.8	1566.5	1990	497.3	594.1	744.3	1835.7

				interest rates (estimates)					
mortgages	individ	business	other	total		demand	personal	non-pers	total
0.131226	0.151499	0.115395	0.115509	0.123608	1983	0.029382	0.084737	0.098070	0.083294
0.119716	0.135241	0.117733	0.122935	0.121142	1984	0.030072	0.083751	0.100802	0.084587
0.122028	0.133488	0.109639	0.109635	0.116418	1985	0.024052	0.080396	0.092932	0.079161
0.113979	0.130875	0.104235	0.100232	0.111102	1986	0.021395	0.074697	0.080060	0.071368
0.107770	0.121875	0.093930	0.083214	0.103695	1987	0.014078	0.065077	0.072609	0.062592
0.105863	0.122307	0.109869	0.100169	0.111179	1988	0.017951	0.071013	0.077001	0.067720
0.110354	0.137102	0.128838	0.109010	0.123940	1989	0.025265	0.091649	0.095468	0.086470
0.115021	0.147597	0.133454	0.108655	0.129323	1990	0.029085	0.099181	0.100602	0.093503

				fee rates (estimates)					
mortgages	individ	business	other	total		demand	personal	non-pers	total
0.001276	0.009407	0.004812	0.003393	0.004787	1983	0.009213	0.001789	0.004077	0.003517
0.000792	0.010041	0.005350	0.003639	0.005101	1984	0.011576	0.002056	0.004506	0.003962
0.000820	0.010225	0.005718	0.003784	0.005354	1985	0.012508	0.002228	0.005076	0.004273
0.000636	0.010391	0.006094	0.004078	0.005506	1986	0.014145	0.002542	0.005529	0.004710
0.000604	0.010744	0.007913	0.005285	0.006399	1987	0.016093	0.003033	0.006420	0.005402
0.000660	0.011373	0.008943	0.006027	0.006778	1988	0.018030	0.003267	0.007322	0.005974
0.000496	0.010560	0.008041	0.004903	0.005999	1989	0.019740	0.003219	0.009151	0.006452
0.000467	0.010510	0.007904	0.004636	0.005729	1990	0.019795	0.003112	0.009890	0.006302

(cont'd...)

TABLE 5.II

LOANS						DEPOSITS			
service rates (estimates)									
mortgages	individ	business	other	total		demand	personal	non-pers	total
0.021005	0.049410	0.008711	0.007406	0.016898	1983	0.070875	0.008096	-0.002949	0.011267
0.008887	0.033663	0.011463	0.014954	0.014622	1984	0.071671	0.008472	-0.006130	0.009545
0.017459	0.038325	0.009969	0.008032	0.016385	1985	0.074187	0.007563	-0.002125	0.010843
0.018039	0.044689	0.013753	0.007733	0.020031	1986	0.073365	0.008460	0.006085	0.013957
0.020563	0.044808	0.014032	0.000688	0.022283	1987	0.074310	0.010250	0.006106	0.015104
0.013687	0.040844	0.025976	0.013360	0.025121	1988	0.080831	0.013007	0.011075	0.019007
0.003892	0.040706	0.029923	0.006956	0.022982	1989	0.094654	0.011750	0.013862	0.020161
0.002183	0.044802	0.028053	-0.000015	0.021747	1990	0.097074	0.010295	0.015652	0.019164

nominal output (estimates)

mortgages	individ	business	other	total	index		index	demand	personal	non-pers	total
657.0	1260.6	941.0	57.4	2916.0	74.7	1983	73.1	1748.6	867.1	-234.6	2381.1
314.3	931.3	1183.6	102.7	2531.9	64.9	1984	62.8	1591.8	946.5	-493.0	2045.3
677.2	1179.6	1021.5	57.1	2935.2	75.2	1985	73.3	1645.9	907.6	-165.8	2387.7
824.9	1542.3	1485.6	51.4	3904.2	100.0	1986	100.0	1668.6	1096.8	493.6	3258.9
1132.9	1953.5	1271.1	4.5	4361.8	111.7	1987	110.2	1711.2	1406.7	473.2	3591.1
949.2	2047.0	2384.1	83.6	5463.7	139.9	1988	145.8	1968.1	1917.6	866.8	4752.5
321.1	2283.8	3024.9	52.6	5682.4	145.5	1989	163.3	2355.4	1933.4	1033.6	5322.3
213.8	2697.0	3035.6	-0.1	5946.2	152.3	1990	171.3	2438.8	1965.3	1177.9	5582.0

real output (estimates)

mortgages	individ	business	other	total	index		index	demand	personal	non-pers	total
615.0	1288.3	1609.5	65.3	3578.2	91.7	1983	111.0	2045.2	1023.9	547.0	3616.0
665.6	1338.1	1471.5	55.4	3530.6	90.4	1984	101.8	1763.5	1022.9	529.7	3316.0
708.7	1426.8	1420.6	55.7	3611.7	92.5	1985	99.2	1688.4	1053.2	492.4	3234.1
824.9	1542.3	1485.6	51.4	3904.2	100.0	1986	100.0	1668.6	1096.8	493.6	3258.9
963.4	1866.2	1211.8	48.5	4089.9	104.8	1987	97.6	1618.3	1112.1	451.6	3182.0
1163.4	2062.3	1177.4	45.0	4448.1	113.9	1988	99.2	1644.9	1148.5	438.5	3231.9
1347.3	2199.4	1270.8	53.0	4870.5	124.8	1989	98.8	1601.4	1221.0	398.0	3220.4
1579.6	2251.2	1356.6	48.9	5236.2	134.1	1990	100.6	1542.4	1351.4	383.2	3277.0

TOTAL OUTPUT (estimates)

nominal	index		real	index
5297.1	73.9	1983	7194.2	100.4
4577.2	63.9	1984	6846.6	95.6
5322.9	74.3	1985	6845.8	95.6
7163.1	100.0	1986	7163.1	100.0
7952.9	111.0	1987	7272.0	101.5
10216.2	142.6	1988	7680.0	107.2
11004.7	153.6	1989	8091.0	113.0
11528.2	160.9	1990	8513.2	118.8

Sources: OSFI/IOFD Survey of Financial Institutions

Our estimates were derived as follows:
interest rates: l^l_i/L_i and l^d_j/D_j
fee rates: F^l_i/L_i and F^d_j/D_j
service rates: $s^l_i = i^l_i + f^l_i - i$ and $s^d_j = (1-k)i - i^d_j + f^d_j$
nominal output: $\sum s^l_i L_i$ and $\sum s^d_j D_j$
real output: $\sum s^l_{bi}(L_i/P)$ and $\sum s^d_{bj}(D_j/P)$
total nominal output: $\sum s^l_i L_i + \sum s^d_j D_j$
total real output: $\sum s^l_{bi}(L_i/P) + \sum s^d_{bj}(D_j/P)$

where i stands for the four types of loans and j stands for the three types of deposits.

In Table 5.III, estimates are presented for the low level of aggregation, which comprises 29 services (11 types of loans and 18 types of deposits) and for the pure rate of interest given by equation (20).

Total nominal output, as well as nominal outputs for individual services, are again identical to those in Tables 5.I and 5.II. Total real output, though, was found to be higher for this level of aggregation, as was the case when we moved from the high to the middle level of aggregation. This is suggestive of that, in practice, as many services as the data allow should be utilized. Once again, the growth pattern becomes smoother compared with the previous aggregation level as can be seen by the total real output index.

Total loan output exceeds total deposit output, again, but the difference between the two is smaller. This is probably brought about by the introduction of many deposit services. This level of aggregation produces a lower real growth of loan output and much higher for deposit output than the other two aggregation levels.

Service rates were found to be higher for residential than for non-residential mortgages. Not surprisingly, service rates for credit card loans were almost double than those for personal and other loans to individuals. On the deposit side, the higher service rates observed in the previous tables, with regard to demand deposits, can be said to stem basically from personal chequing accounts. For personal deposits, chequable accounts were charged higher service rates than non-chequable accounts. The same is also true for

non-personal deposits. The same services carried also higher fee rates.

As in Tables 5.I and 5.II, the real output allocated to loans to individuals exceeds the real output allocated to business loans and mortgages. Moreover, real mortgage output has increased dramatically since 1986 as its index shows, whereas real business loan output has declined considerably. The real output for deposits is dominated by that for demand deposits, followed by personal deposit output and a very small non-personal deposit output.

Some negative service charges were arrived at. This is not so paradoxical, as explained in the development of the model in Chapter 4. These negative service charges are chiefly associated with government deposits, which seem to receive some preferential treatment.

Undoubtedly, the findings in Tables 5.I, 5.II and 5.III depend, to some extent, on the choice of the base-year. But this is not an issue specific to our estimation methodology. It is always present in every attempt to estimate real output.

TABLE 5.III

LOANS

MORTGAGES

INDIVIDUALS

average balances (million $)

nha-res	oth-res	non-res	total		personal	credit	other	total
11230.5	17620.2	2425.9	31276.6	1983	17425.4	3571.8	4516.5	25513.7
12450.8	20104.7	2811.6	35367.1	1984	18886.7	4221.4	4558.0	27666.1
14104.1	21825.2	2855.4	38784.7	1985	20647.6	4590.3	5540.1	30778.0
15487.9	27084.0	3160.1	45732.0	1986	22964.0	5123.1	6424.5	34511.6
15968.4	35744.9	3377.4	55090.7	1987	24636.9	5756.3	13204.9	43598.1
17570.6	47532.9	4242.7	69346.2	1988	28260.1	6685.0	15172.1	50117.2
19122.8	58451.2	4919.0	82493.0	1989	30851.9	7667.7	17586.7	56106.3
20978.5	71379.9	5591.4	97949.8	1990	31498.6	8877.2	19821.9	60197.7

interest flows (million $)

nha-res	oth-res	non-res	total		personal	credit	other	total
1448.2	2347.8	308.3	4104.3	1983	2772.9	552.1	540.3	3865.3
1533.7	2414.1	286.2	4234.0	1984	2625.8	578.3	537.5	3741.6
1747.9	2666.9	318.0	4732.8	1985	2843.6	642.6	622.3	4108.5
1778.8	3091.4	342.3	5212.5	1986	3061.9	736.8	718.0	4516.7
1741.7	3848.2	347.2	5937.1	1987	3098.8	792.7	1422.0	5313.5
1880.6	5033.0	427.6	7341.2	1988	3563.5	873.1	1693.1	6129.7
2108.6	6468.8	526.0	9103.4	1989	4295.2	1120.7	2276.4	7692.3
2421.3	8220.1	624.9	11266.3	1990	4744.9	1398.3	2741.8	8885.0

fees (million $)

nha-res	oth-res	non-res	total		personal	credit	other	total
14.3	22.5	3.1	39.9	1983	68.7	153.6	17.8	240.1
9.9	15.9	2.2	28.0	1984	81.0	177.4	19.5	277.9
11.6	17.9	2.3	31.8	1985	91.8	198.4	24.6	314.8
9.9	17.2	2.0	29.1	1986	110.0	217.8	30.8	358.6
9.7	21.6	2.0	33.3	1987	150.0	238.0	80.4	468.4
11.6	31.4	2.8	45.8	1988	196.3	268.3	105.4	570.0
9.5	29.0	2.4	40.9	1989	175.1	317.6	99.8	592.5
9.8	33.3	2.6	45.7	1990	171.4	353.5	107.8	632.7

interest rates (estimates)

nha-res	oth-res	non-res	total		personal	credit	other	total
0.128952	0.133245	0.127087	0.131226	1983	0.159130	0.154572	0.119628	0.151499
0.123181	0.120076	0.101793	0.119716	1984	0.139029	0.136992	0.117925	0.135241
0.123929	0.122194	0.111368	0.122026	1985	0.137721	0.139991	0.112326	0.133488
0.114851	0.114141	0.108319	0.113979	1986	0.133335	0.143819	0.111760	0.130875
0.109072	0.107657	0.102801	0.107770	1987	0.125779	0.137710	0.107687	0.121875
0.107031	0.105885	0.100785	0.105863	1988	0.126097	0.130606	0.111593	0.122307
0.110266	0.110670	0.106932	0.110354	1989	0.139220	0.146159	0.129439	0.137102
0.115418	0.115160	0.111761	0.115021	1990	0.150638	0.157516	0.138322	0.147596

fee rates (estimates)

nha-res	oth-res	non-res	total		personal	credit	other	total
0.001273	0.001277	0.001278	0.001276	1983	0.003943	0.043004	0.003941	0.009411
0.000795	0.000791	0.000782	0.000792	1984	0.004289	0.042024	0.004278	0.010045
0.000822	0.000820	0.000805	0.000820	1985	0.004446	0.043222	0.004440	0.010228
0.000639	0.000635	0.000633	0.000636	1986	0.004790	0.042513	0.004794	0.010391
0.000607	0.000604	0.000592	0.000604	1987	0.006088	0.041346	0.006089	0.010744
0.000660	0.000661	0.000660	0.000660	1988	0.006946	0.040135	0.006947	0.011373
0.000497	0.000496	0.000488	0.000496	1989	0.005676	0.041421	0.005675	0.010560
0.000467	0.000467	0.000465	0.000467	1990	0.005442	0.039821	0.005438	0.010510

(cont'd...)

