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Abstract

This paper contains estimates of physical and intangible (information technology, advertising and training) capital stock, together with capital, labor and externally provided input services, of Spanish commercial and saving banks in the period 1983 to 2003. Capital stocks are valued at replacement costs and assets' services flows are computed using estimates of the risk-adjusted user cost of capital. Replacement costs of assets are substantially higher than book values and economic estimates of costs of input services allow for more accurate measures of efficiency and productivity of banks.

JEL codes: G21, G31, M41.

Keywords: Spanish banks, intangible assets, cost of capital services.

1 Introduction

This study presents the calculations of the stocks and flows of capital, labor and external services for Spanish commercial and savings banks in the period 1983-2003. Special attention is given to the computation of physical, information technology (IT) and advertising capital at their respective replacement costs for each bank, and to the computation of human capital accumulated through in the job training, also at replacement cost. The flow of capital, labor and other input services used in the production of banking services (output) is evaluated assuming that banks choose their respective service flows in a profit maximizing way, so that the user cost of capital and the labor cost per worker are equal to the marginal productivity of the respective input¹.

The most common source of data on productive capital of firms is the balance sheet. However, these data suffer from important limitations. First, assets are reported at their purchase cost net of accumulated amortization and, consequently, at every point in time we have assets of different age and acquisition prices aggregated into a single measure difficult to interpret in economic terms. This situation may change with the introduction of the International Financial Reporting Standards (IFRS), as firms shift towards fair-value valuation criteria. However, historical values will be still affected by the heterogeneity of prices and services and, more importantly, the valuation criteria of replacement cost used here for capital stock has a different economic meaning and use than the fair value recommended by the IFRS.

Second, conventional accounting principles, in particular the prudential principle that recommends conservative estimates of valuations for those assets that may have low realization value in case of sale or liquidation, tend to underestimate the stock of intangible assets recorded in the balance sheet. For example, companies tend to account as year costs most of the expenditures in R&D, advertising, software development, employees training, even though in many cases these expenditures imply the accumulation of assets with productive life beyond the year when they are materialized. As the expenditures in these intangible assets have increased over time, often at a faster pace than physical assets, accountants and business analysts have paid increasing attention to ways of measuring the total assets of the firm, beyond the figures reported in their balance sheets².

The main purpose of the report is to describe the data base and methodology, state the assumptions and show the most relevant results obtained in the economic valuation of stocks and flows of productive services accumulated by Spanish banks in a twenty years period. No detailed analysis of the results obtained is provided. We distinguish four main non-human capital assets and one human capital. The non-human capital assets include: physical capital, mainly buildings and equipment different from IT; IT capital, including physical equipment and software; advertising capital, resulting from advertising expenditures and, finally, financial assets as counterpart of bank equity above non-human capital assets. The human capital is estimated as the replacement cost of the assets built through year by year expenditures in training, using the permanent inventory model and assuming a

1. For an up to date review of the methodology and actual computation of stock and flows of capital services in Spain see Mas, Pérez and Uriel (2005).

2. See Hall (1998), Lev and Zarowin (1999) and Corrado et al. (2006) for estimates of intangible capital in the US economy.

depreciation rate of the human capital acquired. Information on the formal education of workers, on their experience accumulated in previous and in the current job, on the investment in education paid by the workers while they are in the job market, is not available: So the final estimation of human capital provided in the paper is necessarily quite limited.

Following the conventional approaches of valuation of capital and non-capital inputs, we distinguish between the stock of capital at estimated replacement cost, and the flow of services that gets into production of goods or services in a time period (the year). The replacement cost of the asset indicates the current expenditures needed to purchase the stock of productive services incorporated in already invested assets. If the services in place were to be replaced by others similar but at current prices, the difference between the new value of the asset and the value reported in the accounting statements would just reflect the price inflation of the assets over time. In general the replacement of the existing services takes into account the technological progress that affects capital goods and the economically sound decision is not to reproduce existing assets but to replace productive capacity by the most efficient and effective stock of technologically advanced services. Under technological progress and no price inflation the replacement value of existing assets will often imply a lower amount monetary disbursement than the net acquisition cost reported in the balance sheet. The replacement costs of the existing assets refer to the expenditures needed today to replace existing productive capacity in the most efficient way. The difference between book value and replacement cost will reflect the net effect of two trends of different signs, price inflation and embodied technical progress in productive assets.

Productive inputs are valuable because they can be transformed into output to be sold in the market. Under given assumptions on the productive technology, the total output produced in a given time period can be decomposed as the sum of the contributions of services from all the inputs used in the production process. When the flow of services from each input is determined by profit maximizing conditions (firms choose input quantities such that their respective marginal productivity is equal to marginal cost), then the input contribution to produced output is equal to the marginal cost times the quantity of input. In this paper, marginal cost is estimated by the user cost of capital in the case of physical, IT, advertising and human capital, and by the average labor cost per worker in the case of the labor input.

The rest of the report is organized as follows. Section 2 contains a description of the methodology used to compute the stock of capital and the flows of input services. Section 3 presents a description of the database, variables and parameters to be used in the calculations. In section 4 we show the results of the calculations of the capital stock and flows on input services, while section 5 presents valuations of services flows from internal and from external sources. The final section summarizes the main results.

2 Conceptual framework and methodology

2.1 Stock of capital services

Productive capital refers to resources held by firms to be used in production activities. We focus on assets with productive life longer than a year, that is, assets in which there is a significant time delay between the moment they were purchased by the bank and the moment when they are evaluated as a part of the existing stock. *Non-human capital* (buildings, equipment, brand name, technological know-how) is accumulated through the investment process, so that the stock of capital in a given moment of time is the sum of the investment flows made in the past minus the assets retired or lost, also over time. Firms report the investment flows and resulting stocks of assets in the accounting statements. When the accounting conventions and accepted practices consider that a flow of expenditures paid in the acquisition of a particular input imply the accumulation of assets whose consumption in production will be postponed in time from the moment of the acquisition, then these flows are added to the stock of assets already registered in the balance sheet. Otherwise, they are accounted in the income statement as input costs of the corresponding year. Finally, firms also include as expenses the estimated economic depreciation of the assets held in stock during the year, though fiscal guidelines and restrictions do affect the expensing of depreciation reported in accounting statements, too.

The obtaining of the stock of non-human capital assets from the balance sheet of firms, banks in our case, has serious limitations because of several reasons: assets are reported at their acquisition costs, the aggregation of assets implies physical capital services of different vintages and technological characteristics, the amortization can be different from the true economic depreciation of the asset, some assets with uncertain realization value are expensed when they are purchased (following prudential accounting conventions), and so on. In theory, what we are interested in is a measure of capital services for each class of assets that are technologically homogeneous. The physical measure of capital services would then be converted into a monetary measure multiplying the stock of services by the corresponding price per unit of service. We refer to this measure as the *replacement cost of the capital* of the firm, which can be defined as the amount of money that the firm has to pay to the market in a given period of time in order to obtain a stock of capital services of equal productive capacity than those in place.

The concept of replacement cost differs from reproduction costs and market value of the invested assets. *Reproduction cost* means the outflow of money needed today to replace the existing capital services by others identical to those initially purchased. *Replacement cost* is the minimum outflow of money needed to substitute services from invested assets by the most effective services existing in the market while maintaining the productive capacity of the firm. Compared with book values and acquisition costs, reproduction costs would differ from them by just price inflation effects, while replacement costs will differ because of inflation and because of technological change, both with opposite effects over the final net difference. The *market value* of invested assets is the value resulting from discounting to the present the cash flows generated by the assets over time in the productive activities of the firm. The market value is the price the firm would have to pay in the market for the cash flows attributed to the asset, while the replacement cost is the opportunity cost of the asset, the maximum price that others would pay for the services of the asset if it had to be deployed in uses different from the current one (because the productive capacity can be bought in the

market at that price and no one would pay a higher price for the asset than its market price). The difference between market value and replacement cost is a measure of the extraordinary rents the firm is earning with the assets invested.

In practice, the data available for the computation of the replacement cost of the assets of the firm are flows of investments in new assets during a given time period (yearly investment flows in monetary terms) and stocks of assets in place reported in the balance sheet at their acquisition costs, net of accumulated amortization. Let I_t be the gross investment flow of new capital services in year t ; K_t the stock of homogeneous capital services at the end of year t ; ϕ the depreciation rate of the asset used in production activities during a year period; μ the rate of technological progress incorporated into capital services invested during one year with respect to those invested one year before. And let q_t be the purchase price of one unit of services in period t . One of the methodologies to obtain the replacement cost of the capital of the firm is the so called permanent inventory formula given by³,

$$q_t K_t = q_t I_t + \frac{1-\phi}{1+\mu} \cdot \frac{q_t}{q_{t-1}} \cdot (q_{t-1} \cdot K_{t-1}) \quad (1)$$

The formulation takes into account the fact that, because of technological progress embodied in capital goods, to replace today one unit of service in place at the end of the previous year, $t-1$, the number of units needed are $1/(1+\mu)$, where μ is the rate of embodied technical progress. Depreciation implies that for each unit of capital in place in $t-1$, there are only $(1-\phi)$ units remaining at the end of the year. This computation of the net capital services is exact when the depreciation of the asset is exponential at rate ϕ ⁴. The actual application of the formula requires finding data on investment flows, prices, depreciation and technological progress rates. In the next section we will discuss how the formula is applied to available data for Spanish banks.

Firms cannot own *human capital* assets. The reason is that persons cannot be owned and firms cannot limit their possibility of abandoning the collaboration at their will, taking with them their incorporated knowledge and capabilities. Keeping this in mind, we can refer to the available stock of human capital services as the services that employees can supply to the productive activities of the firm in their remaining productive life. Each new worker hired by the firm contributes to the stock of human capital services with knowledge and capabilities that may or may not be similar to those of the people already employed. One important difficulty when aggregating human capital from different workers is that we do not observe the price the firm pays for a stock of potential capital services over a productive life, as in the case of non-human capital assets. We only observe payments for the services provided during a certain period of time, for example year salaries. We neither observe the amount invested by each worker in formal education before entering the job market, nor the experience acquired during the period when he or she has been working.

Employees have the opportunity, and some times the obligation, to be involved in on the job training provided by the employer. Training expenditures can be considered an investment, and therefore a contribution to the stock of human capital, provided that the

3. For a more general discussion and measurement methodologies more data demanding see Mas, Pérez, and Uriel [(2005), chapter 2].

4. See Martín and Moreno (1992).

knowledge and capabilities acquired by the trainees last more than one year. If information is available on depreciation rates, on rates of technological progress and on service prices, then the permanent inventory equation (1) could be used to calculate the stock of human capital at replacement cost, resulting from on the job training. Ideally, the evolution of this stock should be combined with information about age, years until retirement, abandonment, lay offs, quantity and quality of formal education of persons employed in a given moment of time, in order to obtain an aggregate measure of human capital services at the disposable of the firm. In practice, all this information is very difficult to obtain and because of this difficulty the paper will just provide an estimate of the human capital accumulated through training expenditures using the permanent inventory model and under some assumptions about the parameters involved in the calculation.