TABLE 5.III

LOANS

MORTGAGES | INDIVIDUALS

service rates (estimates)

nha-res	oth-res	non-res	total		personal	credit	other	total
0 018729	0.023025	0.016868	0.021005	1983	0.051576	0.086079	0.012073	0.049413
0.012355	0.009247	-0.009046	0.008887	1984	0.031697	0.067396	0.010582	0.033666
0.019363	0.017626	0.006785	0.017459	1985	0.036779	0.077824	0.011379	0.038328
0.018913	0.018199	0.012375	0.018039	1986	0.041548	0.089756	0.019977	0.044689
0.021869	0.020451	0.015583	0.020563	1987	0.044057	0.091245	0.025965	0 044808
0.014855	0.013709	0.008608	0.013687	1988	0.040206	0.077904	0.025703	0.040844
0.003806	0.004209	0.000463	0.003892	1989	0.037938	0.080622	0.028156	0.040705
0.002580	0.002321	-0.001080	0.002182	1990	0.042774	0.084031	0.030455	0.044801

nominal output (estimates)

nha-res	oth-res	non-res	total	index		index	personal	credit	other	total
210.3	405.7	40.9	657.0	79.6	1983	81.7	898.7	307.5	54.5	1260.6
153.8	185.9	-25.4	314.3	38.1	1984	60.4	598.7	284.5	48.2	931 3
273.1	384.7	19.4	677.2	82.1	1985	76.5	759.4	357.2	63.0	1179.6
292.9	492.9	39.1	824.9	100.0	1986	100.0	954.1	459.8	128.3	1542.3
349.2	731.0	52.6	1132.9	137.3	1987	126.7	1085.4	525.2	342.9	1953.5
261.0	651.6	36.5	949.1	115.1	1988	132.7	1136.2	520.8	390.0	2047.0
72.8	246.0	2.3	321.1	38.9	1989	148.1	1170.5	618.2	495.2	2283.8
54.1	165.7	-6.0	213.7	25.9	1990	174.9	1347.3	746.0	603.7	2697.0

real output (estimates)

nha-res	oth-res	non-res	total	index		index	personal	credit	other	total
231.5	349.6	32.7	613.8	74.4	1983	83.1	818.1	362.2	101.9	1282.3
245.7	381.8	36.3	663.7	80.5	1984	88.0	849.2	410.1	98.5	1357.8
270.2	402.4	35.8	708.4	85.9	1985	92.9	889.9	427.4	114.8	1432.1
292.9	492.9	39.1	824.9	100.0	1986	100.0	954.1	459.8	128.3	1542.3
292.8	630.6	40.5	963.9	116.8	1987	112.0	980.5	494.9	252.7	1728.0
309.1	804.5	48.8	1162.4	140.9	1988	124.0	1081.2	552.5	279.1	1912.8
327.5	963.2	55.1	1345.8	163.1	1989	132.0	1124.4	603.7	308.2	2036.3
354.7	1161.4	61.9	1577.9	191.3	1990	135.7	1095.1	666.8	331.4	2093.3

(cont'd ..)

TABLE 5.III

	BUSINESS	LOANS OTHER					TOTAL LOANS
		average balances (million $)					
	business	day	banks	prov	leases	total	
1983	108022.6	1822.2	1510.8	2663.3	1754.6	7750.9	172,564
1984	103254.3	1283.2	1946.5	2004.6	1635.2	6869.5	173,157
1985	102468.4	1841.2	1841.4	1807.2	1618.3	7108.1	179,139
1986	108020.9	1614.1	1612.7	1654.2	1764.6	6645.6	194,910
1987	90584.9	2011.5	1480.1	1180.1	1799.6	6471.3	195,745
1988	91778.2	1573.4	1430.5	1147.8	2103.7	6255.4	217,497
1989	101091.1	1749.7	2355.6	1138.3	2322.7	7566.3	247,257
1990	108208.6	1009.0	2209.7	1341.5	2515.4	7075.6	273,432
		interest flows (million $)					
	business	day	banks	prov	leases	total	TOTAL LOANS
1983	12465.3	179.9	179.9	299.7	235.8	895.3	21330.2
1984	12156.4	131.5	255.2	239.2	218.6	844.5	20976.5
1985	11234.5	174.8	202.7	191.3	210.5	779.3	20855.1
1986	11259.6	146.1	133.1	167.3	219.6	666.1	21654.9
1987	8508.6	167.1	53.4	109.5	208.5	538.5	20297.7
1988	10083.6	141.3	134.5	117.9	232.9	626.6	24181.1
1989	13024.4	197.9	209.6	143.7	273.6	824.8	30644.9
1990	14440.9	125.7	160.3	180.8	302.0	768.8	35361.0
		fees (million $)					
	business	day	banks	prov	leases	total	TOTAL LOANS
1983	519.8	26.3	0.0	0.0	0.0	26.3	826.1
1984	552.4	25.0	0.0	0.0	0.0	25.0	883.3
1985	585.9	26.9	0.0	0.0	0.0	26.9	959.4
1986	658.3	27.1	0.0	0.0	0.0	27.1	1073.1
1987	716.8	34.2	0.0	0.0	0.0	34.2	1252.7
1988	820.8	37.7	0.0	0.0	0.0	37.7	1474.3
1989	812.9	37.1	0.0	0.0	0.0	37.1	1483.4
1990	855.3	32.8	0.0	0.0	0.0	32.8	1566.5
							0.0
		inetrest rates (estimates)					
	business	day	banks	prov	leases	total	TOTAL LOANS
1983	0.115395	0.098727	0.119076	0.112530	0.134390	0.115509	0.123608
1984	0.117733	0.102478	0.131107	0.119326	0.133684	0.122935	0.121142
1985	0.109639	0.094938	0.110079	0.105854	0.130075	0.109635	0.116418
1986	0.104235	0.090515	0.082532	0.101137	0.124447	0.100232	0.111102
1987	0.093930	0.083072	0.036079	0.092789	0.115859	0.083214	0.103695
1988	0.109869	0.089806	0.094023	0.102718	0.110710	0.100169	0.111179
1989	0.128838	0.113105	0.088979	0.126241	0.117794	0.109010	0.123940
1990	0.133454	0.124579	0.072544	0.134775	0.120060	0.108655	0.129323
		fee rates (estimates)					
	business	day	banks	prov	leases	total	TOTAL LOANS
1983	0.004812	0.014433	0.00	0.00	0.00	0.003393	0.004787
1984	0.005350	0.019483	0.00	0.00	0.00	0.003639	0.005101
1985	0.005718	0.014610	0.00	0.00	0.00	0.003784	0.005356
1986	0.006094	0.016790	0.00	0.00	0.00	0.004078	0.005506
1987	0.007913	0.017002	0.00	0.00	0.00	0.005285	0.006400
1988	0.008943	0.023961	0.00	0.00	0.00	0.006027	0.006778
1989	0.008041	0.021204	0.00	0.00	0.00	0.004903	0.005999
1990	0.007904	0.032507	0.00	0.00	0.00	0.004636	0.005729

(cont'd...)

TABLE 5.III

LOANS

	BUSINESS	OTHER					TOTAL LOANS
		service rates (estimates)					
	business	day	banks	prov	leases	total	
1983	0.008711	0.001663	0.007580	0.001033	0.022893	0.007406	0.016898
1984	0.011462	0.010340	0.019487	0.007705	0.022063	0.014954	0.014622
1985	0.009968	0.004160	0.004691	0.000466	0.024687	0.008031	0.016384
1986	0.013753	0.010727	-0.014045	0.004560	0.027870	0.007732	0.020031
1987	0.014031	0.012264	-0.051732	0.004978	0.028049	0.000688	0.022284
1988	0.025976	0.020930	0.001187	0.009882	0.017873	0.013359	0.025121
1989	0.029922	0.027352	-0.017978	0.019284	0.010837	0.006956	0.022982
1990	0.028053	0.043781	-0.040762	0.021469	0.006755	-0.000015	0.021746

			nominal output (estimates)						TOTAL	
	business	index	day	banks	prov	leases	total	index	LOANS	index
1983	941.0	63.3	3.0	11.5	2.8	40.2	57.4	111.7	2916.0	74.7
1984	1183.6	79.7	13.3	37.9	15.4	36.1	102.7	199.9	2531.9	64.9
1985	1021.4	68.8	7.7	8.6	0.8	40.0	57.1	111.1	2935.2	75.2
1986	1485.6	100.0	17.3	-22.6	7.5	49.2	51.4	100.0	3904.2	100.0
1987	1271.1	85.6	24.7	-76.6	5.9	50.5	4.5	8.7	4361.8	111.7
1988	2384.1	160.5	32.9	1.7	11.3	37.6	83.6	162.6	5463.7	139.9
1989	3024.9	203.6	47.9	-42.3	22.0	25.2	52.6	102.4	5682.4	145.5
1990	3035.6	204.3	44.2	-90.1	28.8	17.0	-0.1	-0.2	5946.2	152.3

			real output (estimates)						TOTAL	
	business	index	day	banks	prov	leases	total	index	LOANS	index
1983	1609.5	108.3	21.3	-23.1	13.2	53.3	64.7	125.9	3570.3	91.4
1984	1471.5	99.1	14.4	-28.5	9.5	47.5	42.9	83.5	3536.0	90.6
1985	1420.6	95.6	20.0	-26.2	8.3	45.7	42.9	83.5	3604.0	92.3
1986	1485.6	100.0	17.3	-22.6	7.5	49.2	51.4	100.0	3904.2	100.0
1987	1211.8	81.6	20.9	-20.2	5.2	48.6	54.6	106.3	3958.4	101.4
1988	1177.4	79.3	15.7	-18.7	4.9	54.5	56.4	109.8	4309.0	110.4
1989	1270.8	85.5	17.0	-30.0	4.7	58.6	50.4	98.0	4703.2	120.5
1990	1270.8	85.5	9.7	-27.7	5.5	62.7	50.1	97.4	4992.1	127.9

(cont'd...)

TABLE 5.III

DEPOSITS

DEMAND

average balances (million $)

	pca	banks	gov't	other	total
1983	3458.6	1738.5	5083.1	14411.1	24671.3
1984	3236.1	1534.6	3197.1	14242.5	22210.3
1985	3012.8	1625.6	3301.1	14245.7	22185.2
1986	2954.8	1968.7	2705.5	15114.4	22743.4
1987	3069.8	1890.5	1158.9	16909.1	23028.3
1988	3387.5	1491.5	916.3	18553.5	24348.8
1989	4082.6	1335.3	753.2	18712.9	24884.0
1990	4447.2	1196.8	952.8	18525.9	25122.7

interest flows (million $)

	pca	banks	gov't	other	total
1983	0.1	59.8	371.2	293.8	724.9
1984	0.3	65.3	294.1	308.2	667.9
1985	0.2	49.5	236.8	247.1	533.6
1986	0.0	71.9	176.4	238.3	486.6
1987	0.0	25.0	62.3	236.9	324.2
1988	10.9	25.4	57.2	343.6	437.1
1989	54.2	33.3	76.1	465.1	628.7
1990	101.5	41.1	91.1	497.0	730.7

fees (million $)

	pca	banks	gov't	other	total
1983	44.0	0.0	0.0	183.3	227.3
1984	47.6	0.0	0.0	209.5	257.1
1985	48.4	0.0	0.0	229.1	277.5
1986	52.6	0.0	0.0	269.1	321.7
1987	56.9	0.0	0.0	313.7	370.6
1988	67.8	0.0	0.0	371.2	439.0
1989	88.0	0.0	0.0	403.2	491.2
1990	96.3	0.0	0.0	401.0	497.3

interest rates (estimates)

	pca	banks	gov't	other	total
1983	0.000029	0.034397	0.073315	0.020387	0.029382
1984	0.000093	0.042552	0.091990	0.021639	0.030072
1985	0.000066	0.030450	0.071734	0.017346	0.024052
1986	0.000000	0.036522	0.065201	0.015766	0.021395
1987	0.000000	0.013224	0.053758	0.014010	0.014078
1988	0.003218	0.017030	0.062425	0.018519	0.017952
1989	0.013276	0.024938	0.101036	0.024855	0.025265
1990	0.022823	0.034342	0.095613	0.026827	0.029085

fee rates (estimates)

	pca	banks	gov't	other	total
1983	0.012722	0.00	0.00	0.012719	0.009213
1984	0.014709	0.00	0.00	0.014709	0.011576
1985	0.016065	0.00	0.00	0.016082	0.012508
1986	0.017802	0.00	0.00	0.017804	0.014145
1987	0.018535	0.00	0.00	0.018552	0.016093
1988	0.020015	0.00	0.00	0.020007	0.018030
1989	0.021555	0.00	0.00	0.021547	0.019740
1990	0.021654	0.00	0.00	0.021645	0.019795

(cont'd...)

TABLE 5.III

DEPOSITS

DEMAND

service rates (estimates)

	pca	banks	gov't	other	total
1983	0.103737	0.056647	0.017730	0.083377	0 070875
1984	0.104783	0.047615	-0.001823	0.083237	0.071671
1985	0.101729	0.055281	0.013997	0.084467	0.074187
1986	0.098417	0.044094	0.015415	0.082653	0.073365
1987	0.090830	0.059071	0.018537	0.076836	0.074309
1988	0.097550	0.063723	0.018328	0.082241	0.080831
1989	0.108459	0.075242	-0.000856	0.096872	0.094653
1990	0.105195	0.072023	0.010752	0.101183	0.097074

nominal output (estimates)

	pca	banks	gov't	other	total	index
1983	358.8	98.5	89.8	1201.6	1748.6	104.8
1984	339.1	73.1	-5.8	1185.5	1591.8	95.4
1985	306.5	89.9	46.2	1203.3	1645.9	98.6
1986	290.8	86.8	41.7	1249.3	1668.6	100.0
1987	278.8	111.7	21.5	1299.2	1711.2	102.6
1988	330.5	95.0	16.8	1525.9	1968.1	118.0
1989	442.8	100.5	-0.6	1812.8	2355.4	141.2
1990	467.8	86.2	10.2	1874.5	2438.8	146.2
						0 0

real output (estimates)

	pca	banks	gov't	other	total	index
1983	384.6	86.6	88.2	1345.9	1905.3	114.2
1984	344.7	73.2	53.3	1274.0	1745.3	104.6
1985	307.6	74.4	52.8	1221.4	1656.2	99.3
1986	290.8	86.8	41.7	1249.3	1668.6	100.0
1987	289.4	79.8	17.1	1338.7	1725.0	103.4
1988	307.0	60.6	13.0	1412.1	1792.6	107.4
1989	352.5	51.6	10.2	1356.7	1771.0	106.1
1990	366.3	44.2	12.3	1281.4	1704.1	102.1

(cont'd...)

TABLE 5.III

DEPOSITS

PERSONAL

average balances (million $)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total
1983	2202 7	5544.9	10378.2	39423.3	49557.2	107106.3
1984	5058.8	5463.8	10865.8	39110.6	51219.7	111718.7
1985	14459 4	5153.2	10891.6	34244.8	55266.9	120015.9
1986	24505 3	5213.5	12244.4	29508.5	58173.0	129644.7
1987	29143 6	4172.0	20928.1	25221.9	57775.8	137241.4
1988	26586.7	4361 9	32971.2	21515.4	61992.7	147427.9
1989	27235.8	4426.7	44749.9	15826.7	72297.0	164536.1
1990	27011.7	4337.3	58816.0	16502.4	84228.2	190895.6

interest flows (million $)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total
1983	122.6	119.5	677.4	2803.9	5352.5	9075.9
1984	307.2	132.9	772.8	2938.5	5205.1	9356.5
1985	1008.4	122.8	656.6	2206.9	5654.1	9648.8
1986	1638.9	135.6	720.7	1803.4	5385.5	9684.1
1987	1604 4	68.4	1170.0	1305.8	4782.7	8931.3
1988	1544 9	72.2	2265.2	1248.8	5338.2	10469.3
1989	2166.0	71.4	4284.6	1406.4	7151.1	15079.5
1990	2385.9	66.6	6118.9	1425.7	8936.2	18933.3

fees (million $)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total
1983	67.1	47.9	38.3	28.7	9.6	191.6
1984	80.4	57.4	45.9	34.5	11.5	229.7
1985	93.6	66.9	53.5	40.1	13.4	267.5
1986	115 3	82.4	65.9	49.4	16.5	329.5
1987	145.7	104.1	83.2	62.4	20.8	416.2
1988	168.6	120.4	96.3	72.3	24.1	481.7
1989	185.4	132.4	105.9	79.5	26.5	529.7
1990	207.9	148.5	118.8	89.1	29.7	594.0

interest rates (estimates)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total
1983	0.055659	0.021551	0.065271	0.071123	0.108007	0.084737
1984	0.060726	0.024324	0.071122	0.075133	0.101623	0.083751
1985	0.069740	0.023830	0.060285	0.064445	0.102305	0.080396
1986	0.066879	0.026009	0.058860	0.061115	0.092577	0.074697
1987	0.055052	0.016395	0.055906	0.051772	0.082780	0.065077
1988	0.058108	0.016552	0.068702	0.058042	0.086110	0.071013
1989	0.079528	0.016129	0.095745	0.088862	0.098913	0.091649
1990	0.088328	0.015355	0.104035	0.086393	0.106095	0.099181

fee rates (estimates)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total
1983	0.030463	0.008639	0.003690	0.000728	0.000194	0.001789
1984	0.015893	0.010506	0.004224	0.000882	0.000225	0.002056
1985	0.006473	0.012982	0.004912	0.001171	0.000242	0.002229
1986	0.004705	0.015805	0.005382	0.001674	0.000284	0.002542
1987	0.004999	0.024952	0.003976	0.002474	0.000360	0.003033
1988	0.006342	0.027603	0.002921	0.003360	0.000389	0.003267
1989	0.006807	0.029909	0.002366	0.005023	0.000367	0.003219
1990	0 007697	0.034238	0.002020	0.005399	0.000353	0.003112

(cont'd...)

TABLE 5.III

DEPOSITS

PERSONAL

service rates (estimates)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total
1983	0.065848	0.078132	0.029463	0.020650	-0.016768	0.008096
1984	0.045334	0.076349	0.023269	0.015916	-0.011232	0.008472
1985	0.022464	0.074883	0.030358	0.022457	-0.016332	0.007562
1986	0.018441	0.070411	0.027138	0.021175	-0.011678	0.008460
1987	0.022242	0.080852	0.020364	0.022996	-0.010126	0.010250
1988	0.028987	0.091803	0.014971	0.026071	-0.004968	0.013007
1989	0.027459	0.113960	0.006801	0.016340	0.001633	0.011750
1990	0.025733	0.125247	0.004350	0.025370	0.000622	0.010295

nominal output (estimates)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total	index
1983	145.0	433.2	305.8	814.1	-831.0	867.1	79.1
1984	229.3	417.2	252.8	622.5	-575.3	946.5	86.3
1985	324.8	385.9	330.6	769.0	-902.6	907.6	82.8
1986	451.9	367.1	332.3	624.8	-679.3	1096.8	100.0
1987	648.2	337.3	426.2	580.0	-585.0	1406.7	128.3
1988	770.7	400.4	493.6	560.9	-308.0	1917.6	174.8
1989	747.9	504.5	304.3	258.6	118.1	1933.4	176.3
1990	695.1	543.2	255.8	418.7	52.4	1965.2	179.2

real output (estimates)

	ch-dail	ch-oth	n-ch-dl	n-ch-oth	fix	total	index
1983	45.9	441.2	318.2	943.3	-653.9	1094.6	99.8
1984	101.0	416.4	319.1	896.3	-647.3	1085.4	99.0
1985	276.6	376.4	306.6	752.2	-669.5	1042.3	95.0
1986	451.9	367.1	332.3	624.8	-679.3	1096.8	100.0
1987	514.8	281.4	544.0	511.6	-646.3	1205.5	109.9
1988	451.5	282.8	823.9	419.5	-666.6	1311.1	119.5
1989	440.6	273.4	1065.3	294.0	-740.6	1332.6	121.5
1990	416.8	255.6	1335.7	292.4	-823.1	1477.4	134.7

(cont'd)

TABLE 5.III

DEPOSITS

NON-PERSONAL

average balances (million $)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	ch-oth	n-ch-oth	fix-oth	total	TOTAL DEPOSITS
1983	0 0	348 9	28853 7	25.4	79 9	583.7	1508.6	408.0	47742.3	79550 5	211328.1
1984	5 4	543.5	27863.7	12.4	83.2	611.3	1990.2	618.0	48699.9	80427.6	214356.6
1985	8 8	522.0	27482.7	55.7	99.7	450.9	4822.0	496.6	44074.6	78013.0	220214.1
1986	59 5	423.7	24970 1	202.2	18.2	762.0	8162.0	606.7	45908.6	81113.0	233501.1
1987	318.4	288.6	21115.8	755.9	5.8	975.7	10860.3	1138.4	42027.6	77486.5	237756.2
1988	294 3	186.0	18650 5	919.7	4.8	1615.1	12581.6	1141.0	42872.7	78265.7	250042.4
1989	126.2	128.7	16190.1	1185.8	132.7	1278.9	13646.5	944.2	40931.0	74564.1	263984.2
1990	128.5	259.6	17144.7	1538.4	160.8	1280.5	14990.4	615.4	39138.3	75256.6	291274.9

interest flows (million $)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	TOTAL DEPOSITS
1983	0.0	31.4	2894 2	0.9	3.9	59.0	93.1	33.8	4685.2	7801.5	17602.3
1984	0.6	56.5	2933 0	0.4	4.7	69.5	122.9	45.4	4874.3	8107.3	18131.7
1985	0.7	40.9	2601 2	3.1	5.2	46.8	347.5	31.3	4173.2	7249.9	17432.3
1986	1.2	32.1	1917.9	14.2	1.2	75.8	549.7	40.3	3861.5	6493.9	16664.6
1987	24.2	19.1	1393.8	240.4	0.2	71.9	483.9	70.8	3321.9	5626.2	14881.7
1988	8.0	13.3	1384.5	58.1	0.3	131.1	870.3	78.5	3482.4	6026.5	16932.9
1989	3.6	13.0	1485.6	89.3	11.5	108.8	1267.3	86.6	4052.8	7118.5	22826.7
1990	3.1	23.4	1506.8	121.3	14.0	162.7	1536.6	50.5	4152.6	7571.0	27235.0

fees (million $)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	TOTAL DEPOSITS
1983	0.0	0.0	0.0	0.0	0.0	0.0	194.6	97.3	32.4	324.3	743.2
1984	0.0	0.0	0.0	0.0	0.0	0.0	217.4	108.7	36.2	362.3	849.1
1985	0.0	0.0	0.0	0.0	0.0	0.0	237.6	118.8	39.6	396.0	941.0
1986	0.0	0.0	0.0	0.0	0.0	0.0	269.1	134.5	44.9	448.5	1099.7
1987	0.0	0.0	0.0	0.0	0.0	0.0	298.5	149.3	49.8	497.6	1284.4
1988	0.0	0.0	0.0	0.0	0.0	0.0	343.9	171.9	57.3	573.1	1493.8
1989	0.0	0.0	0.0	0.0	0.0	0.0	409.4	204.7	68.2	682.3	1703.2
1990	0.0	0.0	0.0	0.0	0.0	0.0	446.6	223.3	74.4	744.3	1835.6

interest rates (estimates)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	TOTAL DEPOSITS
1983	0.000000	0.089997	0.100306	0.035433	0.048811	0.101079	0.061713	0.082843	0.098135	0.098070	0.083294
1984	0.111111	0.103956	0.105262	0.032258	0.056490	0.113692	0.061753	0.073463	0.100089	0.100802	0.084587
1985	0 079545	0.078352	0.094649	0.055655	0.052156	0.103792	0.072066	0.063029	0.094685	0.092932	0.079161
1986	0.020168	0.075761	0.076808	0.070227	0.065934	0.099475	0.067349	0.066425	0.084113	0.080060	0.071368
1987	0.076005	0.066182	0.066007	0.318031	0.034483	0.073691	0.044557	0.062193	0.079041	0.072609	0.062592
1988	0.027183	0.071505	0.074234	0.063173	0.062500	0.081171	0.069172	0.068799	0.081227	0.077001	0.067720
1989	0.028526	0.101010	0.091760	0.075308	0.086662	0.085073	0.092866	0.091718	0.099015	0.095468	0.086470
1990	0.024125	0.090139	0.087887	0.078848	0.087065	0.127060	0.102506	0.082060	0.106101	0.100602	0.093503

fee rates (estimates)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	TOTAL DEPOSITS
1983	0.00	0.00	0.00	0.00	0.00	0.00	0.128994	0.238480	0.000679	0.004077	0.003517
1984	0.00	0.00	0.00	0.00	0.00	0.00	0.109235	0.175890	0.000743	0.004505	0.003961
1985	0.00	0.00	0.00	0.00	0.00	0.00	0.049274	0.239227	0.000898	0.005076	0.004273
1986	0.00	0.00	0.00	0.00	0.00	0.00	0.032970	0.221691	0.000978	0.005529	0.004710
1987	0.00	0.00	0.00	0.00	0.00	0.00	0.027485	0.131149	0.001185	0.006422	0.005402
1988	0.00	0.00	0.00	0.00	0.00	0.00	0.027334	0.150657	0.001337	0.007322	0.005974
1989	0.00	0.00	0.00	0.00	0.00	0.00	0.030000	0.216797	0.001666	0.009151	0.006452
1990	0.00	0.00	0.00	0.00	0.00	0.00	0.029792	0.362853	0.001901	0.009890	0.006302

(cont'd...)

TABLE 5.III

DEPOSITS

NON-PERSONAL

service rates (estimates)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	TOTAL DEPOSITS
1983	0.091044	0.001047	-0.009262	0.055611	0.042233	-0.010035	0.158325	0.246682	-0.006412	-0.001349	0.011268
1984	-0.020944	-0.013789	-0.015095	0.057909	0.033677	-0.023525	0.137650	0.192594	-0.009178	-0.006131	0.009541
1985	0.006185	0.007378	-0.008918	0.030076	0.033574	-0.018062	0.062939	0.261929	-0.008056	-0.002125	0.010843
1986	0.060448	0.004854	0.003808	0.010388	0.014682	-0.018859	0.046237	0.235882	-0.002519	0.006085	0.013957
1987	-0.003710	0.006113	0.006287	-0.245737	0.037812	-0.001396	0.055223	0.141251	-0.005561	0.006106	0.015104
1988	0.053570	0.009248	0.006519	0.017580	0.018253	-0.000418	0.038914	0.162611	0.000863	0.011075	0.019006
1989	0.071654	-0.000830	0.008420	0.024872	0.013518	0.015107	0.037314	0.225259	0.002831	0.013861	0.020162
1990	0.082240	0.016226	0.018477	0.027516	0.019300	-0.020695	0.033651	0.387158	0.002165	0.015652	0.019164

nominal output (esimates)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	index	TOTAL DEPOSITS	index
1983	0.0	0.4	-267.2	1.4	3.4	-5.9	238.8	100.6	-306.1	-234.6	-47.5	2381.2	73.1
1984	-0.1	-7.5	-420.6	0.7	2.8	-14.4	274.0	119.0	-447.0	-493.0	-99.9	2045.4	62.8
1985	0.1	3.9	-245.1	1.7	3.3	-8.1	303.5	130.1	-355.0	-165.8	-33.6	2387.7	73.3
1986	3.6	2.1	95.1	2.1	0.3	-14.4	377.4	143.1	-115.7	493.6	100.0	3258.9	100.0
1987	-1.2	1.8	132.8	-185.8	0.2	-1.4	599.7	160.8	-233.7	473.2	95.9	3591.1	110.2
1988	15.8	1.7	121.6	16.2	0.1	-0.7	489.6	185.5	37.0	866.8	175.6	4752.6	145.8
1989	9.0	-0.1	136.3	29.5	1.8	19.3	509.2	212.7	115.9	1033.6	203.4	5322.4	163.3
1990	10.6	4.2	316.8	42.3	3.1	-26.5	504.4	238.3	84.7	1177.9	238.7	5581.9	171.3

real output (estimates)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	index	TOTAL DEPOSITS	index
1983	0.0	1.9	124.1	0.3	1.3	-12.4	78.8	108.7	-135.9	166.9	33.8	3166.9	97.2
1984	0.4	2.9	114.8	0.1	1.3	-12.5	99.6	157.8	-132.8	231.6	46.9	3062.3	94.0
1985	0.6	2.6	108.6	0.6	1.5	-8.8	231.3	121.5	-115.2	342.6	69.4	3041.1	93.3
1986	3.6	2.1	95.1	2.1	0.3	-14.4	377.4	143.1	-115.7	493.6	100.0	3258.9	100.0
1987	18.4	1.3	77.0	7.5	0.1	-17.6	481.0	257.2	-101.4	723.5	146.6	3654.1	112.1
1988	16.4	0.8	65.4	8.8	0.1	-28.0	535.7	247.8	-99.5	747.5	151.4	3851.2	118.2
1989	6.7	0.5	54.1	10.8	1.7	-21.2	553.5	195.4	-90.4	711.1	144.1	3814.7	117.1
1990	6.5	1.1	54.6	13.4	2.0	-20.2	580.0	121.5	-82.5	676.3	137.0	3857.8	118.4