Banking regulation sets minimum solvency ratios and minimum absolute levels of equity to finance the assets in place. In our valuation of banks' capital assets, it is assumed that banks start their activity with an amount of cash financed with equity capital. Part of this cash is invested in the acquisition of tangible and intangible assets needed to provide banking services, and the remaining is kept in cash reserves or invested in income generating financial assets. Therefore, the balance sheet structure we have in mind for the representative bank in our sample is the following: the liability consists of Deposits, Bonds, Subordinated Debt and Gross Equity, which includes Capital, Reserves and Provisions (i.e. loan loss reserves); the assets include Cash, Loans, Other Financial Assets, Physical and Intangible Assets.

The rest of inputs considered in the production function are services from Employees and services purchased from outside the bank. With all these internal (capital and labor) and external inputs banks attract depositors, issue bonds and other form of debt, provide payment and liquidity services, provide out-of-balance-sheet services, grant loans, monitor the quality of borrowers and manage credit risk, and make financial investments in debt and equity issued by the government and non-financial firms. All these services are part of the output of the bank.

2.2 Flow of input services

The stock of capital services does not inform about the intensity of capital use in the production of the output of the firm. Moreover, the difficulty in estimating a measure of human capital stock comparable to those of non-human capital makes it impossible to obtain measures of total, human and non-human stock of capital and other input services. To overcome these limitations the stock of capital is complemented with estimations of the sum of flows of services from each productive input consumed in the production of the output during a given period of time.

Inputs and outputs are linked by the production function, which gives the maximum output per period of time that can be produced with given quantities of inputs and given the current state of the production technology. From this relationship output can be written as a weighted sum of the quantities of inputs used in the production. One reasonable weight to use in the calculation is the marginal productivity of the respective input, which is the marginal contribution to output from marginal changes in the quantity of the input. Marginal productivity is not observable but, if the observed quantities of inputs and outputs employed by the firm are determined by a profit maximizing behavior, then marginal productivity will be equal to the marginal cost of the input. Under competitive input markets, marginal cost will be equal to the market price of the input.

The evaluation of capital/inputs flows of services that contribute to productive output requires knowing the stock of capital/input services and the price of the input to be used as the estimation of the marginal cost. To obtain the cost of capital inputs is not straightforward, since most often capital services used in production are supplied internally from the stock of services available, so a shadow price substitutes the market price. It can be shown that the economically meaningful value of the cost of a capital input to be used in the calculation of imputed service flow is given by the so-called *user cost of capital*. This cost is determined as the market price of one unit of capital services for asset j , q_{jt} , times the opportunity cost of holding this amount invested in the firm. Analytically, the user cost of capital is equal to the nominal financial return that could be obtained investing in alternatives of equal risk, R_{jt} , plus the loss due to depreciation (ϕ) and technological obsolescence (μ) of the stock of services over the year period [altogether, $\delta_j = 1 - (1 - \phi)/(1 + \mu)$]; minus the relative change in value of one unit of service due to changes in its replacement price [$\rho_{jt} = (q_{jt} - q_{jt-1})/q_{jt-1}$]. In other words⁵, the user cost of capital for asset j (physical, IT, advertising, human capital and free equity) c_{jt} is,

$$c_{jt} = q_{jt} (R_{jt} + \delta_j - \rho_{jt}) \quad (2)$$

Therefore, the contribution of the capital input to output produced in period t is given by $c_{jt} K_{jt}$, that is, the gross return per invested euro times the total investment in terms of assets, at their replacement cost.

To compute the flow of services that labor brings along we take into account the expenses in wages and investment in training programs. We know the number of people employed by each bank, L_t , and the average cost per person (salary, social security and pension contributions), w_t , obtained dividing total labor related expenditures by the number of employees. When productive workers are endowed with training financed by the employer, there is an additional contribution to the output due to services drawn from the stock of human capital services accumulated through training investments over time. Let H_t be the stock of human capital from training and ch_t the user cost of this capital; then the total labor contributions to productive output will be $w_t L_t + ch_t H_t$.

Therefore, the total services from productive internal inputs incorporated into the output produced during the current time period t , that is, the flow of internal input services, is given by,

$$\sum_{j \neq H} c_j K_{jt} + ch_t H_t + w_t L_t \quad (3)$$

Finally, if banks also use externally supplied inputs in production, then the total flow of input services would include the sum of internal (capital and labor) and external inputs. We assume that external services are valued at market prices equal to opportunity costs. Notice that the flow of internal and external services provides a measure of the total opportunity cost of the output produced, since assets are valued at replacement cost and each unit of input (included the free equity) has a cost independently of whether it is internally or externally supplied. Accounting costs, on the other hand, only report explicit costs of assets valued at acquisition prices. Therefore the methodology presented is also a way to obtain estimates of economic profits of banks.

5. Jorgenson (1967), Mato and Salas (1992).

3 Database and assumptions

In year 1984 many Spanish firms, including banks, took advantage of a law which allowed them to apply a tax-free adjustment in the book value of the assets in order to modify book values towards a more realistic current value. In 1996, firms had a second opportunity to update the book value of their assets, but this time the adjustment was not totally tax-free, so a reduced number of firms did the adjustment.

We exclude credit cooperatives from the calculation of stock and flows of productive inputs of Spanish banks because of lack of important data for the purpose of the study. We also exclude branches of foreign banks with limited presence in the country, especially in retail banking, to keep the units of analysis as much homogeneous as possible. Commercial or savings banks with severe inconsistencies in the reported data, for example, zero or close to zero number of workers, are also excluded from the sample. The total number of banks with usable information starts with 159 in 1983 (84 commercial banks and 75 savings banks), and finishes with 100 (55 commercial banks and 45 savings banks) in 2003. Mergers and acquisitions among banks during this period explain the former evolution in the number of banks. Banks considered in our paper represent 89.25% of total banking assets in Spain in 2003. That proportion is similar for other variables, such as number of employees, and remains fairly stable across time periods (Table A in the Appendix shows the details of the coverage of the data used in the paper).

The main database for this study is the information contained in accounting statements, balance sheet and profit and loss account, as well as in complementary files, reported by individual banks to the Banco de España from 1983 to 2003. Banks report the stock, at the end of the year, of assets held in the balance sheet, together with the expenses in labor, expenses in information technology services, expenses in personnel training (since 1993), and expenses in advertising, all charged as costs of the year in the income statement. Complementary files of banks also inform about the number of workers employed, number of branches they own and number of branches they rent. However, we do not know the formal education, age, tenure in the company and/or in the current job, new recruiting or layoffs, of bank workers.

The internal non-human inputs included in the valuation are, Physical capital, Information Technology (i.e. IT capital), Advertising capital and Free Equity. Human capital includes an estimation of the stock of capital services accumulated through investment in training paid by the bank. Physical capital includes in turn two types of assets: Buildings and Furniture/Equipment different from IT equipment. Total IT capital is obtained from two sources, the IT Equipment reported in the balance sheet of the bank and the flow of expenses in IT services reported in the income statement. Advertising capital is obtained from the flow of advertising expenditures reported in the income statement. Free Equity is the difference between Equity of the bank at replacement cost and non-human capital, also at replacement cost.

One important limitation to calculate replacement costs of invested assets comes from not having unquestionable data on depreciation rates, incorporated technical progress and current prices of comparable input services. In what follows we explain the assumptions

made in each class of capital, to obtain these variables. When possible, the values proposed to use in this study are close to those used in other studies with similar purposes.

3.1 Physical capital

It is equal to the sum of replacement cost of Buildings used to provide services and the replacement cost of Furniture/Equipment, different from IT. Buildings include, among others, bank branches. Banks own their branches or lease/rent them. Own outlets are included as part of the fixed assets of the bank, but rented assets are not recorded in the balance sheet. To obtain a comparable capital measure for the buildings of each bank we first estimate the replacement cost of the buildings owned by the bank and then we adjust the estimated value taking into account the number of rented branches.

Calculation of owned buildings' replacement costs using the permanent inventory method needs information about the annual investment flows, I_t , the depreciation rate ϕ , the rate of technical progress μ , and the price index q_t . The annual investment flow in year t is obtained as the sum of year depreciation in buildings plus the difference between reported balance sheet book values of Buildings at the end of year t and the reported book value at the end of period $t-1$. Depreciation and incorporated technological progress are combined into a single index $(1-\delta)$. Then, we assume that the combination of the two factors is equivalent to an exponential depreciation rate of 3%. Market prices of buildings are assumed to vary over time according to the implicit price deflator of gross capital investment in "other constructions" published by the INE. Once the replacement value of this capital is computed using the permanent inventory formula (1), we obtain the average replacement value of one branch that belongs to the network owned by the bank dividing total replacement value by number of owned branches. Finally, the total replacement cost of the buildings used by the bank is equal to the value per branch times the total number of branches, owned plus rented.

$$\text{Replacement cost of Buildings}_t = \frac{\text{Replacement cost of Buildings}_t}{\text{Owned Branches}_t} \cdot \text{Total Number of branches}_t$$

The replacement cost of non-IT Equipment and Furniture is assumed to be equal to the book value of the assets as reported in the balance sheet⁶. Therefore, the total replacement cost of Physical capital is obtained as,

$$\text{Physical capital} = \text{Replacement cost of Buildings} + \text{Book value of non-IT Equipment and Furniture}$$

3.2 Intangible non-human capital

It includes IT capital and Advertising capital. The IT capital at replacement cost includes IT assets registered by the bank in the balance sheet as IT Equipment, and the valuation, using the permanent inventory formula, of the IT capital accumulated through the expenditures in IT services as reported in the income statement⁷. To estimate the IT capital from the flow of

6. Nevertheless, the depreciation rate, corrected by the technical progress, is 0.15 (i.e. $\delta = 0.15$).

7. The consensus on IT capital is that it includes intangibles build from investments in computers hardware and software and investments in communications equipment. Unfortunately the information reported by banks on IT expenditures and stock of capital does not allow us to identify the communications equipment and to clearly separate expenditures on software and hardware. The reason is that the fixed asset which registers IT assets in the balance sheet just says "Equipment on computers and installations", and the expenditures in the income statement include expenditures on renting of software or hardware, expenditures on acquisition of software programs and so on. Presumably the communications equipment that goes together with installations of computers hardware is included

expenditures in IT services we assume that⁹ $(1-\delta) = (1-0.35)$. Hedonic price index of IT capital and software products in the US report a decrease in the price of this capital over time, Lichtenberg (1995). In this paper we assume that nominal prices of quality adjusted IT assets are equal to those of 1983 over the whole period that is we assume a price index equal to 1 for all years between 1983 and 2003⁹. The assumption of zero inflation in prices of IT capital inputs, instead of the negative inflation used in US studies, is justified because of the higher general inflation in Spain than in the US and because the expected lag in the introduction of innovations in the former compared with the later. For IT capital reported in the balance sheet of the bank it is assumed that book value equals to replacement cost.

$$IT\ capital = Replacement\ cost\ of\ IT\ services + Book\ value\ of\ IT\ Equipment$$

Banks advertise products and services and often they also deploy institutional campaigns to build brand awareness among customers and among the whole community. No separate data are available about the amount of money invested in commercial advertising and in institutional communication by Spanish banks. In the computation of the intangible capital coming from expenditures in advertising and institutional communication strategies, we aggregate all sources of awareness, product or service and brand name, into a single measure of what we refer as Advertising capital¹⁰.