(cont'd)

TABLE 5.III

TOTAL OUTPUT (estimates)

	nominal	INDEX
1983	5297.2	74.0
1984	4577.3	63.9
1985	5322.9	74.3
1986	7163.1	100.0
1987	7952.9	111.0
1988	10216.3	142.6
1989	11004.8	153.6
1990	11528.1	160.9

	real	INDEX
1983	6737.2	94.1
1984	6598.3	92.1
1985	3041.1	42.5
1986	7163.1	100.0
1987	7612.5	106.3
1988	8160.2	113.9
1989	8518.0	118.9
1990	8849.9	123.5

Sources: OSFI/IOFD Survey of Financial Institutions

Our estimates were derived as follows:
interest rates: I^l_i/L_i and I^d_j/D_j
fee rates: F^l_i/L_i and F^d_j/D_j
service rates: $s^l_i = r^l_i + f^l_i - i$ and $s^d_j = (1-k)i - i^d_j + f^d_j$
nominal output: $\sum s^l_i L_i$ and $\sum s^d_j D_j$
real output: $\sum s^l_{bi}(L_i/P)$ and $\sum s^d_{bj}(D_j/P)$
total nominal output: $\sum s^l_i L_i + \sum s^d_j D_j$
total real output: $\sum s^l_{bi}(L_i/P) + \sum s^d_{bj}(D_j/P)$

where i stands for the 11 types of loans and j stands for the 18 types of deposits.

Tables 6.I, 6.II and 6.III presents all the estimates for each of the three levels of aggregation and for the rate of pure interest given by Equation (21), without the average balances, interest and fee flows, and the derived interest and fee rates since they are the same with those in the set of Tables 5. The pure rate of interest used here, is lower than the previous one, since its estimation partially depends on the lowest rather than the average interest rate charged on loans. Because of that, service rates for loans are higher and service rates for deposits are lower for every level of aggregation than under the previous pure rate of interest. As a consequence, output allocated to loans is higher and output allocated to deposits is lower than the values obtained in the set of Tables 5.

The total nominal output estimates are the same with those obtained by means of the higher pure rate of interest. Real output estimates, however, are higher for each level of aggregation than those arrived at before. Thus, the lower the rate of pure interest, the greater the value of total real output.

As was the case in the set of Tables 5, real output for loans is increasing over time as a proportion of total output, due to the shrinking of the gap between the stocks of loans and the stocks of deposits. More specifically, for the high level of aggregation it increased from 68% in 1983 to 73% in 1990.

As expected, due to the specification of this pure rate of interest, we get only a few negative service rates, which again are concentrated in government and inter-bank deposits.

TABLE 6.I

i (estimates)	LOANS service rates (estimates)		DEPOSITS service rates (estimates)
0.107229	0.021165	1983	0.00778
0.109057	0.017185	1984	0.00747
0.101641	0.020132	1985	0.00779
0.090981	0.025627	1986	0.00929
0.078059	0.032035	1987	0.00708
0.087365	0.030592	1988	0.01425
0.097724	0.032215	1989	0.01151
0.102768	0.032284	1990	0.00927

nominal output (estimates)				
	index		index	
3652.4	73.1	1983	75.9	1644.7
2975.7	59.6	1984	73.9	1601.5
3606.4	72.2	1985	79.2	1716.5
4994.9	100.0	1986	100.0	2168.2
6270.6	125.5	1987	77.6	1682.3
6653.7	133.2	1988	164.3	3562.5
7965.3	159.5	1989	140.2	3039.4
8827.5	176.7	1990	124.6	2700.7

real output (estimates)				
	index		index	
4820.5	96.5	1983	102.3	2217.3
4629.8	92.7	1984	99.4	2154.2
4650.3	93.1	1985	97.8	2121.2
4994.9	100.0	1986	100.0	2168.2
4862.9	97.4	1987	97.5	2114.7
5183.8	103.8	1988	98.6	2137.9
5737.2	114.9	1989	99.2	2150.2
6264.3	125.4	1990	104.4	2263.3

TOTAL OUTPUT (estimates)				
nominal	index		index	real
5297.1	73.9	1983	98.3	7037.8
4577.2	63.9	1984	94.7	6784.0
5322.9	74.3	1985	94.5	6771.5
7163.1	100.0	1986	100.0	7163.1
7952.9	111.0	1987	97.4	6977.5
10216.2	142.6	1988	102.2	7321.7
11004.7	153.6	1989	110.1	7887.4
11528.2	160.9	1990	119.0	8527.7

Sources: OSFI/IOFD Survey of Financial Institutions

Our estimates were derived as follows:
interest rates: I^l/L and I^d/D
fee rates: F^l/L and F^d/D
$k = (D-L)/D$
$i = [\min(i^l + f^l)L + (i^d - f^d)D/(1-k)]/(L+D)$
service rates: $s^l = i^l + f^l - i$ and $s^d = (1-k)i - i^d + f^d$
nominal output: $s^l L$ and $s^d D$
real output: $s^l{}_b(L/P)$ and $s^d{}_b(D/P)$
total nominal output: $s^l L + s^d D$
total real output: $s^l{}_b(L/P) + s^d{}_b(D/P)$

TABLE 6.II

LOANS						DEPOSITS			
service rates (estimates)									
mortgages	individ	business	other	total		demand	personal	non-pers	total
0.025273	0.053677	0.012978	0.011673	0.021165	1983	0.067391	0.004611	-0.006433	0.007783
0.011450	0.036225	0.014026	0.017517	0.017185	1984	0.069600	0.006402	-0.008200	0.007471
0.021206	0.042072	0.013716	0.011779	0.020132	1985	0.071139	0.004515	-0.005173	0.007795
0.023635	0.050285	0.019349	0.013329	0.025627	1986	0.068694	0.003789	0.001414	0.009286
0.030315	0.054559	0.023784	0.010439	0.032035	1987	0.066281	0.002221	-0.001922	0.007076
0.019159	0.046316	0.031448	0.018831	0.030592	1988	0.076072	0.008248	0.006316	0.014248
0.013125	0.049939	0.039156	0.016189	0.032215	1989	0.086006	0.003102	0.005214	0.011514
0.012720	0.055339	0.038590	0.010523	0.032284	1990	0.087182	0.000403	0.005760	0.009272

nominal output (estimates)											
mortgages	individ	business	other	total	index		index	demand	personal	non-pers	total
790.4	1369.5	1401.9	90.5	3652.4	73.1	1983	75.9	1662.6	493.9	-511.8	1644.7
405.0	1002.2	1448.2	120.3	2975.7	59.6	1984	73.9	1545.8	715.2	-659.5	1601.5
822.5	1294.9	1405.4	83.7	3606.4	72.2	1985	79.2	1578.2	541.8	-403.6	1716.5
1080.9	1735.4	2090.1	88.6	4994.9	100.0	1986	100.0	1562.3	491.2	114.7	2168.2
1670.1	2378.7	2154.4	67.6	6270.6	125.5	1987	77.6	1526.3	304.9	-148.9	1682.3
1328.6	2321.2	2886.2	117.8	6653.7	133.2	1988	164.3	1852.3	1216.0	494.3	3562.5
1082.8	2801.9	3958.3	122.5	7965.3	159.5	1989	140.2	2140.2	510.5	388.8	3039.4
1245.9	3331.3	4175.8	74.5	8827.5	176.7	1990	124.6	2190.3	77.0	433.5	2700.7

real output (estimates)											
mortgages	individ	business	other	total	index		index	demand	personal	non-pers	total
805.8	1449.7	2264.4	112.6	4632.5	92.7	1983	115.3	1915.0	458.5	127.1	2500.6
872.1	1505.6	2070.3	95.5	4543.5	91.0	1984	103.0	1651.2	458.1	123.1	2232.4
928.6	1605.5	1998.6	96.0	4628.6	92.7	1985	99.9	1580.9	471.7	114.4	2167.0
1080.9	1735.4	2090.1	88.6	4994.9	100.0	1986	100.0	1562.3	491.2	114.7	2168.2
1262.2	2099.9	1705.0	83.6	5150.7	103.1	1987	97.7	1515.2	498.1	104.9	2118.2
1524.3	2320.6	1656.5	77.5	5578.9	111.7	1988	99.5	1540.2	514.3	101.9	2156.4
1765.3	2474.8	1787.9	91.3	6119.3	122.5	1989	98.6	1499.5	546.8	92.5	2138.8
2069.6	2533.1	1908.6	84.3	6595.5	132.0	1990	98.6	1444.2	605.2	89.0	2138.4

TOTAL OUTPUT (estimates)				
nominal	index		real	index
5297.1	73.9	1983	7133.1	99.6
4577.2	63.9	1984	6775.9	94.6
5322.9	74.3	1985	6795.6	94.9
7163.1	100.0	1986	7163.1	100.0
7952.9	111.0	1987	7268.9	101.5
10216.2	142.6	1988	7735.3	108.0
11004.7	153.6	1989	8258.1	115.3
11528.2	160.9	1990	8734.0	121.9

Sources: OSFI/IOFD Survey of Financial Institutions

Our estimates were derived as follows:
interest rates: I^f_i/L_i and I^d_j/D_j
fee rates: F^f_i/L_i and F^d_j/D_j
service rates: $s^f_i = i^f_i + f^f_i - i$ and $s^d_j = (1-k)i - i^d_j + f^d_j$
nominal output: $\sum s^f_i L_i$ and $\sum s^d_j D_j$
real output: $\sum s^f_{bi}(L_i/P)$ and $\sum s^d_{bj}(D_j/P)$
total nominal output: $\sum s^f_i L_i + \sum s^d_j D_j$
total real output: $\sum s^f_{bi}(L_i/P) + \sum s^d_{bj}(D_j/P)$

where i stands for the four types of loans and j stands for the three types of deposits.

TABLE 6.III

LOANS

MORTGAGES | INDIVIDUALS

service rates (estimates)

nha-res	oth-res	non-res	total		personal	credit	other	total
0.022997	0.027293	0.021136	0.025273	1983	0.055843	0.090346	0.016340	0.053681
0.014919	0.011810	-0.006482	0.011450	1984	0.034261	0.069959	0.013146	0.036229
0.023110	0.021373	0.010532	0.021206	1985	0.040526	0.081571	0.015126	0.042075
0.024509	0.023795	0.017971	0.023635	1986	0.047144	0.095351	0.025573	0.050285
0.031620	0.030203	0.025334	0.030315	1987	0.053808	0.100997	0.035717	0.054559
0.020326	0.019180	0.014080	0.013687	1988	0.045678	0.083375	0.031175	0.046316
0.013039	0.013442	0.009696	0.013125	1989	0.047171	0.089855	0.037389	0.049939
0.013117	0.012858	0.009458	0.012720	1990	0.053312	0.094569	0.040992	0.055338

nominal output (estimates)

nha-res	oth-res	non-res	total	index		index	personal	credit	other	total
258.3	480.9	51.3	790.4	73.1	1983	78.9	973.1	322.7	73.8	1369.5
185.8	237.4	-18.2	405.0	37.5	1984	57.8	647.1	295.3	59.9	1002.2
325.9	466.5	30.1	822.5	76.1	1985	74.6	836.8	374.4	83.8	1294.9
379.6	644.5	56.8	1080.9	100.0	1986	100.0	1082.6	488.5	164.3	1735.4
504.9	1079.6	85.6	1670.1	154.5	1987	137.1	1325.7	581.4	471.6	2378.7
357.1	911.7	59.7	1328.6	122.9	1988	133.8	1290.9	557.4	473.0	2321.2
249.3	785.7	47.7	1082.8	100.2	1989	161.5	1455.3	689.0	657.6	2801.9
275.2	917.8	52.9	1245.9	115.3	1990	192.0	1679.3	839.5	812.5	3331.3

real output (estimates)

nha-res	oth-res	non-res	total	index		index	personal	credit	other	total
300.0	457.0	47.5	804.6	74.4	1983	83.2	928.2	384.8	130.5	1443.6
318.4	499.1	52.7	870.2	80.5	1984	87.9	963.6	435.6	126.1	1525.4
350.2	526.1	52.0	928.2	85.9	1985	92.8	1009.8	454.0	147.0	1610.8
379.6	644.5	56.8	1080.9	100.0	1986	100.0	1082.6	488.5	164.3	1735.4
379.4	824.5	58.8	1262.8	116.8	1987	113.0	1112.5	525.7	323.5	1961.7
400.5	1051.9	70.9	1523.3	140.9	1988	125.1	1226.8	586.9	357.3	2171.0
424.4	1259.3	80.0	1763.7	163.2	1989	133.2	1275.9	641.3	394.5	2311.7
459.7	1518.5	89.8	2067.9	191.3	1990	136.9	1242.6	708.3	424.2	2375.2

(cont'd...)

TABLE 6.III

LOANS

BUSINESS	OTHER					TOTAL LOANS
	service rates (estimates)					
business	day	banks	prov	leases	total	
0.012978	0.005931	0.011847	0.005301	0.027161	0.011673	0.021166
0.014026	0.012904	0.022050	0.010269	0.024627	0.017517	0.017186
0.013716	0.007907	0.008438	0.004213	0.028434	0.011779	0.020133
0.019349	0.016323	-0.008449	0.010156	0.033466	0.013329	0.025627
0.023784	0.022016	-0.041980	0.014730	0.037800	0.010439	0.032035
0.031448	0.026401	0.006658	0.015353	0.023345	0.018831	0.030592
0.039156	0.036585	-0.008745	0.028517	0.020070	0.016189	0.032215
0.038590	0.054318	-0.030224	0.032007	0.017292	0.010523	0.032284

				nominal output (estimates)				TOTAL	
business	index	day	banks	prov	leases	total	index	LOANS	index
1401.9	67.1	10.8	17.9	14.1	47.7	90.5	102.1	3652.5	73.1
1448.2	69.3	16.6	42.9	20.6	40.3	120.3	135.8	2975.8	59.6
1405.4	67.2	14.6	15.5	7.6	46.0	83.7	94.5	3606.6	72.2
2090.1	100.0	26.3	-13.6	16.8	59.1	88.6	100.0	4994.9	100.0
2154.4	103.1	44.3	-62.1	17.4	68.0	67.6	76.3	6270.7	125.5
2886.2	138.1	41.5	9.5	17.6	49.1	117.8	133.0	6653.8	133.2
3958.3	189.4	64.0	-20.6	32.5	46.6	122.5	138.3	7965.4	159.5
4175.8	199.8	54.8	-66.8	42.9	43.5	74.5	84.1	8827.5	176.7

				real output (estimates)				TOTAL	
business	index	day	banks	prov	leases	total	index	LOANS	index
2264.4	108.3	32.4	-13.9	29.5	64.0	112.0	126.4	4624.6	92.6
2070.3	99.1	21.9	-17.2	21.2	57.1	83.0	93.7	4549.0	91.1
1998.6	95.6	30.4	-15.8	18.6	54.9	88.1	99.5	4625.7	92.6
2090.1	100.0	26.3	-13.6	16.8	59.1	88.6	100.0	4994.9	100.0
1705.0	81.6	31.8	-12.1	11.6	58.4	89.7	101.3	5019.2	100.5
1656.5	79.3	23.9	-11.2	10.8	65.5	89.0	100.4	5439.8	108.9
1787.9	85.5	25.9	-18.0	10.5	70.4	88.7	100.1	5952.0	119.2
1787.9	85.5	14.7	-16.7	12.2	75.3	85.5	96.5	6316.5	126.5

(cont'd)

TABLE 6.III

DEPOSITS

DEMAND

service rates (estimates)

	pca	banks	gov't	other	total
1983	0.100253	0.053162	0.014245	0.079892	0.067391
1984	0.102712	0.045544	-0.003894	0.081166	0.069600
1985	0.098681	0.052232	0.010949	0.081419	0.071139
1986	0.093746	0.039423	0.010744	0.077982	0.068694
1987	0.082801	0.051042	0.010508	0.068808	0.066281
1988	0.092791	0.058964	0.013569	0.077481	0.076072
1989	0.099811	0.060593	-0.009504	0.088224	0.094653
1990	0.095303	0.062131	0.000860	0.091291	0.087182

nominal output (estimates)

	pca	banks	gov't	other	total	index
1983	346.7	92.4	72.1	1151.3	1662.6	106.4
1984	332.4	69.9	-12.4	1156.0	1545.8	98.9
1985	297.3	84.9	36.1	1159.9	1578.2	101.0
1986	277.0	77.6	29.1	1178.7	1562.3	100.0
1987	254.2	96.5	12.2	1163.5	1526.3	97.7
1988	314.3	87.9	12.4	1437.5	1852.3	118.6
1989	407.5	88.9	-7.2	1650.9	2140.2	137.0
1990	423.8	74.4	0.8	1691.2	2190.3	140.2

real output (estimates)

	pca	banks	gov't	other	total	index
1983	366.4	77.4	61.5	1269.8	1775.1	113.6
1984	328.3	65.5	37.2	1202.0	1633.0	104.5
1985	293.0	66.5	36.8	1152.4	1548.7	99.1
1986	277.0	77.6	29.1	1178.7	1562.3	100.0
1987	275.7	71.4	11.9	1263.0	1622.0	103.8
1988	292.4	54.1	9.1	1332.3	1687.9	108.0
1989	335.7	46.2	7.1	1280.1	1669.1	106.8
1990	348.9	39.5	8.6	1209.0	1605.9	102.8

(cont'd...)

TABLE 6.III

DEPOSITS

PERSONAL

service rates (estimates)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total
1983	0.062363	0.074647	0.025979	0.017165	-0.020253	0.004611
1984	0.043263	0.074278	0.021198	0.013845	-0.013302	0.006402
1985	0.019416	0.071835	0.027310	0.019409	-0.019380	0.004514
1986	0.013770	0.065740	0.022467	0.016504	-0.016349	0.003789
1987	0.014214	0.072823	0.012336	0.014968	-0.018154	0.002221
1988	0.024227	0.087044	0.010212	0.021312	-0.009728	0.008248
1989	0.018811	0.105312	-0.001847	0.007692	-0.007015	0.003102
1990	0.015841	0.115355	-0.005542	0.015478	-0.009270	0.000403

nominal output (estimates)

	ch-daily	ch-other	n-ch-dl	n-ch-oth	fixed	total	index
1983	137.4	413.9	269.6	676.7	-1003.7	493.9	100.5
1984	218.9	405.8	230.3	541.5	-681.3	715.2	145.6
1985	280.7	370.2	297.4	664.7	-1071.1	541.8	110.3
1986	337.4	342.7	275.1	487.0	-951.1	491.3	100.0
1987	414.2	303.8	258.2	377.5	-1048.9	304.9	62.1
1988	644.1	379.7	336.7	458.5	-603.1	1216.0	247.5
1989	512.4	466.2	-82.7	121.8	-507.1	510.6	103.9
1990	427.9	500.3	-326.0	255.4	-780.8	77.1	15.7

real output (estimates)

	ch-dail	ch-oth	n-ch-dl	n-ch-oth	fix	total	index
1983	34.3	411.9	263.5	735.2	-915.5	529.4	107.8
1984	75.4	388.7	264.2	698.6	-906.3	520.7	106.0
1985	206.5	351.4	253.8	586.3	-937.3	460.8	93.8
1986	337.5	342.7	275.1	487.0	-951.1	491.2	100.0
1987	384.4	262.7	450.4	398.7	-904.8	591.5	120.4
1988	337.1	264.0	682.1	327.0	-933.2	677.0	137.8
1989	329.0	255.3	881.9	229.1	-1036.8	658.5	134.1
1990	311.3	238.6	1105.8	227.9	-1152.3	731.3	148.9

(cont'd)

TABLE 6.III

DEPOSITS

NON-PERSONAL

service rates (estimates)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	TOTAL DEPOSITS
1983	0.087560	0.002437	-0.012746	0.052127	0.038749	-0.013520	0.154841	0.243197	-0.009897	-0.006433	0.007783
1984	0.023015	0.015860	-0.017166	0.055838	0.031606	-0.025596	0.135579	0.190523	-0.011249	-0.008202	0.007471
1985	0.003137	0.004330	-0.011966	0.027027	0.030526	-0.021110	0.059891	0.258881	-0.011104	-0.005173	0.007795
1986	0.055776	0.000183	-0.000863	0.005717	0.010010	-0.023531	0.041566	0.231211	-0.007190	0.001414	0.009286
1987	0.011739	0.001915	-0.001741	-0.253765	0.029783	-0.009425	0.047195	0.133223	-0.013590	0.006106	0.007076
1988	0.048810	0.004488	0.001760	0.012821	0.013494	-0.005178	0.034155	0.157852	-0.003896	0.006316	0.014247
1989	0.063006	0.009478	-0.000228	0.016224	0.004870	0.006459	0.028666	0.216611	-0.005818	0.005214	0.011514
1990	0.072348	0.006334	0.008585	0.017624	0.009408	-0.030587	0.023759	0.377266	-0.007727	0.005760	0.009272

nominal output (estimates)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	index	TOTAL DEPOSITS	index
1983	0.0	-0.9	-367.8	1.3	3.1	-7.9	233.6	99.2	-472.5	-511.7	-466.1	1644.8	75.9
1984	-0.1	-8.6	-478.3	0.7	2.6	-15.6	269.8	117.7	-547.8	-659.5	-574.9	1601.6	73.9
1985	0.0	2.3	-328.9	1.5	3.0	-9.5	288.8	128.6	-489.4	-403.6	-351.7	1716.5	79.2
1986	3.3	0.1	-21.5	1.2	0.2	-17.9	339.3	140.3	-330.1	114.7	100.0	2168.4	100.0
1987	-3.7	-0.6	-36.8	-191.8	0.2	-9.2	512.5	151.7	-571.2	-148.9	-129.8	1682.3	77.6
1988	14.4	0.8	32.8	11.8	0.1	-8.4	429.7	180.1	-167.1	494.3	430.9	3562.6	164.3
1989	8.0	-1.2	-3.7	19.2	0.6	8.3	391.2	204.5	-238.1	388.8	338.9	3039.6	140.2
1990	9.3	1.6	147.2	27.1	1.5	-39.2	356.2	232.2	-302.4	433.5	377.9	2700.9	124.6

real output (estimates)

	ch-bank	n-ch-bank	fix-bank	ch-gov't	n-ch-gov't	fix-gov't	t ch-oth	n-ch-oth	fix-oth	total	index	TOTAL DEPOSITS	index
1983	0.0	0.1	-28.1	0.2	0.9	-15.5	70.9	106.6	-387.9	-252.9	-220.4	2051.5	94.6
1984	0.3	0.1	-26.0	0.1	0.9	-15.6	89.5	154.6	-378.9	-175.0	-152.5	1978.7	91.3
1985	0.5	0.1	-24.6	0.3	1.0	-11.0	207.9	119.1	-328.7	-35.3	-30.8	1974.1	91.0
1986	3.3	0.1	-21.5	1.2	0.2	-17.9	339.3	140.3	-330.1	114.7	100.0	2168.3	100.0
1987	17.0	0.1	-17.5	4.1	0.1	-22.0	432.4	252.1	-289.4	376.9	328.5	2590.4	119.5
1988	15.1	0.0	-14.8	4.8	0.0	-35.0	481.6	242.9	-283.8	410.9	358.2	2775.8	128.0
1989	6.2	0.0	-12.3	5.9	1.2	-26.4	497.6	191.5	-258.1	405.6	353.6	2733.2	126.1
1990	6.0	0.0	-12.4	7.4	1.3	-25.2	521.4	119.1	-235.5	382.2	333.1	2719.3	125.4

(cont'd)

TABLE 6.III

TOTAL OUTPUT (estimates)

	nominal	INDEX
1983	5297.1	73.9
1984	4577.2	63.9
1985	5322.9	74.3
1986	7163.1	100.0
1987	7952.9	111.0
1988	10216.2	142.6
1989	11004.7	153.6
1990	11528.2	160.9

	real	INDEX
1983	6676.0	93.2
1984	6527.5	91.1
1985	6599.7	92.1
1986	7163.0	100.0
1987	7609.3	106.2
1988	8215.4	114.7
1989	8685.0	121.2
1990	9035.6	126.1

Sources: OSFI/IOFD Survey of Financial Institutions

Our estimates were derived as follows:
interest rates: I^r_i/L_i and I^d_j/D_j
fee rates: F^r_i/L_i and F^d_j/D_j
service rates: $s^r_i = i^r_i + f^r_i - i$ and $s^d_j = (1-k)i - i^d_j + f^d_j$
nominal output: $\sum s^r_i L_i$ and $\sum s^d_j D_j$
real output: $\sum s^r_{ai}(L_i/P)$ and $\sum s^d_{aj}(D_j/P)$
total nominal output: $\sum s^r_i L_i + \sum s^d_j D_j$
total real output: $\sum s^r_{ai}(L_i/P) + \sum s^d_{aj}(D_j/P)$

where i stands for the 11 types of loans and j stands for the 18 types of deposits.

5.3. Empirical Findings

Real banking output increased considerably over the years under consideration. Table 7 summarizes and contrasts, in index form, total real output for each level of aggregation and rate of pure interest. Chart 2 depicts the performance of nominal versus real output for the lowest level of aggregation (most detailed) and for each pure rate of interest (real output 1 and real output 2, respectively).

Not surprisingly, the rate of growth of total real output increases as we move to a lower level of aggregation - although, naturally, nominal output and its rate of growth remain unchanged. Index-number theory suggests that the lower the level of aggregation the better the quality of the results. Total real output was found to be less sensitive to the choice of the rate of pure interest than it is to the choice of the level of aggregation, the choice of the base year as well as to the choice of the general deflators. Extensive experimentation tended to confirm this.

The decline of real output between 1983 to 1984, as estimated by all variants, is consistent with the behaviour of real (and even nominal) balances[43].