To obtain the replacement cost of the Advertising capital of each bank we use information on advertising expenditures as reported by banks in the income statement. Then we apply the permanent inventory formula (1) assuming that¹¹ $(1-\delta) = (1-0.35)$ and price index equal to the price index of services sold to the market. Therefore,

$$Advertising\ capital = Replacement\ cost\ of\ services\ from\ advertising\ expenditures$$

3.3 Human capital from training expenditures

The data to obtain estimations of the human capital of banks is very limited, as already indicated above. We know the number of people working in the bank and, since 1992 we also know the training expenditures reported by the bank also during the one year period. These expenditures allow us to compute a measure of the quality index H_t on labor services used by the bank over time. The index is based in the replacement cost of human capital accumulated through investment in training paid by the bank. The permanent inventory formula used in the calculation takes as inputs the annual flow of training expenditures

in the balance sheet account and it may be assumed that other communications equipment is not particularly important in relative terms for banks.

8. This depreciation rate is in line with that used by Lichtenberg (1995) and others.

9. This is clearly a strong assumption. Mas and Quesada (2005) present an estimated price index separated for computer hardware and software, showing a clear different trend in each price index over time, decreasing in the case of hardware and increasing in the case of software. Since we can not separate investments in hardware from investment in software, we assume that the two trends in prices just cancel out. The exercise of Mas and Quesada in calculating the stock of IT capital in Spain, including that in the industry of "financial intermediaries", should give more accurate results of the aggregate stock of IT in the banking and related industries than the one obtained in this paper. However we obtain estimates of IT capital for each individual bank and this imposes other limitations as for example having to work with data reported by banks in filling their accounting statement.

10. In any case, both advertising strategies are often very closely intertwined.

11. Berry (2001) and Berry and Sakakibara (2002) use delta values of 0.50 for product level advertising. We choose a slightly lower value of delta because we also consider bank level advertising and recognition (i.e. generic brand advertising).

from 1992, the depreciation parameter¹² $(1-\delta) = (1-0.2)$ and the price index is set equal to the price index of education services as provided by the INE.

Training human capital = Replacement cost of services from training expenditures

3.4 Free Equity

In the liability side of the banks balance sheet there is debt with an explicit cost, for example deposits, subordinated debt, bonds, there is equity, with no explicit cost, and other elements more difficult to classify, for example reserves from loan loss provisions. The counterparts of these liabilities are assets such as tangible and intangible productive resources, loans and other financial investments, including cash and equity issued by other firms. We assume that loan loss reserves and provisions net out of outstanding loans and investments in shares issued by other firms, so that the remaining assets are financed by Onerous debt (deposits, subordinated debt, bonds) and Equity, bank capital plus reserves from retained earnings. Subtracting Onerous debt from the asset side we have a reduced balance sheet of Equity in the liability side and Tangible and Intangible Assets plus Net Financial Assets (Loans net of loan loss reserves plus Financial investments minus Onerous debt) in the asset side.

Tangible and intangible assets such as Physical capital, IT capital, Advertising capital, Human capital are valued and reported in the reduced balance sheet at replacement cost. We also value Equity at replacement cost using the permanent inventory method assuming zero depreciation and price index equal to consumer price index. That is we obtain the equity at current euros of year by year contributions to Capital and Reserves of the bank. To make sure that total reduced assets equal total reduced liabilities we define the account Free Equity which is equal to the difference between Equity at replacement cost minus Physical, IT, Advertising and Human capital all at replacement cost. Free Equity can also be interpreted as the replacement value of financial assets which jointly with non financial assets used in the provision of banking services assure that bank Equity is at replacement value (constant purchasing power).

3.5 User cost

The user cost of capital is the rental price to pay if the asset was rented instead of owned. When capital services are internally supplied the rental price has to be explicitly computed from equation (2). In general, the financial opportunity cost R_t is the return net of taxes investors could obtain in alternative investment opportunities of the same risk as the risk assumed investing in equity of the bank. To approximate this value, in this study we use the expression,

$$R_t = r_t + (r_t - i_t) (Debt/Equity)_t \quad (4)$$

where r_t is the average interest rate of loans of the bank in year t , i_t is the interest rate of the ten year government bond (risk-free long-term interest rate), Debt includes deposits, bonds and subordinated debt of the bank and Equity is equal to capital, reserves and provisions, all at book values. Thus, the financial opportunity cost of the bank takes into account differences

¹²For R&D expenditures and technological capital accumulation the delta values most often used are 0.15; Griliches and Mairesse (1984) and Hall (1993). We assume that training human capital depreciates slightly faster than technological capital.

in credit risk across banks, included in the interest rate charged in the loans they grant, and differences in the leverage ratio of the bank (i.e. financial risk¹³).

The financial opportunity cost is assumed to be equal for all assets invested since the cost of capital is determined by the financial structure of the bank. This opportunity cost enters equation (3) together with depreciation and specific price level and price inflation of asset j to obtain the user cost of capital of the asset for each time period. The depreciation rate δ applied to asset j is obviously the same that the rate used in the calculation of the replacement cost of capital as shown in Table 1: 0.03 for Buildings, 0.15 for non-IT Equipment, 0.35 for IT capital, 0.35 for Advertising capital, and 0.20 for Training human capital. For Free equity the depreciation rate is zero.

Labor costs per worker are calculated as the ratio between total labor costs as reported in the income statement of the bank (excluding lay offs and restructuring costs) divided by the number of workers at the end of the year. Total labor services used in production are computed as the sum of compensations made to employees (salaries and benefits, social security, contributions to pension funds) plus the imputed cost of capital from the stock of human capital resulting from training expenditures.

13. We follow Modigliani and Miller propositions. Alternative approaches to the calculation of financial cost of capital for banks can be found in Green et al. (2003).

4 Results on capital and labor stocks and service flows

Table 2 presents capital stocks and number of employees for commercial and savings banks at current replacement cost values every year from 1983 to 2003. For exposition purposes, operating assets will be grouped in Non-Human capital (which include Physical, IT and Advertising) and Human capital (which include Training and Employees); then we have financial assets in an amount equal to Free Equity. The table also shows the respective growth rates for selected time periods. Mergers and acquisitions are the main explanation for why the number of banks decreases from 162 in 1983 to 100 in 2003.

The stock of capital at current prices increases over time in all assets, but the number of employees decreases in around 10,000 people. In 1983, banks have around 8.1 billion euros of Non-Human capital, and employ 226,169 persons. In 2003 total Non-Human capital has increased up to 30.8 billions, and the number of employees goes down to 215,935. Most of the Non-Human capital is accumulated during the years 1983 to 1994, that is the first half of the period, when the stock increases at an average annual rate of over 10%. In the last decade the increase is much moderate, only 2.71% a year between 1994 and 1999 and even decreasing -0.58% between 1999 and 2003. Free Equity grows at almost 27% annual rates in the first period, and between 8.6% and 17.8% in rest of periods.

In the period 1983-1989 all the non human capital assets increase at nominal two digit growth rates or close to them. As price level changes moderate so it does the nominal growth rate. Physical capital increases at the higher rate of 13.58% in the period 1989 to 1994 (just after the liberalization of geographic expansion of saving banks). But in the most recent ten year period the net growth has been close to zero. From 1994 to 1999 IT capital grows at an annual rate of 7.73%, compared with 2.71% growth rate of all non human capital, and in 1999-2003. Advertising capital also shows a steady decline over time from 12% in the years before 1994 to 1.8% in the last five years period. So we observe dispersion in the nominal growth rates of non human assets across them and over time. Human capital from Training expenditures is only available starting in 1992. Since then it has been increasing at higher rates than the rest of capital inputs, between 8 and 10% of annual growth.

For comparison purposes, Tables 3 and 4 present the calculations of the stock of Non-Human capital, Human capital and Free Equity, separated for commercial and savings banks, respectively. The reduction in the number of banks over time is similar in both forms of ownership. Commercial and savings banks follow a fairly similar growth pattern in Non-Human capital until 1994, although the former concentrate lower growth rates in the first five-year period than the later. In the ten-year period of 1994-2003, savings banks increase their stock of capital at higher rates than commercial banks. In the last five-year period of the sample Physical capital increases at an annual rate of 7% in commercial banks, while it increases at 5.5% in savings banks. In the final five years period of the sample Non-Human capital decreases at an annual rate of 5.33% in commercial banks and it increases at a rate of 5.17% in savings banks. In 1983, commercial banks had a Non-Human capital stock of almost 6 billion euros and savings banks a stock of less than half, 2.2 billions. In 2003, the stock of Non-Human capital of commercial banks is practically the same that the stock of savings banks.

Number of employees of commercial banks decreases over time all over the period, from 163,185 employees in 1983 to 106,666 in 2003. The trend is just the opposite one in savings banks where the number of employees increases from 62,984 in 1983 to 109,269 in 2004, a steady annual growth rate close to 3%. The human capital accumulated from training expenditures also grows at higher annual rates in savings banks than in commercial banks and in 2003 the total stock of the former is higher than that of the later.

Commercial banks have significantly higher Free Equity than savings banks in all years of the period, although the relative differences diminish over time. In 1983 commercial (savings) banks had Free Equity of 1.9 (0.53) billion euros, while in 2003 the respective Free Equity is 38.2 and 23.7 billion euros¹⁴.

Figure 1 complements the information shown in Tables 2, 3 and 4. It shows the proportion of each form of Non-Human capital over total Non-Human capital every year in the period 1983 to 2003, for all the banks, for only commercial banks and for only savings banks. Since the early nineties the counterpart of free equity increases the relative importance in the total non-human capital assets of banks, reflecting possibly a deepening in riskier (more regulatory capital demanding) investments. IT capital increases its relative importance over total Non-Human capital at current replacement cost mainly at the expense of Physical capital. Both commercial and savings banks made relatively substantial investments in IT capital in the late eighties and also at the end of the period.