The estimation of nominal and real output series allows us to shed some light to the behaviour of pricing in banking. This can be achieved through the

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[43] *Recall that we deal with schedule-A banks. Competition between these banks and other deposit-accepting institutions became particularly keen following the recession of the early '80s.*

TABLE 7

Real output indexes (1st rate)

	Level I	Level II	Level III
1983	99.1	100.4	94.1
1984	95.7	95.6	92.1
1985	95.3	95.6	92.8
1986	100.0	100.0	100.0
1987	97.4	101.5	106.3
1988	101.4	107.2	113.9
1989	107.7	113.0	118.9
1990	115.8	118.8	123.5

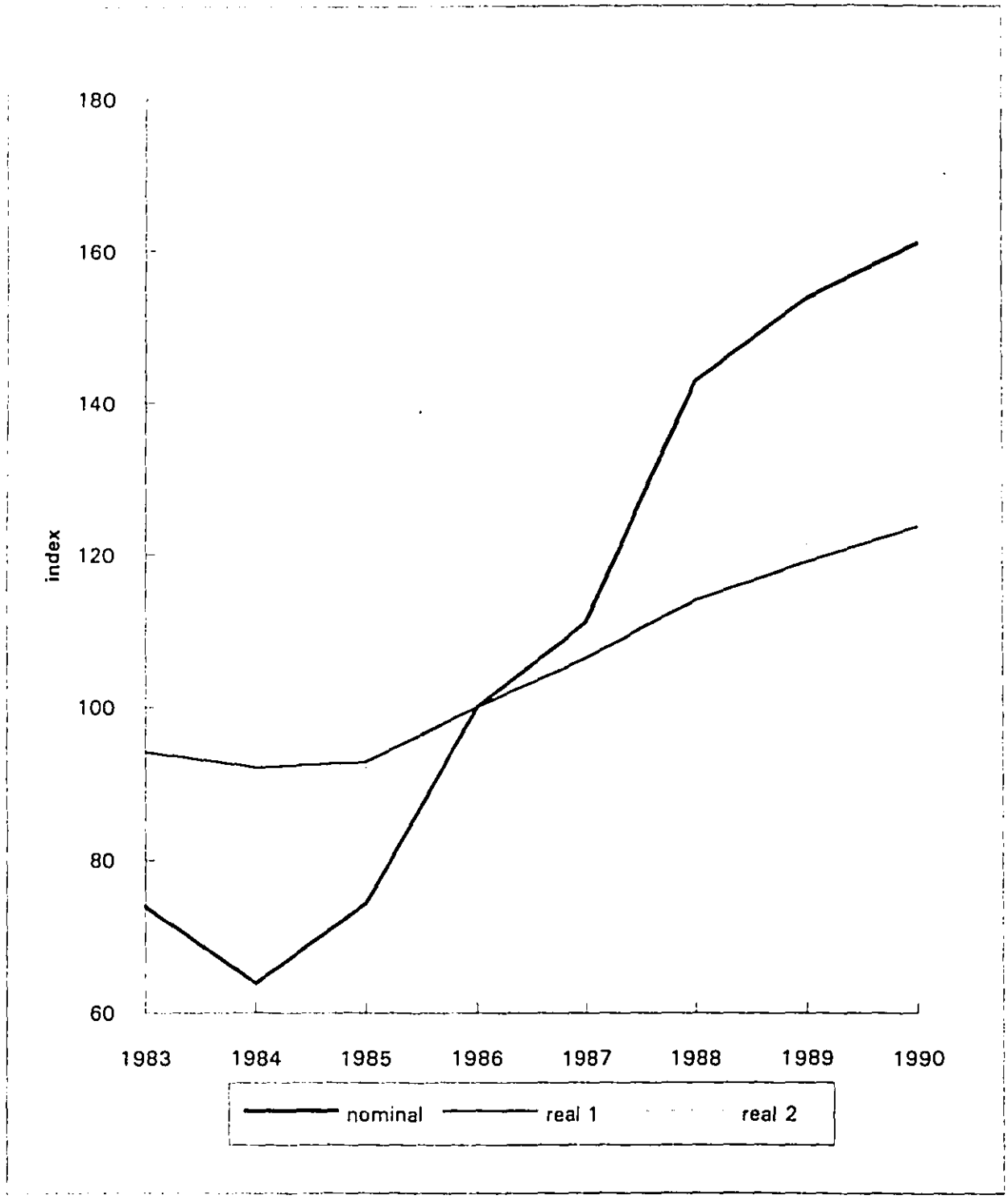
Real output indexes (2nd rate)

	Level I	Level II	Level III
1983	98.3	99.6	93.2
1984	94.7	94.6	91.1
1985	94.5	94.9	92.1
1986	100.0	100.0	100.0
1987	97.4	101.5	106.2
1988	102.2	108.0	114.7
1989	110.1	115.3	121.2
1990	119.0	121.9	126.1

Source: Our estimates

CHART 2

Nominal vs real output



Source: Our estimates

construction of implicit price indexes. Implicit price indexes were derived from the lowest level of aggregation for each pure rate of interest. They are shown in Table 8 and Chart 3 (implicit 1 and implicit 2), and are contrasted with the evolution of the overall price level, as shown by the CPI, over the same period. These indexes show price increases for banking services significantly higher than the rate of increase in the overall price level.

Furthermore, implicit prices for deposit services increased faster than those for loan services. See the implicit price indexes for loan and deposit services in Table 9 and Chart 4.

In the period between 1983 and 1990 the gap between the stock of deposits and that of outstanding loans shrank. Chart 5 shows the behaviour of k, that is the percentage of non-loaned deposits over deposits. Demonstrably, it has declined significantly over the last decade. These observations reflect the relative deregulation of the industry in Canada in the second half of the '80s and are consistent with the premises of our approach.

The rate of pure interest initially decreased, to rebound later and reach its highest level, for the period under examination in 1990, following closely the behaviour of the loan and deposit interest rates. The estimated service rates generally increased within the same time period - only to a small degree due to higher explicit charges[44]. Chart 6 depicts their evolution.

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[44] *Service rates are not expected to increase indefinitely but rather to oscillate over the long term since they are rates. But they are applied on greater balances as the overall price level increases.*

TABLE 8

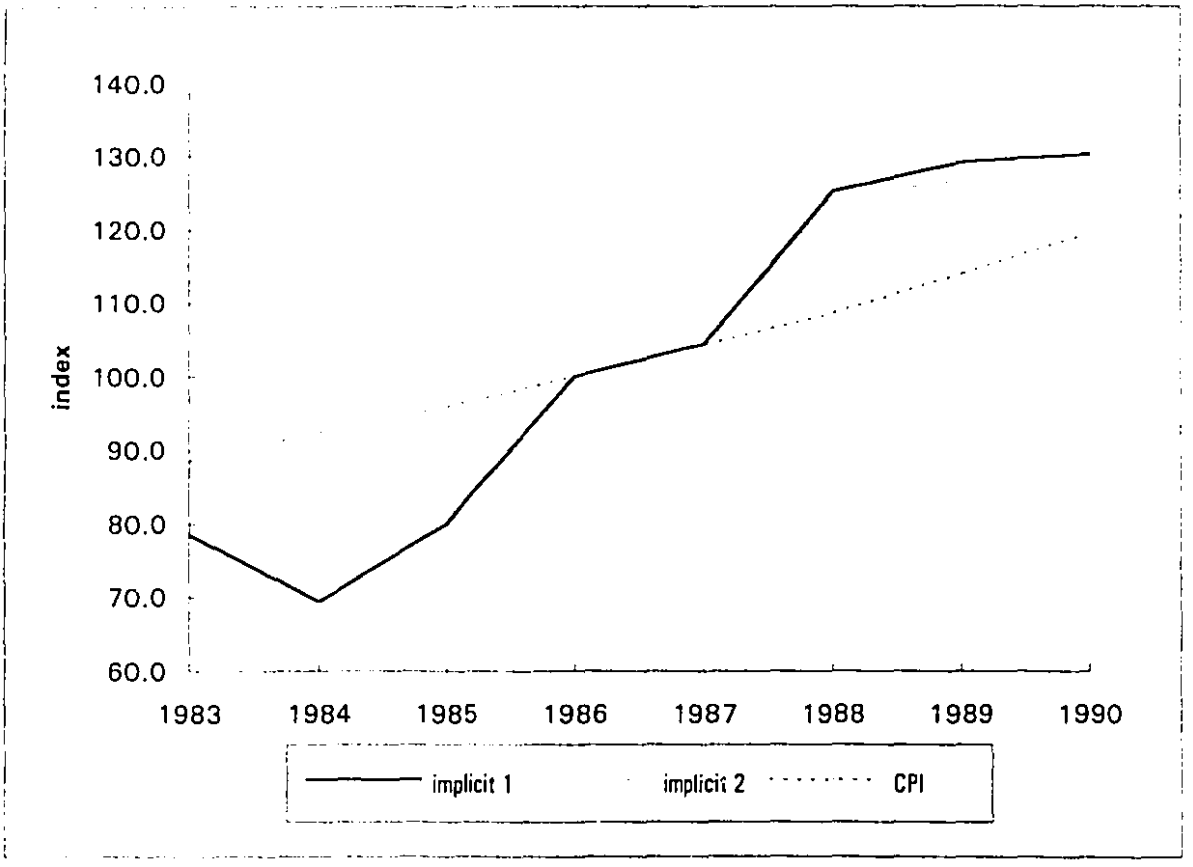
price indexes

	implicit 1	implicit 2	CPI
1983	78.5	79.3	88.5
1984	69.4	70.1	92.4
1985	80.1	80.7	96.0
1986	100.0	100.0	100.0
1987	104.4	104.5	104.4
1988	125.2	124.3	108.6
1989	129.2	126.7	114.0
1990	130.3	127.6	119.5

Sources: "The consumer price index", Statistics Canada, cat. 62-001 and our estimates.

CHART 3

Price indexes



Sources: "The consumer price index", Statistics Canada, cat. 62-001 and our estimates.

TABLE 9

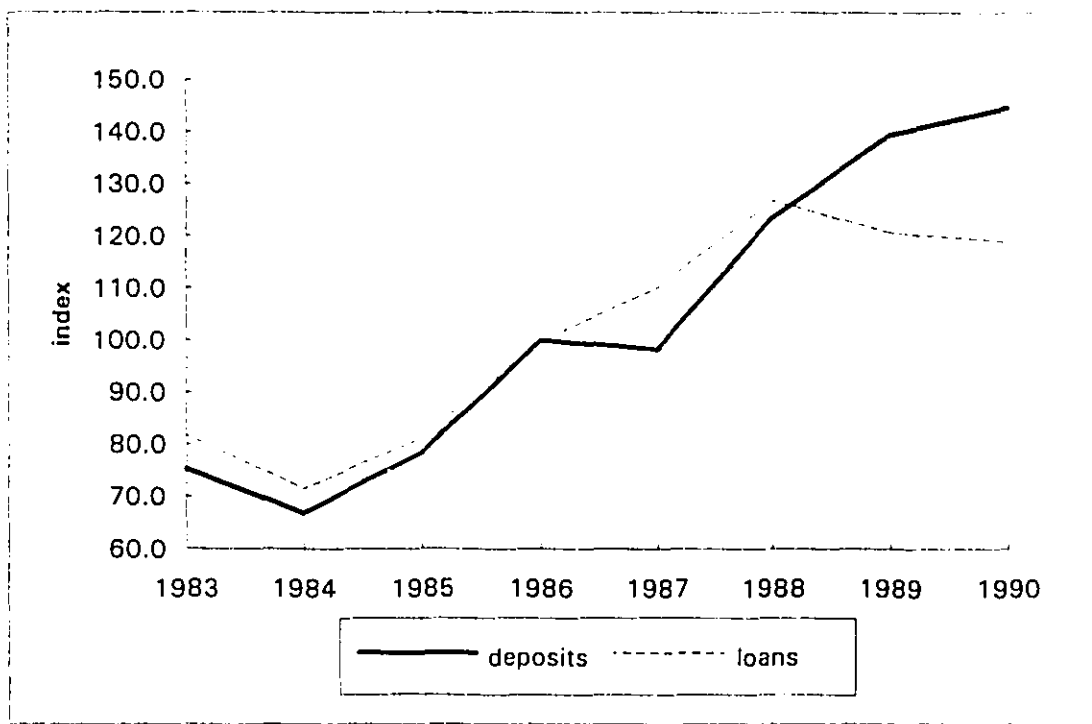
implicit price indexes

deposits		loans
75.2	1983	81.7
66.8	1984	71.6
78.5	1985	81.3
100.0	1986	100.0
98.3	1987	110.2
123.4	1988	126.8
139.5	1989	120.8
144.7	1990	119.1