4.1 Constant prices

The capital stock at current replacement values incorporates the general increasing trend in price inflation of the assets invested over time. To obtain a measure of the units of services available for production current values have to be adjusted to remove price effects. Values of capital stock, Physical, Advertising, IT and Training, together with Free Equity are divided by the respective price index (shown in Table 1) used to calculate replacement values. We do so for all banks, for commercial banks and for savings banks. The results appear in Tables 5, 6 and 7.

Banks start in 1983 with Physical capital of 7.1 billions and finish in 2003 with Physical assets at constant prices of 10.5 billions (Table 5). However Physical capital increases until 1994 and decreases since then, specially in the period 1999-2003, with negative annual growth rate of -6.24%. Advertising capital at constant prices has negative growth rates in the period 1999-2003 and positive in all the previous ones, while the stock of human capital from Training has positive increases all over the period. At constant prices, Non-Human capital in 2003 is almost twice of the value in 1983. The declining evolution of Non-Human capital starts in the late nineties and since then it declines at rates of almost 4% a year, mainly because of the decline in Physical capital. IT capital increases its relative importance in constant prices with respect to the rest of components, from a proportion of 8% of total Non-Human capital in 1983 to 35% in 2003. This change in composition has a lot to do with the evolution on relative prices of Physical and IT capital, increasing in the former and assumed constant for the later. Free Equity at constant prices increases at two digits rates, 19.41% and 14.61%, in the first and the last periods.

14. A closer look at the data shows that a significant portion of the differences in Free Equity between Commercial and Savings Banks come from the fact that Physical capital is relatively large in Commercial banks than in Savings banks and because Provisions are relatively much higher in the former than in the later.

The observation of Tables 6 and 7 shows that real Non-Human capital declines over time just in commercial banks (7.9% annual decline in the period 1999-2003), though in savings banks, during the same period real Non-Human capital increases at an annual rate of 1.48%. In both types of banks the time trend in Physical capital explains most of the behavior over time of the aggregate capital stock. IT capital is the only one that shows a steady positive growth rate over time in commercial and in savings banks. Free Equity at constant prices increases in commercial banks at two digit rates in the first and in the last period, 18.6% and 17.1%, but at moderate rates of 2.6% and 1.9% in the central periods. Savings banks increase Free equity at annual rates of 15% during the first half of the sample period and of around 11.5% in the second half.

The numbers shown in Tables 5, 6 and 7 are complemented with Figure 2 that represents the proportion of each form of non-human capital over total capital at constant prices for total banks, for commercial, and for savings banks, respectively. The observation of the figures confirms that IT capital is increasing its share in total Non-Human capital of Spanish banks especially in the final years of the period under study. It also confirms the relatively high investment effort in these technologies in the late eighties, especially among savings banks.

4.2 Non-Human capital per worker

Although the comparison of growth rates of number of Employees and Non-Human capital at constant prices provides information about the evolution of the capital-labor ratio over time, Tables 8 (total banks), 9 (commercial), and 10 (savings) provide specific estimates of these ratios. They inform about possible substitution between labor and capital services in production of banking services. The first five columns of the tables show the ratio obtained dividing total capital by number of employees, while the last five show the (simple) average of the ratio from individual bank values. If average capital to labor ratio is higher (lower) than the ratio from aggregated figures, then small banks (in terms of number of employees) have higher (lower) capital to labor ratio than large banks.

Non-Human capital to labor ratio of all banks increases over time until the late nineties, but it declines afterwards, mainly because of the decline in Physical capital per employee and in spite of the growth in the allowance of IT capital per worker (Table 9). The decline is larger when the ratio is computed from aggregated values, column four, than when the ratio refers to averages of individual bank values, column nine. This means that the decline is more pronounced in larger banks. The difference between aggregated and average capital to labor ratios is particularly important in Advertising capital, especially in the last part of the period. This is explained by the irruption of Internet banking and the aggressive strategy of large advertising expenditures implemented by these banks. Since Internet banks operate with small number of employees their ratio of cumulative advertising expenditures per employee is particularly high and affects the average¹⁵.

The capital stock from Training expenditures is higher in column 5 than in column 10, which indicates that larger banks invest more in training per employee than smaller ones.

The comparison of the ratios of capital per employee between commercial (Table 9) and savings banks (Table 10) shows that commercial banks invest more in capital per worker than savings banks. The differences between the two widen mainly during the

15. When Internet banks are excluded the average and consolidated ratios became close again.

period 1989-1994, when Non-Human capital increased at 9.52% a year in the case of commercial banks and only at 5.51% in savings banks. Commercial banks start the period with lower IT capital per employee than savings banks but the former increase the ratio at higher growth rates since the early nineties and in 2003 the stock of IT capital per employee is higher in commercial than in savings banks. Table 9 confirms that average Advertising capital to labor ratio is higher in smaller banks (Internet banking effect) and also that the decrease in physical capital in smaller banks is compensated by the higher increase in both IT and commercial capital. Table 10, shows capital stock per worker values referred to saving banks. In the group of savings banks, small and large banks appear quite homogeneous in terms of capital per employee. The exception is capital from Training investments where larger savings banks invest more than smaller ones.

Figure 3 shows the relative importance of each form of non-human capital in total Non-Human Capital computed from the data of Tables 8 to 10. The figure helps to visualize the trends in the substitution of tangible capital by non-tangible one, especially among commercial banks.

4.3 Flow of Capital and other Input Services

4.3.1 USER COST OF CAPITAL AND WORKERS' SALARIES

From section 1, the flow of input services used in the production of goods or services during a given period of time is estimated as the stock of services available times the market price of one unit of service, assumed to be a good proxy of marginal cost (and marginal productivity). Tables 5 to 7 show the real stock of capital services and number of people employed by banks every year from 1983 to 2003. To obtain the flow of services we need also the price estimated for each input and year, c_{it} , defined in equation (2). This formula uses the financial opportunity cost given by equation (4). The calculations of the financial opportunity costs, according to this formula, are summarized in Table 11 for each year from 1983 to 2003. Opportunity costs (i.e. returns shareholders expect to be willing to finance the assets of the bank) are given in real terms. Table 11 also shows the change in consumer price index, CPI, each year of the period.

Average real financial opportunity costs remains in values over 14% year returns from 1983 to 1993, the first half of the period. Then decline to around 12% return in the next five year period and finish the period in values around 9.3% in 1999 to 2003. The decreasing trend in real interest rate of long term government bonds along the time period, including the effects of Spain joining the EMU area, explains in a good part the evolution of average costs, together with lower debt equity ratios (lower financial risk) in the final part of the period. The 25th and 75th percentiles provide evidence of dispersion of opportunity costs across banks¹⁶. Table 11 also shows the decreasing trend in inflation in Spain during the period of study.

Table 11 also reports the average and representative percentiles of the accounting return on equity of Spanish banks, calculated as the ratio between accounting net profit (after taxes) and the sum of capital and reserves of the bank at book values. Average accounting rates of return are above our estimated average opportunity costs in all years except 1992-1997, when bank accounting profits are below opportunity costs. The comparison of respective percentiles of cost and return reveals that dispersion is higher in returns than in cost, mainly because dispersion in opportunity cost within a year reflects

¹⁶. To avoid outliers that could distort the calculations banks with opportunity financial costs above percentile 75th or below percentile 25th have been assigned an opportunity cost equal to the respective percentile value.

dispersion in debt equity ratios across banks, which is moderate, while dispersion in rates of returns reflects the important differences observed in profits across banks.

The calculation of the user cost of capital for each type of capital, and of the cost per employee, used in the analysis, was described in section 2. Tables 12 to 14 present the estimated values of per unit cost of capital services for all banks, for commercial and for savings banks, respectively. The formula used in the calculation of the user cost of capital is given by equation (2). Tables 12 to 14 show the average value across banks of the user's cost of capital for each operating Non-Human asset, together with the weighted average value of user's cost for all combined assets. They also show the average labor cost per worker, equal to the (simple) average across banks of Labor expenditures, as reported in the income statement of the bank in year t , divided by the number of employees of the bank. The final column shows the relative unit cost of labor to unit cost of capital assets. The ratio is the average across banks of the salary per worker divided by the user cost of combined Non-Human capital, normalized to 1 in year 1983.

The evolution of the unit cost of capital and labor inputs is the result of the evolution of price inflation of the respective assets, together with the evolution in the real financial opportunity cost from Table 11. Unit costs show a positive growth rate in all periods of time and in all inputs. All the magnitudes of growth but IT are relatively parallel over time to those of the inflation rate shown also in Table 11, with the exception of the period 1999-2003 when capital inputs unit costs grow at higher rates than inflation, while labor cost per worker increases at a rate lower than the increase in consumer price index. Nominal cost of IT capital decreases over time due mainly to the assumption of nominal price stability for the IT capital, taking into account the opposite evolution in prices of software and in prices of hardware. On the other hand, no clear trend in the evolution of relative unit costs of labor and capital inputs is detected. Late eighties and late nineties are periods of time when labor unit costs stay relatively higher than capital unit costs. The periods 1986-1993 and 1999-2003 show a moderate decline in the relative unit costs ratio. In the last five-year period, unit cost of capital inputs grows at 6.61% a year while labor cost per worker increases only at 2.81%, which explains the decreasing trend in the ratio of unit costs.

Profit maximizing banks will respond to the evolution of relative input prices increasing the use of inputs whose unit costs increases relatively less and decreasing the use of inputs that become relatively more expensive. Data from Table 8 confirms that capital intensity per worker increases (decreases) in periods when labor becomes relatively more expensive (cheaper) than capital, as expected.

Tables 13 and 14 show the user unit costs of capital, the labor cost per worker and the relative labor to capital costs for commercial and savings banks, respectively. The basic conclusions from Table 12 referred to all banks are maintained. Commercial banks have lower weighted average unit cost of capital than savings banks but the difference is explained by differences in the weighting factors, since nominal unit costs of each capital input are very similar for the two types of banks. Labor costs per worker are lower in commercial banks than in savings banks until 1998, but since then, the average unit costs of the two types of banks converge to a figure of around 50,000 euros per year. Relative labor to capital unit costs remain more stable over time in commercial banks than in savings banks, although the substantial decline in the relative costs of labor over capital in the period 1999-2003 occurs

in the two types of banks. The evolution of relative input prices has similar effects in the input substitution process in commercial than in savings banks (Tables 9 and 10).

4.3.2 FLOW OF SERVICES

The flow of input services consumed in production during a year period is obtained multiplying the stock of capital services at constant prices and the number of employees (Tables 5, 6 and 7) by the nominal user cost of capital and nominal cost per employee shown in Tables 12 to 14. The multiplication is made at the individual bank level and then bank values are aggregated into a total flow of imputed services. The results are shown in Tables 15 to 17 for the same groups of banks as before.

During the period 1983-1989 flows of input services increase at high rates for Non-Human capital, Labor and Free Equity (Table 15). The increase is particularly high for Free Equity and for IT capital services, with annual growth rates of 31.78% and 17.73% respectively. Total Non-Human capital services increase at 9.22% a year, while labor costs increase at an annual rate of 13.07%. From 1989-1994 the flows of Non-Human capital input services continue to increase at a higher rate, 10%, but since 1994 the average growth rate has been negative (-1.89% from 1999 to 2003). Human capital input services, on the other hand, increase at similar rates in all three time periods after 1989 and since 1994, services from Training are the flow of input services with higher growth rate among all inputs. Finally, Free Equity increases at high rates (two digits) in the first and in the last five years period, but at moderate rates in the period in between.

The comparison of growth rates of flows of input services over time between commercial and saving banks (Tables 16 and 17) shows that, in the second part of the period, the growth rates of non human capital and of labor services in the two groups of banks is quite different. In fact in commercial banks the growth rates are negative or close to zero, while in saving banks they are always positive. The differences in growth rates are lower in Free Equity and Training capital services.

The information about input service flows is completed with Figure 4 that shows the relative importance of each type of services over total flows, from Non-Human capital and Labor. By far labor is the most important service flow. Its relative importance is only moderately reduced in the middle years of the period. This happens in both, commercial and savings banks.

5 Further issues

5.1 External services and total service flows

Although the main focus of this report is to provide estimates of stocks and flows of capital and labor inputs, the analysis of total services used in production is incomplete if we do not consider those services supplied from outside the bank. Among those services we have energy, office supplies, communications, security, governance, etc. Moreover, from 1999 onwards, information is also available on the monetary value of administrative services outsourced every year by each individual bank.

Tables 18 to 20 show the time evolution of total flows from internal and external services and the sum of the two, for all banks, for commercial and for savings banks. The internal input services are obtained from the sum of all columns of Tables 15 to 17. From 1999 on the tables also separate the monetary value of administrative services outsourced by banks from the total paid for externally supplied services. In the case of total banks (Table 18), external services grow at a similar annual rate than internal ones in all time periods. From 1999 we observe an increase in services from outsourcing activities of 14.7% per year, compared to 3.17% growth rate of total internal services. Table 19 and Table 20 show the time evolution of service flows and growth rates for external services in commercial and in saving banks, respectively. Commercial banks moderate the growth rate of internal and external services in the period 1994-2003, compared with previous growth rates in previous periods. In saving banks the annual growth rates of service flows internal and external have been fairly stable around 6% since 1989. The outsourcing of administrative services increases at annual rate of almost 20% in commercial banks but only at 7.3% in saving banks. In the last five-year period, total costs of external and internal services grow at annual rates of around 1% in the case of commercial banks and of 6% in savings banks.

5.2 Economic versus book value of physical capital

One way to appreciate the relevance of the capital stock calculations presented in this paper is to compare the book value (in balance sheets) and replacement cost value of physical assets. In order to make more homogeneous the comparisons, we estimate the book value of the Physical assets of banks as if all branches were owned by banks, that is, including the estimated book value of those branches in outlets rented by banks. The calculation is similar to that used above to obtain replacement values of rented branches, but now using book values instead of replacement values of owned ones.

Table 21 shows the results of the comparison for all banks, commercial and savings banks. In 1983, both accounting and replacement values are equal by assumption, that is, we start assuming that book values in 1983 are good approximations of replacement values. This assumption is reasonable taking into account that, in that year, banks and other firms were allowed to value their assets at replacement costs tax free. In year 1988 the estimated replacement cost of Physical assets is 10% higher than book values. The difference goes up to 20% in the second part of the nineties and to 27% in 2003. Until year 2000 the relative difference between replacement cost and book value of Physical capital was higher in commercial banks than in saving banks, but after year 2000 the situation reverses. This is explained by the steady branch expansion of saving banks in the last part of the period and by the sale of emblematic headquarters buildings by commercial banks.

5.3 Inputs and Outputs

We compare the flow calculations from the input side of the production process of the bank with variables that approximate flows from the output side. This way, flows of input services and costs can be evaluated relative to the outputs they generate, although in a very aggregate and approximate way. Table 22 presents the evidence we refer to. For all banks Table 22 shows total Operating margin (Income minus costs of deposits and of subordinated debt), the efficiency ratio (Total Costs, from Table 20, divided by Operating margin) and Assets Unit Costs (Total Costs divided by Assets, with non financial assets at their replacement costs and loans net of loan loss provision reserves). In commercial and saving banks it also includes a column with the market share of each of the two calculated on the total of Operating margin.

The efficiency ratio for all banks increases to reach a maximum in 1994, 91.3%, and to stay around this figure until 1997 when the ratio starts to decrease until the value of 71.5% in year 2003. By calculation the evolution of the efficiency ratio over time is the result of the comparative evolution of Operating margin (denominator) and Total costs (denominator). Average unit cost (per euro of assets at replacement costs) reaches a maximum in 1987 when total economic costs just calculated represented 4.06 cents per euro of total assets. Since then they decline to reach a minimum of 1.83 cents of cost per euro of assets in year 2003. So unit average cost in 2003 are less than half they were twenty years earlier.

The operating margin of savings banks represents 38.48% of total operating margin in 1983 and goes up to represent 46.82% in year 2003. That is, saving banks clearly gain market share to commercial banks also if the market is measured in terms of operating margins. Overall, saving banks have lower operating efficiency than commercial banks in the two measures, efficiency and Unit costs, except is the period 1992-1999 when the efficiency ratio of saving banks is lower than that of commercial banks. The gain in operating efficiency of Savings banks is higher in the period 1989 to 1994, when the efficiency ratio improves (decreases) at an annual rate of 4.36%, while the efficiency ratio for commercial banks increases at almost 3% in the same period. The full liberalization of the banking system helped savings banks to gain efficiency thorough internal and external growth (mergers). Not surprisingly, 1989 to 1994 is also the period when saving banks gain market share at faster rate. At the end of the period, since year 2000, commercial banks improve in efficiency while the efficiency measures of savings banks stay more stable. Now are commercial banks those which benefit the most, in terms of efficiency, from mergers and acquisitions.

6 Conclusion

Conventional accounting data has important limitations to evaluate the resources used in production of goods and services. The limitations are even more important when the firm invests heavily in intangible resources that, following accounting conventions or taking advantage of tax laws, are treated as expenses of the period. Production of banking services is an economic activity where intangible assets are said to play an increasing role and therefore it is likely that accounting information gives a distorted view of the value of the resources consumed in production. Having more accurate estimations of stocks and flows of input services deployed in production of banking products and services will lead to a more precise picture of the situation of this important industry and will help to obtain more meaningful measures of efficiency and profitability.

This paper provides estimates of stocks and flows of capital and non-capital services at replacement values for Spanish commercial and savings banks during the years between 1983 and 2003. The main purpose of the study is to describe the methodology used in the computations and to show aggregate estimates of the relevant economic magnitudes in terms of inputs used in the production process. Special attention is given in the estimates of intangible capital such as IT, Commercial and employees' Training, together with estimates of users' cost of capital for each of the productive inputs and their evolution over time.

We find that the evolution of the stocks and flows of labor and capital inputs is quite different in the first part of the period (from 1983 to mid-nineties) than that observed in the second one. While in the first part nominal and real stock of capital increased over time, in the second part (and specially in the period 1999-2003) total non-human capital stock at constant prices decreased mainly because of the deep decline in the stock of Physical capital among commercial banks. Commercial banks also reduce the number of employees over time while savings banks increase it. At the end, savings banks have and use practically the same volume of inputs than commercial banks in year 2003, even though their departure levels in 1983 were quite behind than those of commercial banks in stock of capital, employees and flows of input services.

Intangible capital (Advertising, IT and Training) increases its relative importance over time, especially IT capital. The services from this input at current prices represent 25% of the flow of services from Physical capital in year 1983 and goes up to represent almost 70% in year 2003¹⁷. In 2003 the only operating input for which the flow of capital services is higher in commercial banks than in savings banks is IT capital. Commercial banks draw substantially higher services from Free Equity than savings banks during all the period.

The user's cost of capital evolves over time in response to changes in interest rate (which declines significantly from 1994 to 1999) and to changes in the price level of capital assets (increasing over time, except in IT). Labor cost per worker in nominal terms grew over the 1983-2003 period, being such an increase parallel in commercial and savings banks. Relative unit cost of labor with respect to unit cost of operating capital inputs does not follow a regular pattern over time, but it decreases in the period 1999 to 2003, period in which

¹⁷ Mas and Quesada [(2005), page 227] estimate that in the Spanish financial intermediation industry services from IT capital represent an average of 59.17% of services from non residential capital in the period 1995-2002.

banks lower the ratio of operating capital to number of workers as a reaction to the increase in the relative unit cost of capital over the unit cost of labor observed in that period. Finally, the study finds a significant increase of services from outsourced administrative activities by commercial banks, in the period 1999 to 2003, compared with the increase in services from internal inputs and also from that of other externally purchased services. In saving banks the outsourcing grows at moderate rates comparable with those observed in other sources of services, internal and external.

As indicated the purpose of the paper is to present the methodology used to estimate the replacement costs and service flows for tangible and intangible assets of banks and to provide numbers reflecting the resulting estimates. In addition to that the last section of the paper has provided preliminary evidence on measures of production efficiency for all banks, for commercial and for saving banks, based upon these new measures of stocks and flows. Future research should continue with refinements in the methodology (especially in refining estimations of prices and depreciation parameters to be applied to intangibles such as IT and advertising) as well as with further applications of the measures of stock and flows of capital services in areas such as: profitability of banks, total factor productivity growth, individual measure of productive efficiency and product market competition.

REFERENCES

- BERRY, H. (2001). *When does multinationality increase firm value? Evidence from US and Japanese firms, 1974-1997*, Working Paper, Department of Management, The Wharton School.
- BERRY, H., and M. SAKAKIBARA (2005). "Resource Accumulation and Overseas Expansion by Japanese Multinationals", *Journal of Economic Behavior and Organization*, forthcoming.
- CORRADO, C., CH. HULTEN and D. SICHEL (2006). *Intangible Capital and Economic Growth*, NBER Working Paper No. 11948.
- GREEN, E. J., J. A. LOPEZ and Z. WANG (2003). "Formulating the Imputed Cost of Equity Capital for Priced Services at Federal Reserve Banks", FRB New York, *Economic Policy Review*, 9, pp. 55-81.
- GRILICHES and MAIRESSE (1984). "Productivity and R&D at the Firm Level", in Z. Griliches (ed.), *R&D, Patents, and Productivity*, Chicago, University of Chicago Press, pp. 339-374.
- HALL, B. (1993). "A framework linking intangible resources and capabilities to sustainable competitive advantage", *Strategic Management Journal*, 14, pp. 607-618.
- (1998). *Innovations and market value*, NBER Working Paper No. 6984.
- JORGENSON, D. W. (1967). "The Theory of Investment Behaviour", in *Determinants of Investment Behaviour*, Universities-National Bureau conference Series, 18, New York, Columbia University Press, pp. 129-155.
- LEV, B., and P. ZAROWIN (1999). "The boundaries of financial reporting and how to extend them", *Journal of Accounting Research*, 37 (2), pp. 353-385.
- LICHTENBERG, F. (1995). "The output contribution of computer equipment and personnel: a firm level analysis", *Journal of Economics of Innovation and New Technology*, 3, pp. 201-217.
- MARTÍN, A., and L. Moreno (1992). "Medidas del stock de capital a partir de datos contables", in *Valoración económica del beneficio y el capital*, G. Mato and V. Salas (eds.), FEDEA Estudios.
- MAS, M., F. PÉREZ and E. URIEL (2005). *El stock y los servicios de capital en España (1964-2002)*. Nueva metodología, Fundación BBVA.
- MAS, M., and J. QUESADA (2005). *Las nuevas tecnologías y el crecimiento económico en España*, Fundación BBVA.