Source: Our estimates

CHART 4

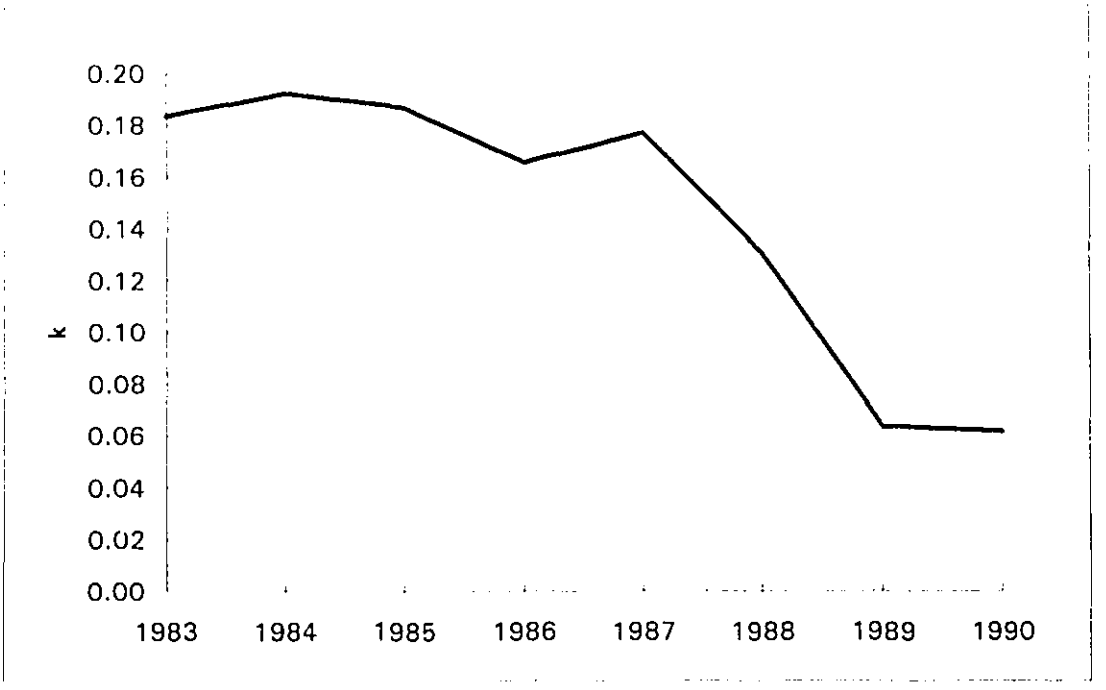
implicit price indexes



Source: Our estimates

CHART 5

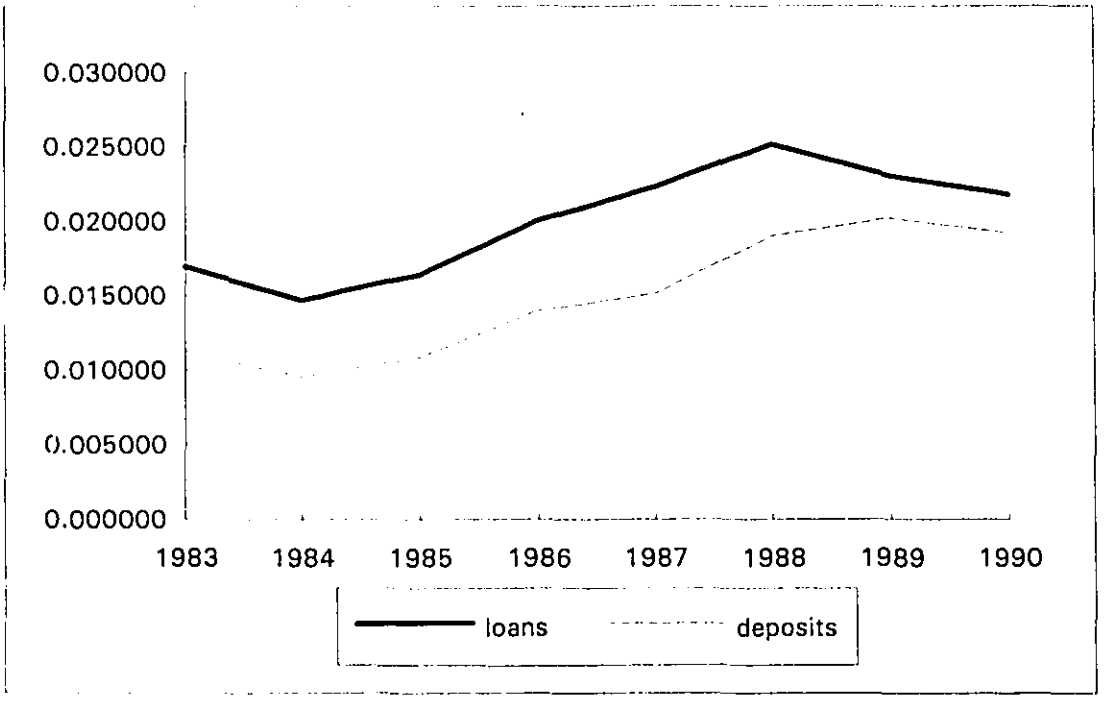
The evolution of k



Source: OSFI/IOFD Survey of Financial Institutions

CHART 6

Service rates



One of the most important findings from the new measures is that the value of the output of loan services generally exceeds the value of the output of deposit services, in both nominal and real terms, and for all the levels of aggregation and rates of pure interest. For instance, see the allocation for aggregation Level III and for pure interest 1 presented in index form with the same origin (Table 10 and Chart 7). This is counter to the practised allocation in the SNAs where more of the output is assigned to deposits - by 'necessity', since allocation is proportional to relative stocks and deposit stocks always exceed the stocks of loans.

In our results output is not allocated to the various categories according to the sheer size of their balances despite the proportionality assumption, which requires quantities to be proportional to stock balances. This is explained by the presence of prices, in the form of service rates.

Another illustration of the above is that although mortgage balances exceed the balances of loans to individuals the value of the output estimated for the former is less of that estimated for the latter. This is so because of lower service rates for mortgages rather than personal loans - in conformity with the reflected degrees of risk. Analogous findings hold true among demand, personal and non-personal deposits.

The rate of growth of real total loan services exceeds the rate of growth of real deposit services although the opposite holds true in nominal terms. This is again the corollary of the higher prices of loan services and their lower rate

TABLE 10

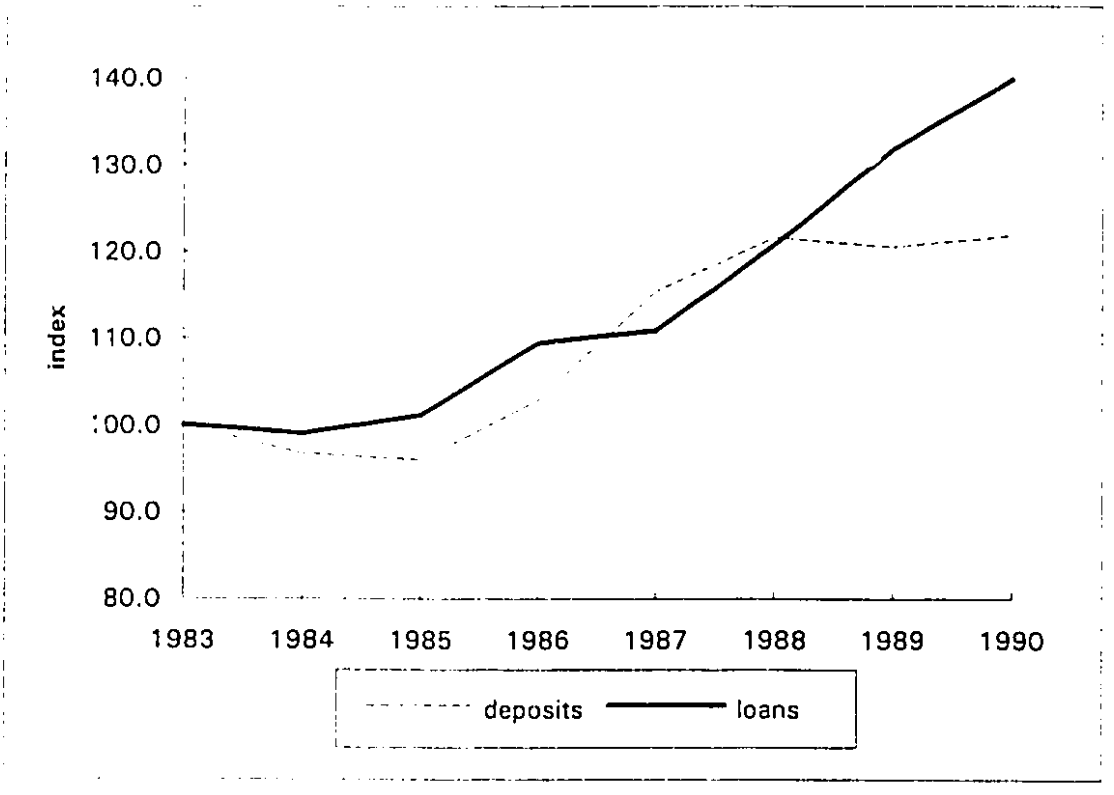
output indexes

deposits			loans	
nominal	real		nominal	real
100.0	100.0	1983	100.0	100.0
85.9	96.7	1984	86.8	99.0
100.3	96.0	1985	100.7	101.1
136.9	102.9	1986	133.9	109.4
150.8	115.4	1987	149.6	110.9
199.6	121.6	1988	187.4	120.7
223.5	120.5	1989	194.9	131.7
234.4	121.8	1990	203.9	139.8

Source: Our estimates

CHART 7

output indexes



Source: Our estimates

of increase compared to deposit service rates.

Furthermore, it can also be seen that most of the increase in loan services output came from mortgage services - which almost doubled within the 1986-1990 period - and to a lesser extent from output associated with loans to individuals. Services to business and other loans declined. On the deposit side, growth was much more symmetric among the various categories. This was not the behaviour, however, of service rates. Service rates for mortgages declined over time and service rates for loans to individuals and other loans remained relatively stable. The overall increase is explained by the increase in the service rates for business loans. All deposit categories are responsible for the increase in the service rates for deposit services.

The sporadic negative rates on the loan side may be explained by average pricing behaviour on the part of the banks, i.e. they do not calculate such rates for every service they provide. They may also be the result of cross-subsidization - knowingly or not. In any case, they are not expected to last.

The foregone discussion serves as an illustration of the analytical horizons that the new detailed estimates open. As has been already stressed, caution should be exercised when comparative analysis is done over the short-term.

5.4. Summary and Conclusions

Extensive empirical work was carried out in this chapter. Income statement and balance sheet data for schedule-A banks, in Canada, were

collected for the period 1983-1990. The strengths and the limitations of the data were discussed and the new approach was employed. The results obtained were presented together with analytical findings.

All in all, the new methodology was found to perform very well. The results are plausible and the allocation of banking output among the numerous loan and deposit services does not pose any problem. An important finding was that the output associated with loans exceeds the output associated with deposits. This could never be the case under the existing imputation treatment in the Canadian SNA, since allocation is proportional to the stocks of loans and deposits and the latter exceeds the former.

Moreover, implicit price indexes were constructed to shed light to the pricing behaviour of banks. The output estimates at the level of specific banking services were analyzed. These provide some indication with regard to the potential uses of the new data.

The results demonstrate that the approach developed in this work can be a viable methodological solution to the banking problem. Should its basic thrust be accepted, further refinements may be necessary to cope with all the details of the complicated national accounts structure. As well, some new data needs may have to be identified and filled, particularly those concerning the detailed decomposition of explicit service charges by type of service.

APPENDIX 3: ALLOCATION OF EXPLICIT CHARGES

The following is a complete set of the banks' reported explicit income:

	(million $)
Income from composite service plans	145.2
Service charges on personal deposits	594.1
Safety deposit boxes	79.3
csb commissions	58.1
Security investment services, commissions/fees	737.4
Miscellaneous other retail services	94.5
Non-personal deposit charges	744.3
Night depositories	9.2
Safekeeping	36.1
Credit card merchant discounts and fees	706.9
Service charges on mortgages	45.7
Standby loan fees	84.8
Sundry other loan fees	96.2
Acceptances fees	278.1
Guarantees, letters of credit fees	142.5
Funds transfer service fees	82.0
Computer service revenues	116.9
Contractual management fees	38.7
Miscellaneous other commercial services	186.9
TOTAL	4,367.0

As was explained in the main body of the text, 'safety deposit boxes' are treated as 'general' output and 'csb commissions' and 'security investment services, commissions/fees' as part of 'portfolio' output. Our task is to allocate the remaining fees that pertain to the 'transactions' output by category and by level of aggregation.

Thus allocation for Level I was done as:

Loan services were estimated as the sum of 'credit card merchant discounts and fees', 'service charges on mortgages', 'standby loan fees', 'sundry other loan fees', 'acceptance fees', 'guarantees, letters of credit fees', and half of the sum of 'funds transfer fees', 'computer service revenues', 'contractual management fees' and 'miscellaneous other commercial services'.

Fees for deposit services were obtained as the sum of the other half of the aforementioned total and 'income from composite service plans', 'service charges on personal deposits', 'miscellaneous other retail services', 'non-personal deposit charges', 'night depositories' and 'safekeeping'.

For Level II, allocation was done as follows:

For mortgage services, the fees are as reported. 'Credit card merchant discounts and fees' were split equally between loans to businesses and loans to individuals. The remainder of the total loan fees from Level I were allocated to loans to individuals, business and other in proportion to their average balances. For personal and non-personal deposit services, the fees were as reported. The difference between these and the total of Level I was assigned to demand deposits.

Finally, for Level III, the allocation was done as:

Fees for mortgages were distributed to NHA-insured residential, other residential and non-residential in proportion to their average balances. 'Credit cards' was assigned half the 'Credit card merchant discounts and fees' (which is part of loans to individuals from Level II) and the remaining was allocated proportionately to 'personal' and 'other'. Business fees remain the same as in Level II. The 'other' fees were assigned to 'day, call and short' loans assuming that no fees are charged to banks, provinces and lease receivables.

Fees for demand deposits were distributed between 'individual pcas' and 'other' in proportion to their balances, with banks and government fees assumed zero. Personal deposit fees were distributed to 'chequable daily', 'chequable other', 'non-chequable daily', 'non-chequable other' and 'fixed' according to the ratios 3.5:2.5:2.0:1.5:.05. Non-personal deposit fees were allocated to 'chequable other', 'non-chequable other' and 'fixed other' by the ratios 6:3:1. Deposits by banks and governments were again assumed to bear no fees.

CHAPTER SIX: RELATED ISSUES

This Chapter addresses two issues that overlap to a certain extent with our subject matter. However, it only scratches their surfaces since both of them could be the objects of independent studies. The first of these issues concerns the treatment of the central banks in the system of national accounts. The second examines the treatment of the interest on the public debt.

6.1. Central Banks

The monetary authority constitutes an absolutely integral part of contemporary banking systems, affecting them in many important ways. The central bank does not enter commercial banking activities of the type chartered banks do. It is not a competitor of theirs. Its basic mission is to carry out the government's monetary policy.