TABLE 1: SOURCES OF DATA IN THE COMPUTATION OF CAPITAL STOCKS

	INVESTMENT FLOW	$\delta=1-(1-\phi)/(1+\mu)$	PRICE INDEX
Physical Capital			
<i>Buildings</i>	<i>Difference between book value at t and t-1 from balance sheet data</i>	0.03	<i>Residential (Ministerio de Fomento)</i>
<i>Non-IT Equipment</i>	<i>Book value</i>	0.15	<i>Market Services (INE)</i>
Intangible Capital			
<i>IT Equipment</i>	<i>Book value</i>	0.35	<i>Price Index = 1</i>
<i>IT Services</i>	<i>Expenditures flow from income statement</i>	0.35	<i>Price Index = 1</i>
<i>Advertising</i>	<i>Expenditures flow from income statement</i>	0.35	<i>Market Services (INE)</i>
<i>Training</i>	<i>Expenditures flow from income statement</i>	0.20	<i>Educational Services (INE)</i>
Free Equity	<i>Difference between book value at t and t-1 from balance sheet data</i>	0.00	<i>Consumption Price Index (INE)</i>

TABLE 2. OPERATING AND FINANCIAL ASSETS, ALL BANKS 1983-2003. (Thousands of CURRENT euros).

Year	Number Observations	Non-Human Capital				Human Capital		Free Equity
		Physical	Advertising	IT	Total	Training	Employees	
1983	162	7071095	338676	654013	8063784		226169	2429451
1984	163	7431460	399791	779568	8610819		229487	3504140
1985	165	7417290	432307	1041456	8891053		226979	5062169
1986	165	7522446	480102	1158588	9161136		218754	7171257
1987	163	7581852	537459	1379877	9499188		219029	9297636
1988	161	10397828	590669	1596177	12584674		222646	10406221
1989	161	11944164	698270	1953920	14596354		228219	12084775
1990	152	14350646	899639	2269992	17520277		231375	13463379
1991	147	20283200	1039218	2545030	23867448		236150	13303826
1992	144	21535943	1118437	2696105	25350485	142468	236839	15001667
1993	142	22548673	1215985	2706977	26471635	179480	230495	17196260
1994	138	23557996	1272147	2723404	27553547	219267	228841	19755825
1995	139	24366749	1341524	2742558	28450831	247976	227553	22343016
1996	134	26944771	1431117	2857853	31233741	276217	224610	24005272
1997	132	26329654	1520756	3159962	31010372	314713	223823	26535645
1998	126	25488014	1563091	3614975	30666080	345795	224554	30180283
1999	122	25955667	1584257	4008422	31548346	368650	220736	30371045
2000	114	25025376	1623049	4199187	30847612	404345	219518	44315058
2001	110	24584634	1684792	4410888	30680314	441824	219306	50922316
2002	105	24226327	1696717	4492265	30415309	471015	216433	57132470
2003	100	24562545	1702295	4564177	30829017	504106	215935	61993559

Average cumulative growth

1983-1989	-0.10%	8.74%	12.06%	18.24%	9.89%		0.15%	26.74%
1989-1994	-3.08%	13.58%	12.00%	6.64%	12.71%		0.05%	9.83%
1994-1999	-2.46%	1.94%	4.39%	7.73%	2.71%	10.39%	-0.72%	8.60%
1999-2003	-4.97%	-1.38%	1.80%	3.25%	-0.58%	7.82%	-0.55%	17.84%

TABLE 3. OPERATING AND FINANCIAL ASSETS, COMMERCIAL BANKS 1983-2003. (Thousands of CURRENT euros).

Year	Number Observations	Non-Human Capital				Human Capital		Free Equity
		Physical	Advertising	IT	Total	Training	Employees	
1983	87	5334307	134477	383738	5852522		163185	1893503
1984	88	5520483	157841	431606	6109930		164591	2834549
1985	89	5433444	169951	559467	6162862		160049	4103433
1986	89	5415764	196531	618582	6230877		155200	5391202
1987	87	5377877	223170	723971	6325018		153552	7129474
1988	85	7519166	232812	808748	8560726		154038	7706638
1989	86	8604890	281317	990789	9876996		155109	8950305
1990	89	9342884	402754	1167210	10912848		156013	10596599
1991	92	14396871	495374	1390558	16282803		156920	10062196
1992	92	15244472	539341	1523289	17307102	71884	154832	10918903
1993	92	15864112	594068	1568599	18026779	92969	148656	12159223
1994	88	16523258	627033	1570297	18720588	113681	145937	13400746
1995	90	16859001	661464	1542622	19063087	127555	144160	14879566
1996	85	18126892	713886	1544213	20384991	137460	138106	15302097
1997	83	17081294	765578	1717568	19564440	157624	134546	16523260
1998	77	15852093	761145	1981772	18595010	171543	131622	18582461
1999	74	15898872	754240	2235955	18889067	177729	124349	16950995
2000	68	14076817	760251	2369109	17206177	186527	118729	28989779
2001	65	12993827	769730	2422653	16186210	196909	114559	32999011
2002	60	12205781	759569	2443057	15408407	210364	109524	36300991
2003	55	12045558	743996	2469898	15259452	224341	106666	38235409

Average cumulative growth

1983-1989	-0.19%	7.97%	12.30%	15.81%	8.72%		-0.85%	25.89%
1989-1994	0.46%	13.05%	16.03%	9.21%	12.79%		-1.22%	8.07%
1994-1999	-3.47%	-0.77%	3.69%	7.07%	0.18%	8.94%	-3.20%	4.70%
1999-2003	-7.42%	-6.94%	-0.34%	2.49%	-5.33%	5.82%	-3.83%	20.34%

TABLE 4. OPERATING AND FINANCIAL ASSETS, SAVINGS BANKS 1983-2003. (Thousands of CURRENT euros).

Year	Number Observations	Non-Human Capital				Human Capital		Free Equity
		Physical	Advertising	IT	Total	Training	Employees	
1983	75	1736788	204200	270275	2211263		62984	535949
1984	75	1910977	241950	347962	2500889		64896	669591
1985	76	1983846	262356	481989	2728191		66930	958736
1986	76	2106681	283570	540006	2930257		63554	1780055
1987	76	2203976	314289	655906	3174171		65477	2168162
1988	76	2878662	357856	787429	4023947		68608	2699583
1989	75	3339274	416953	963131	4719358		73110	3134469
1990	63	5007762	496885	1102782	6607429		75362	2866780
1991	55	5886329	543844	1154472	7584645		79230	3241630
1992	52	6291471	579096	1172816	8043383	70584	82007	4082764
1993	50	6684561	621917	1138378	8444856	86511	81839	5037036
1994	50	7034738	645114	1153107	8832959	105586	82904	6355079
1995	49	7507748	680061	1199936	9387745	120422	83393	7463449
1996	49	8817878	717231	1313640	10848749	138757	86504	8703175
1997	49	9248360	755178	1442394	11445932	157090	89277	10012385
1998	49	9635921	801946	1633203	12071070	174253	92932	11597822
1999	48	10056795	830017	1772467	12659279	190921	96387	13420050
2000	46	10948559	862799	1830078	13641436	217818	100789	15325279
2001	45	11590806	915061	1988235	14494102	244915	104747	17923306
2002	45	12020547	937148	2049208	15006903	260652	106909	20831479
2003	45	12516986	958299	2094279	15569564	279765	109269	23758150
<i>Average cumulative growth</i>								
1983-1989	0,00%	10,90%	11,90%	21,18%	12,64%		2,48%	29,44%
1989-1994	-8,11%	14,90%	8,73%	3,60%	12,54%		2,51%	14,14%
1994-1999	-0,82%	7,15%	5,04%	8,60%	7,20%	11,85%	3,01%	14,95%
1999-2003	-1,61%	5,47%	3,59%	4,17%	5,17%	9,55%	3,14%	14,28%

TABLE 5. OPERATING AND FINANCIAL ASSETS, ALL BANKS 1983-2003. (Thousands of CONSTANT* euros).

Year	Number Observations	Non-Human Capital				Human Capital		Free Equity
		Physical	Advertising	IT	Total	Training	Employees	
1983	162	7071095	338676	654013	8063784		226169	2429451
1984	163	7145635	350537	779568	8275740		229487	3148929
1985	165	6857702	348903	1041456	8248061		226979	4180527
1986	165	6673496	355192	1158588	8187276		218754	5443546
1987	163	6489644	373623	1379877	8243144		219029	6705710
1988	161	8326888	384357	1596177	10307422		222646	7158947
1989	161	9024858	425381	1953920	11404159		228219	7785003
1990	152	10077006	500781	2269992	12847779		231375	8126837
1991	147	13441251	531558	2545030	16517839		236150	7580673
1992	144	13736776	526435	2696105	16959316	70646	236839	8069986
1993	142	13846960	537378	2706977	17091315	80786	230495	8846338
1994	138	13930263	540801	2723404	17194468	89924	228841	9705163
1995	139	13801544	543821	2742558	17087923	95139	227553	10486036
1996	134	14920249	558198	2857853	18336300	99603	224610	10878993
1997	132	14221565	573229	3159962	17954756	107829	223823	11793308
1998	126	13622860	569952	3614975	17807787	113439	224554	13171497
1999	122	13417658	559319	4008422	17985399	116304	220736	12955424
2000	114	11975480	553994	4199187	16728661	121910	219518	18276039
2001	110	11334916	547555	4410888	16293359	127162	219306	20273120
2002	105	10757300	523582	4492265	15773147	127585	216433	22068563
2003	100	10454610	504341	4564177	15523128	130209	215935	23239975
<i>Average cumulative growth</i>								
1983-1989	-0,10%	4,07%	3,80%	18,24%	5,78%		0,15%	19,41%
1989-1994	-3,08%	8,68%	4,80%	6,64%	8,21%		0,05%	4,41%
1994-1999	-2,46%	-0,75%	0,67%	7,73%	0,90%	5,14%	-0,72%	5,78%
1999-2003	-4,97%	-6,24%	-2,59%	3,25%	-3,68%	2,82%	-0,55%	14,61%

* Constant euros of 1983.

TABLE 6. OPERATING AND FINANCIAL ASSETS, COMMERCIAL BANKS 1983-2003. (Thousands of CONSTANT* euros).

Year	Number Observations	Non-Human Capital				Human Capital		Free Equity
		Physical	Advertising	IT	Total	Training	Employees	
1983	87	5334307	134477	383738	5852522		163185	1893503
1984	88	5308157	138395	431606	5878158		164591	2547213
1985	89	5023525	137163	559467	5720155		160049	3388767
1986	89	4804565	145399	618582	5568546		155200	4092345
1987	87	4603163	155140	723971	5482274		153552	5141972
1988	85	6021571	151495	808748	6981814		154038	5301772
1989	86	6501745	171376	990789	7663910		155109	5765780
1990	89	6560561	224192	1167210	7951963		156013	6396376
1991	92	9540504	253383	1390558	11184445		156920	5733555
1992	92	9723740	253862	1523289	11500891	35645	154832	5873707
1993	92	9742024	262535	1568599	11573158	41847	148656	6255116
1994	88	9770497	266557	1570297	11607351	46622	145937	6583194
1995	90	9549088	268141	1542622	11359851	48938	144160	6983286
1996	85	10037485	278447	1544213	11860145	49568	138106	6934786
1997	83	9226203	288575	1717568	11232346	54006	134546	7343477
1998	77	8472643	277537	1981772	10731952	56275	131622	8109892
1999	74	8218846	266283	2235955	10721084	56071	124349	7230812
2000	68	6736228	259496	2369109	9364833	56238	118729	11955718
2001	65	5990895	250161	2422653	8663709	56673	114559	13137519
2002	60	5419775	234392	2443057	8097224	56982	109524	14021986
2003	55	5126977	220425	2469898	7817300	57946	106666	14333585

Average cumulative growth

1983-1989	-0.19%	3.30%	4.04%	15.81%	4.49%		-0.85%	18.56%
1989-1994	0.46%	8.15%	8.83%	9.21%	8.30%		-1.22%	2.65%
1994-1999	-3.47%	-3.46%	-0.02%	7.07%	-1.59%	3.69%	-3.20%	1.88%
1999-2003	-7.42%	-11.80%	-4.73%	2.49%	-7.90%	0.82%	-3.83%	17.11%

* Constant euros of 1983.

TABLE 7. OPERATING AND FINANCIAL ASSETS, SAVINGS BANKS 1983-2003. (Thousands of CONSTANT* euros).

Year	Number Observations	Non-Human Capital				Human Capital		Free Equity
		Physical	Advertising	IT	Total	Training	Employees	
1983	75	1736788	204200	270275	2211263		62984	535949
1984	75	1837478	212142	347962	2397582		64896	601715
1985	76	1834177	211740	481989	2527906		66930	791760
1986	76	1868931	209793	540006	2618730		63554	1351202
1987	76	1886481	218483	655906	2760870		65477	1563738
1988	76	2305318	232863	787429	3325610		68608	1857175
1989	75	2523113	254005	963131	3740249		73110	2019223
1990	63	3516444	276589	1102782	4895815		75362	1730461
1991	55	3900747	278175	1154472	5333394		79230	1847118
1992	52	4013036	272574	1172816	5458426	35001	82007	2196279
1993	50	4104935	274842	1138378	5518155	38940	81839	2591222
1994	50	4159766	274244	1153107	5587117	43302	82904	3121969
1995	49	4252455	275680	1199936	5728071	46201	83393	3502750
1996	49	4882763	279751	1313640	6476154	50035	86504	3944208
1997	49	4995362	284654	1442394	6722410	53823	89277	4449831
1998	49	5150217	292415	1633203	7075835	57164	92932	5061605
1999	48	5198812	293036	1772467	7264315	60233	96387	5724612
2000	46	5239251	294498	1830078	7363827	65672	100789	6320321
2001	45	5344021	297394	1988235	7629650	70489	104747	7135601
2002	45	5337525	289190	2049208	7675923	70603	106909	8046576
2003	45	5327633	283916	2094279	7705828	72262	109269	8906390

Average cumulative growth

1983-1989	0.00%	6.22%	3.64%	21.18%	8.76%		2.48%	22.11%
1989-1994	-8.11%	10.00%	1.53%	3.60%	8.03%		2.51%	8.72%
1994-1999	-0.82%	4.46%	1.33%	8.60%	5.25%	6.60%	3.01%	12.13%
1999-2003	-1.61%	0.61%	-0.79%	4.17%	1.48%	4.55%	3.14%	11.05%

* Constant euros of 1983.

TABLE 8. ASSETS PER WORKER, ALL BANKS, 1983-2003. (Thousands of CONSTANT euros of 1983).

Year	Total assets per worker					Average assets per worker across banks				
	Physical	Advertising	IT	Total non-Humar	Training	Physical	Advertising	IT	Total non-Humar	Training
1983	31.3	1.5	2.9	35.7		36.7	1.8	3.1	41.6	
1984	31.1	1.5	3.4	36.1		37.7	1.9	3.9	43.5	
1985	30.2	1.5	4.6	36.3		36.5	1.9	5.2	43.6	
1986	30.5	1.6	5.3	37.4		35.0	1.9	6.0	43.0	
1987	29.6	1.7	6.3	37.6		33.6	2.0	7.2	42.8	
1988	37.4	1.7	7.2	46.3		35.2	2.1	8.7	45.9	
1989	39.5	1.9	8.6	50.0		37.9	2.1	10.1	50.0	
1990	43.6	2.2	9.8	55.5		41.1	2.1	10.9	54.0	
1991	56.9	2.3	10.8	69.9		43.4	2.4	11.0	56.9	
1992	58.0	2.2	11.4	71.6	0.30	46.9	2.6	11.5	61.0	0.33
1993	60.1	2.3	11.7	74.2	0.35	54.8	2.6	11.6	69.0	0.36
1994	60.9	2.4	11.9	75.1	0.39	58.6	2.6	12.5	73.6	0.40
1995	60.7	2.4	12.1	75.1	0.42	61.8	2.7	13.3	77.8	0.43
1996	66.4	2.5	12.7	81.6	0.44	59.1	2.8	13.6	75.5	0.46
1997	63.5	2.6	14.1	80.2	0.48	56.3	2.9	14.8	74.0	0.49
1998	60.7	2.5	16.1	79.3	0.51	53.4	3.0	16.0	72.4	0.51
1999	60.8	2.5	18.2	81.5	0.53	51.2	3.3	18.0	72.4	0.51
2000	54.6	2.5	19.1	76.2	0.56	48.6	4.2	18.9	71.7	0.51
2001	51.7	2.5	20.1	74.3	0.58	45.8	4.9	21.2	71.9	0.51
2002	49.7	2.4	20.8	72.9	0.59	45.1	5.4	23.1	73.5	0.51
2003	48.4	2.3	21.1	71.9	0.60	47.2	5.2	21.4	73.8	0.52
<i>Average cumulative growth</i>										
1983-1989	3.92%	3.65%	18.09%	5.63%		0.56%	1.86%	19.51%	3.06%	
1989-1994	8.63%	4.75%	6.59%	8.16%		8.71%	4.28%	4.29%	7.73%	
1994-1999	-0.03%	1.39%	8.45%	1.62%	5.87%	-2.72%	5.01%	7.34%	-0.33%	4.76%
1999-2003	-5.69%	-2.04%	3.80%	-3.13%	3.37%	-2.02%	11.67%	4.31%	0.47%	0.94%

TABLE 9. CAPITAL STOCK PER WORKER, COMMERCIAL BANKS, 1983-2003. (Thousands of CONSTANT euros of 1983).

Year	Total assets per worker					Average assets per worker across banks				
	Physical	Advertising	IT	Total non-Humar	Training	Physical	Advertising	IT	Total non-Human	Training
1983	32.7	0.8	2.4	35.9		47.8	0.8	2.3	51.0	
1984	32.3	0.8	2.6	35.7		48.5	0.9	3.0	52.4	
1985	31.4	0.9	3.5	35.7		45.9	0.9	3.9	50.8	
1986	31.0	0.9	4.0	35.9		41.7	0.9	4.3	46.9	
1987	30.0	1.0	4.7	35.7		38.7	0.9	4.9	44.6	
1988	39.1	1.0	5.3	45.3		41.0	1.0	6.2	48.2	
1989	41.9	1.1	6.4	49.4		43.8	1.0	7.6	52.4	
1990	42.1	1.4	7.5	51.0		45.7	1.2	8.9	55.8	
1991	60.8	1.6	8.9	71.3		46.1	1.9	9.1	57.1	
1992	62.8	1.6	9.8	74.3	0.23	50.9	2.2	9.7	62.8	0.30
1993	65.5	1.8	10.6	77.9	0.28	61.8	2.2	10.2	74.2	0.33
1994	67.0	1.8	10.8	79.5	0.32	68.5	2.2	11.3	81.9	0.37
1995	66.2	1.9	10.7	78.8	0.34	73.0	2.4	12.4	87.7	0.39
1996	72.7	2.0	11.2	85.9	0.36	65.6	2.6	12.2	80.3	0.44
1997	68.6	2.1	12.8	83.5	0.40	61.6	2.8	13.5	77.9	0.46
1998	64.4	2.1	15.1	81.5	0.43	57.6	2.9	15.1	75.5	0.49
1999	66.1	2.1	18.0	86.2	0.45	54.3	3.4	18.1	75.8	0.48
2000	56.7	2.2	20.0	78.9	0.47	51.3	5.1	19.9	76.3	0.48
2001	52.3	2.2	21.1	75.6	0.49	46.0	6.5	23.9	76.4	0.48
2002	49.5	2.1	22.3	73.9	0.52	44.8	7.7	27.4	79.9	0.49
2003	48.1	2.1	23.2	73.3	0.54	48.7	7.9	25.0	81.5	0.52
<i>Average cumulative growth</i>										
1983-1989	4.14%	4.89%	16.65%	5.34%		-1.46%	3.70%	19.66%	0.46%	
1989-1994	9.36%	10.05%	10.43%	9.52%		8.93%	14.45%	7.94%	8.92%	
1994-1999	-0.26%	3.18%	10.27%	1.61%	6.89%	-4.62%	9.21%	9.45%	-1.54%	5.52%
1999-2003	-7.96%	-0.89%	6.32%	-4.06%	4.66%	-2.74%	20.84%	8.09%	1.82%	1.83%

TABLE 10. CAPITAL STOCK PER WORKER, SAVINGS BANKS, 1983-2003. (Thousands of CONSTANT euros of 1983).