In the SNA, central banks are treated as profit-seeking public enterprises. Despite several views expressing that this is an inappropriate treatment for the valuation of the services provided by central banks, in the output sense, as recently as 1992 the proposed revisions for the SNA were clearly stating that "The services of financial intermediation provided by central banks should be measured in the same way as those of other financial intermediaries. Because of the unique functions which may be performed by central banks, the value of their output may sometimes appear exceptionally large in relation to the resources employed. Services other than financial intermediation which may be carried out by central banks should be valued by the fees or commissions

charged, in the same way as for other financial enterprises" (Revised System of National Accounts 1992, p. 39).

It is illuminating to look at what constitutes "profits" for central banks in their role as public "enterprises". Governments exercise monetary policy through the central banks. When an expansionary monetary policy is followed, such as monetization of the public debt, central banks must buy government securities in the market (open market operations). As Sunga put it, this "...is not a competitive diversion of resources but a *de facto* creation of new money..." (Sunga 1984, p. 397). More specifically, this process entails that the central bank buys new securities issued by the government and credits the government's accounts with the commercial banks. This newly created money eventually finds its way into the economy through government spending. No new production has occurred; the central bank simply has created new money claims over existing resources. However, it receives interest on its holdings of securities with the commercial banks. This interest appears as trading "profit" in the bank's books. It is the direct result of carrying out the government's monetary policy. It has absolutely nothing to do with profits earned by a government (or private) enterprise through business transactions.

As the Guide to the Income and Expenditure Accounts (1990, p. 43) acknowledges "the dividing line is not very clear between government agencies viewed as non-commercial and kept in the government sector, and those regarded as profit-oriented and classified to the corporate and government

business enterprise sector."

The Bank of Canada belongs to the latter group. To arrive at its output the CSNA splits the bank of Canada's expenditures on labour and other inputs between the personal and government sector. The personal component is added as imputed expenditures to the personal and unincorporated business sector of the accounts. The theoretical justification behind this imputation is unclear. In the U.S. it is also felt that the Federal Reserve System enjoys sufficient independence from the government to justify its treatment as a profit-seeking enterprise.

Neoclassical and Keynesian monetary theories differ in the way they view central banks. Neoclassicals see them more or less as an abnormality in the smooth functioning of free markets - mainly because of the regulations they impose. Typically, they argue that these regulations - the 'reserve tax' in particular - have distortive effects on the economy, make the country a net importer of banking services compared to countries with less regulated banking systems and, in general, result in welfare losses[45].

Since the burden of the Neoclassical argument, as presented by Rymes (1989), is that central banks (or more generally Monetary Authorities) can be treated as commercial banks it follows that the banking imputation can be applied to them as well. However, such a treatment would result in output measures that would "...imperfectly reflect the policy being carried out by such

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[45] *According to the interpretation by Rymes (1986, 1989, 1990), this is also what creates the imputation riddle in the national accounts.*

Authorities" (Rymes 1989, p. 379). Value-added would be transferred from private banks to the central bank[46].

On the other hand, the Keynesian theory of banking as formulated by Rymes (1985, 1986, 1889, 1990) argues that the failure of the Monetary Authorities to pay competitive interest on the reserves of commercial banks, reflects the price that these banks have to pay for the provision of the monetary stability provided by the central bank (through the holding of reserves) and does not represent a distorting tax.

The provision of monetary stability cannot be priced. It is a priceless public good which cannot be produced privately. Under such a scenario, if the banking imputation was employed "...the price of the gross output of the banks would meter not just the value of the marginal physical product of the transaction service of banks but also the liquidity premium attached to bank deposits for a service not produced by the banks, except indirectly through their holding of reserves, the liquidity premium being a measure of the confidence with which the Authorities are expected to perform their function of preserving monetary stability" (Rymes 1989, p. 379). Rymes goes as far as to suggest that banking output cannot be measured at all if the chosen

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[46] A relevant example is given by Rymes (1989). If actual service charges were insurance premiums received by the monetary authorities, such as the Canada Deposit Insurance Corporation (CDIC), a distribution of value-added within the finance industry would take place - if the CDIC was treated as a government business enterprise for SNA purposes. "Similarly, with respect to the imputed service charges on reserves, they would be part of the gross output of the central bank, deemed to be a government business enterprise, and part of the intermediate inputs of the private banks" (Rymes 1989, p. 387).

approach does not include the role of the central bank. "The provision of banking services by banks has as a necessary input the services of the Monetary Authorities" (Rymes 1986, pp. 438-439).

Rymes' view with regard to the measurement of output of the central bank itself is that it cannot be imputed in any meaningful way through the value of the marginal product of "real deposits" held with the bank by the commercial banks or the government. The true output is the preservation of monetary stability; and this is not measurable. Therefore, resolution of both the banking imputation problem as well as the treatment of central banks awaits the development of a general equilibrium framework.

Proponents of deregulation compare the existing somewhat regulated situation with a hypothetical regime, entirely unregulated. One could compare, as legitimately, the present situation with one in which banks are not allowed to create money. After all, the central bank delegates power to the commercial banks with regard to the money supply. A critique along the same lines was given by Rymes (1989, pp. 381-382): "The crucial distinction between the Keynesian general banking and monetary general equilibrium and neoclassical theories can be seen by asking what treatment would be suggested if, for example, all banks were nationalized and became de jure, instead of de facto, agents of the central bank. The rejection of the Keynesian argument of the imputation means that government expenditures in the extended government sector would merely be redefined to include the expenditures on labour and

materials undertaken by the bank" .

Advocacy of the same type is found in Haig (1986), where he recommends that the output of central banks be measured as that of the government sector itself, at factor cost. Sunga (1982) also saw the central bank as an "arm of general government" and proposed that its expenditures should be treated as part of government expenditures on goods and services offset by revenues from interest receipts and from other sources.

Thus, central banks are best viewed as extensions of the general government. The societal benefits associated with their presence and the confidence-boosting of the mere knowledge that the economy has access to them cannot fit conventional output measures. A central bank's indirect effect on the economy is manifold compared to its direct 'profit-maximizing' activities.

The fact is that in today's economies, a banking system without a central bank is as inconceivable as commercial banks not creating deposit money. Denying the benefits of the "banker of the banks", "lender of last resort" and other functions of the central banks amounts to collective amnesia and misses the necessity for the creation of such banks in the first place. In the final analysis, however, both commercial and central banks are man-made institutions. As such they can also be man un-made.

6.2. Interest on the public debt

Another long-standing issue of controversy is the treatment of the interest payments on the public debt. Traditionally, these payments have been

also viewed as transfers for SNA purposes and are not counted as part of output. As Rymes puts it "...interest on the National Debt is usefully regarded by economists and national accountants as a transfer from individuals, acting collectively, to themselves, acting privately, with the taxes levied to meet interest payments being regarded as a reverse transfer from individuals, acting privately, to themselves, acting collectively" (1986, p. 426). However, part of these interest payments that accrues to non-residents is treated as "productive" and enters output calculations. The justification for this special treatment is that "such interest payments represent a direct claim by non-residents on the pool of goods and services produced domestically" (National Income and Expenditure Accounts 1975, p. 73).

But why is interest on domestically held public debt seen as "unproductive" and excluded form GDP calculations?. We present next all the reasons that have been put forth[47] and briefly ctiticize them.

1. Interest paid by the government "...was generated by public debt incurred for the acquisition of nonproductive assets such as war equipment, for meeting deficits in periods of depressed economic conditions, or for redistributing income..." and "...because military equipment was either quickly destroyed or was not suitable for peace-time production, the short life-span of war assets meant that there was virtually no continuing physical capital counterpart to that debt" (Sunga 1984, p. 392). Apparently this claim was

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[47] *Some of these reasons appear in Sunga (1982, 1984). However, he was not their proponent.*

made before the era of sizeable peace-time debts. No conceivable notion of output can possibly accommodate it.

2. "A large part of this debt was not incurred for the acquisition of any productive asset currently in existence. In such circumstances, it is difficult to regard the interest arising on such debt as a payment for the production of currently produced goods and services" (National Income and Expenditures 1975, p. 72). But what about the other part of the debt? Could that not have financed the "production of currently produced goods and services"? In any event, the timing of the buying of capital equipment has nothing whatsoever to do with their interest payment flows.

3. "...a large part of government borrowing implicitly finances current rather than capital expenditure..." (Guide to the Income and Expenditure Accounts 1990, p. 33). Even if the above argument is accepted at face value, it definitely implies that an estimate for the part of interest payments that can be attributed to capital spending financing should be included in output.

4. "Output should be invariant to the method of re-financing. Changes in interest rates would 'bias' output" (cited in Sunga 1982, p. 14). This is clearly an argument with a serious built-in asymmetry. The same requirement is not found in corporate debt re-financing.

5. "...it is desirable for GDP to be unaffected by changes in government financing policies" (Guide to the Income and Expenditure Accounts 1990, p. 33). "...National Income should not rise simply because the government

finances its operations through borrowing rather than taxation; and it should not fall, on the other hand, if a shift occurs in the other direction, from borrowing to taxation" (National Income and Expenditure Accounts 1975, p. 73). "If interest on the public debt were treated as productive and therefore included in GDP, then governments could raise or lower GDP at will by switching between tax financing (which is indisputably a form of transfer) and debt financing" (Guide to Income and Expenditure Accounts 1990, p. 33).

This is the "invariance principle"[48] and is probably the best argument that has been advanced to justify the existing practices. Since it ***appears to be*** a valid point it warrants closer examination. Within the logic of the argument, output would appear to increase when the deficits are bond financed and it would fall if there was a shift from bond to tax finance. This, supposedly, differentiates these interest payments from corporate interest payments; when the latter increase, corporate profits are brought down (through operating surplus) and output is not affected. However, this thinking is flawed; output would change even in the case of tax finance if tax revenues came from sales taxes rather than income taxes. Coincidence of tax finance with income taxes seems to be an implicit and crucial assumption for the validity of the argument. Yet, a case can be made for including as output the part of the government's current and capital expenditures that are financed through indirect taxes.

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[48] *This principle appears elsewhere in the accounts as well. One of the most important imputations made on the basis of it is that for owner-occupied dwellings so that output would be invariant to the changing distribution between homeowners and tenants.*

Sunga found the invariance argument to be inconsistent because it is not applicable to the production of individual industries since interest is treated as part of the output of the paying industry. Output should reflect the impact on the economy of different modes of financing. After all, institutional changes are the norm in a dynamic economy. "...changes which cannot be held constant in reality...should not be held constant statistically" said Sunga. And he continued: "The national accounts should reflect what is happening, not what might have happened..." (Sunga 1967, p. 30).

Finally, the "invariance principle" is based on the assumption that it is possible to switch interchangeably from bond to tax financing and vice versa. It is our contention that it fails to distinguish between ***financing*** and ***re-payment*** of deficits and debts.

6.3. Summary and Conclusions

We examined the SNA treatment of central banks and of the interest on public debt. Central banks are currently treated as "profit-seeking" government enterprises. We concluded that they are best seen as an extension of the general government and their output should be valued in the same manner.

Interest on the national debt is currently treated in the SNA as a transfer analogous to corporate debt. It is not considered "productive" and is not part of output. Interest payments on the part of the debt held by non-residents, though, are considered "productive" and therefore included in output. We found no theoretical justification for this practice.

Finally, all the reasons that have been put forth for the exclusion of the interest payments on domestic debt were considered. None of those provides any compelling case for the above treatment.

CHAPTER SEVEN: CONCLUSIONS

Output of financial intermediaries has always been an issue of controversy and its estimation has been problematic. At the heart of the problem is the treatment of interest in the system of national accounts. Interest payments have been traditionally seen as transfers. As a result, net interest payments are part of the output originating in the debtor (non-financial) industries. Accounting consistency requires that the same treatment be carried out in the banking industry as well. As a result, the output measures obtained are either unrealistically low or even negative, largely depending on the magnitude of the explicit service charges.

To correct this problem, an imputation is carried out which adds a value equal to the net interest received by the banks to their output. For the whole national accounts structure to balance the same but negative output is allocated to a fictitious financial industry. Moreover, the value of the banking imputation, as well as the overall banking output, must be allocated by sector and by industry. Unfortunately, these allocations have been skewed, since borrowers are identified only with businesses, depositors only with households, and the foreign sector is ignored.

In this thesis, we developed a new methodological alternative, applicable to this topical area of expanding importance in modern economies. Special care was devoted to its being reconcilable with the SNAs.

Observations of the real state of the banking business, placed within a historical context, and inference from them, were captured by a formal approach. The development of the new approach aimed directly at measuring banking output. The view of interest as a composite price was adopted. The interest rates charged on loans and paid on deposits, together with the respective explicit service charges (accounting prices) were decomposed to a transfer part and to a part representing payments for services (economic or shadow prices). These prices, expressed in the form of rates, in conjunction with the quantities of both loan and deposit services produced by the banks were used to measure the output. It was found that, in principle, the imputation carried out is justified as fetching the relevant value of output produced by banks. However, the inter-sectoral/inter-industrial distribution of this output produced by our model differs significantly from the one obtained under current SNA practices. Output is allocated to both deposits and loans. Moreover, realistically, all sectors are shown to act in both capacities, as depositors and as borrowers.

Extensive empirical work was carried out in order to test the plausibility of the estimates that the new approach yields. The results look quite satisfactory and the approach, as a whole, quite promising. Furthermore, the availability of the new data opens new analytical horizons.

Major advantages that would stem from the proposed approach, should it be adopted, include:

- the provision of a coherent, theoretically sound, internally consistent, and straightforward method of estimating banking output.
- the estimation of real output with the same methodology of normal output - with associated gains in consistency and resources.
- the feasibility of expanding the analytical horizons and availability of detailed data for the study of important issues in the industry, such as product lines and economies of scale.
- the significant facilitation of international comparisons and reconciliations, which are presently impeded by the non-uniform ways of applying the imputation and the diverse methods of obtaining real output.
- all of the above, without affecting the existing aggregates in the accounts.

Acceptance of the new approach could trigger research towards its improvement and refinement.

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