Year	Total assets per worker					Average assets per worker across banks				
	Physical	Advertising	IT	Total non-Humar	Training	Physical	Advertising	IT	Total non-Humar	Training
1983	27.6	3.2	4.3	35.1		24.2	3.0	4.0	31.2	
1984	28.3	3.3	5.4	36.9		25.6	3.0	4.8	33.4	
1985	27.4	3.2	7.2	37.8		25.7	3.0	6.7	35.4	
1986	29.4	3.3	8.5	41.2		27.5	3.1	8.0	38.5	
1987	28.8	3.3	10.0	42.2		27.8	3.1	9.8	40.7	
1988	33.6	3.4	11.5	48.5		28.8	3.2	11.4	43.3	
1989	34.5	3.5	13.2	51.2		31.3	3.2	12.8	47.4	
1990	46.7	3.7	14.6	65.0		34.7	3.3	13.6	51.7	
1991	49.2	3.5	14.6	67.3		38.9	3.4	14.2	56.5	
1992	48.9	3.3	14.3	66.6	0.43	40.1	3.3	14.5	57.8	0.38
1993	50.2	3.4	13.9	67.4	0.48	42.3	3.3	14.1	59.7	0.42
1994	50.2	3.3	13.9	67.4	0.52	41.9	3.2	14.5	59.6	0.45
1995	51.0	3.3	14.4	68.7	0.55	42.0	3.3	14.9	60.1	0.48
1996	56.4	3.2	15.2	74.9	0.58	48.3	3.2	15.9	67.4	0.51
1997	56.0	3.2	16.2	75.3	0.60	47.6	3.2	16.9	67.7	0.53
1998	55.4	3.1	17.6	76.1	0.62	47.1	3.2	17.5	67.8	0.54
1999	53.9	3.0	18.4	75.4	0.62	46.5	3.1	17.9	67.5	0.54
2000	52.0	2.9	18.2	73.1	0.65	44.9	2.9	17.5	65.3	0.55
2001	51.0	2.8	19.0	72.8	0.67	45.5	2.8	17.8	66.1	0.54
2002	49.9	2.7	19.2	71.8	0.66	45.4	2.7	17.9	66.0	0.53
2003	48.8	2.6	19.2	70.5	0.66	45.6	2.6	17.7	65.9	0.53
<i>Average cumulative growth</i>										
1983-1989	3.74%	1.15%	18.69%	6.28%		4.32%	1.23%	19.41%	6.98%	
1989-1994	7.48%	-0.98%	1.09%	5.51%		5.81%	0.21%	2.44%	4.60%	
1994-1999	1.45%	-1.69%	5.58%	2.24%	3.59%	2.10%	-0.93%	4.19%	2.48%	3.46%
1999-2003	-2.52%	-3.93%	1.03%	-1.66%	1.42%	-0.48%	-4.77%	-0.25%	-0.60%	-0.38%

TABLE 11. FINANCIAL OPPORTUNITY COSTS, RETURNS OF EQUITY AND INFLATION RATE , ALL BANKS, 1983-2003.(%).

Year	Real financial opportunity cost			Accounting return of equity			Inflation Rate (CPI)
	Average	25 th percentile	75 th percentile	Average	25 th percentile	75 th percentile	
1983	16.06	13.59	19.55	14.50	5.59	24.87	12.17
1984	16.71	14.36	19.94	16.32	6.38	30.17	11.28
1985	16.66	14.29	19.51	17.06	7.24	34.69	8.81
1986	15.07	13.05	17.25	17.52	7.92	26.76	8.79
1987	16.06	14.04	18.19	21.23	12.01	31.06	5.25
1988	14.38	13.17	15.54	14.71	6.94	22.19	4.84
1989	14.81	13.09	16.46	18.83	10.35	27.06	6.79
1990	14.28	12.64	15.67	17.29	10.85	23.99	6.72
1991	14.14	12.62	15.73	16.43	10.10	22.57	5.93
1992	13.98	12.77	15.40	11.66	5.08	17.40	5.92
1993	14.14	13.03	15.25	10.75	3.60	16.59	4.57
1994	12.80	11.61	13.92	9.20	1.72	15.95	4.72
1995	12.53	11.36	13.74	9.89	2.10	16.13	4.67
1996	13.11	11.86	14.36	11.13	4.40	15.32	3.56
1997	12.05	10.75	13.37	11.70	5.35	16.15	1.97
1998	11.15	9.82	12.47	12.62	5.63	16.95	1.83
1999	9.53	8.09	11.01	12.81	5.69	16.70	2.31
2000	9.17	7.47	10.97	12.30	5.59	16.55	3.43
2001	9.60	7.97	11.20	12.25	6.86	16.72	3.59
2002	9.33	7.70	11.02	11.87	6.82	16.15	3.07
2003	9.13	7.63	10.65	10.99	5.49	15.35	3.04
<i>Average by periods</i>							
1983-1988	15.82	13.75	18.33	16.89	7.68	28.29	8.52
1989-1993	14.27	12.83	15.70	14.99	8.00	21.52	5.99
1994-1998	12.33	11.08	13.57	10.91	3.84	16.10	3.35
1999-2003	9.35	7.77	10.97	12.04	6.09	16.29	3.09

TABLE 12. NOMINAL UNIT COST OF OPERATING ASSETS, LABOUR COST PER WORKER AND RELATIVE COST OF LABOUR TO OTHER INPUTS, AVERAGE ALL BANKS, 1983-2003.

Year	Nominal Cost					Weighed Average (1)	Labour cost per worker* (2)	Relative cost (2)/(1)**
	Physical	Advertising	IT	Training				
1983	0.26	0.47	0.59	0.32	0.31	0.31	14	1.00
1984	0.30	0.52	0.60	0.41	0.35	0.35	16	0.98
1985	0.32	0.62	0.59	0.37	0.37	0.37	18	1.04
1986	0.32	0.64	0.57	0.41	0.37	0.37	22	1.29
1987	0.35	0.72	0.56	0.52	0.41	0.41	25	1.32
1988	0.34	0.75	0.55	0.50	0.40	0.40	28	1.49
1989	0.44	0.81	0.56	0.56	0.48	0.48	30	1.33
1990	0.46	0.85	0.57	0.58	0.50	0.50	31	1.32
1991	0.55	0.92	0.56	0.60	0.57	0.57	32	1.20
1992	0.59	0.99	0.55	0.61	0.61	0.61	33	1.19
1993	0.59	1.10	0.55	0.66	0.61	0.61	35	1.26
1994	0.52	1.13	0.52	0.67	0.55	0.55	37	1.46
1995	0.52	1.16	0.52	0.78	0.55	0.55	39	1.51
1996	0.57	1.21	0.51	0.82	0.60	0.60	40	1.44
1997	0.51	1.21	0.49	0.84	0.55	0.55	41	1.61
1998	0.53	1.21	0.48	0.86	0.57	0.57	43	1.62
1999	0.46	1.23	0.47	0.88	0.52	0.52	45	1.87
2000	0.32	1.26	0.46	0.89	0.42	0.42	45	2.31
2001	0.60	1.30	0.47	0.96	0.63	0.63	48	1.63
2002	0.62	1.33	0.46	0.93	0.65	0.65	50	1.64
2003	0.63	1.40	0.46	1.00	0.67	0.67	50	1.61
<i>Average cumulative growth</i>								
1983-1989	8.52%	9.12%	-0.77%	9.08%	7.61%	12.37%	4.76%	
1989-1994	3.43%	6.65%	-1.55%	3.56%	2.68%	4.51%	1.83%	
1994-1999	-2.26%	1.59%	-2.25%	5.41%	-1.32%	3.68%	4.99%	
1999-2003	7.74%	3.29%	-0.53%	3.26%	6.61%	2.81%	-3.80%	

* Thousands of current euros.

** Relative unit costs normalized to 1 in 1983.

TABLE 13. NOMINAL UNIT COST OF OPERATING ASSETS, LABOUR COST PER WORKER AND RELATIVE COST OF LABOUR TO OTHER INPUTS, AVERAGE COMMERCIAL BANKS, 1983-2003.

Year	Nominal Cost					Weighed Average (1)	Labour cost per worker* (2)	Relative cost (2)/(1)**
	Physical	Advertising	IT	Training				
1983	0.26	0.47	0.59	0.32	0.28	0.28	14	1.00
1984	0.30	0.52	0.59	0.40	0.32	0.32	15	0.96
1985	0.31	0.61	0.58	0.36	0.34	0.34	17	1.04
1986	0.31	0.64	0.56	0.40	0.35	0.35	20	1.19
1987	0.35	0.72	0.56	0.52	0.39	0.39	23	1.23
1988	0.33	0.74	0.55	0.50	0.37	0.37	25	1.40
1989	0.43	0.81	0.56	0.55	0.46	0.46	27	1.23
1990	0.46	0.85	0.57	0.58	0.49	0.49	30	1.26
1991	0.55	0.92	0.56	0.60	0.57	0.57	31	1.13
1992	0.59	0.99	0.55	0.61	0.60	0.60	34	1.17
1993	0.59	1.10	0.55	0.66	0.60	0.60	36	1.23
1994	0.51	1.13	0.52	0.66	0.53	0.53	37	1.45
1995	0.51	1.16	0.52	0.78	0.54	0.54	38	1.48
1996	0.56	1.21	0.51	0.82	0.58	0.58	39	1.40
1997	0.50	1.21	0.49	0.84	0.54	0.54	41	1.58
1998	0.53	1.21	0.48	0.86	0.56	0.56	43	1.62
1999	0.46	1.23	0.47	0.87	0.51	0.51	46	1.90
2000	0.32	1.26	0.46	0.89	0.42	0.42	46	2.27
2001	0.61	1.31	0.48	0.97	0.64	0.64	49	1.60
2002	0.62	1.33	0.46	0.93	0.66	0.66	51	1.60
2003	0.62	1.40	0.46	0.99	0.67	0.67	50	1.54
<i>Average cumulative growth</i>								
1983-1989	8.53%	9.19%	-0.72%	9.19%	8.10%	11.50%	3.40%	
1989-1994	3.37%	6.64%	-1.56%	3.51%	2.86%	6.19%	3.33%	
1994-1999	-1.82%	1.69%	-2.15%	5.59%	-0.84%	4.54%	5.38%	
1999-2003	7.41%	3.25%	-0.57%	3.19%	7.06%	1.81%	-5.25%	

* Thousands of current euros.

** Relative unit costs normalized to 1 in 1983.

TABLE 14. NOMINAL UNIT COST OF OPERATING ASSETS, LABOUR COST PER WORKER AND RELATIVE COST OF LABOUR TO OTHER INPUTS, AVERAGE SAVINGS BANKS, 1983-2003.

Year	Nominal Cost					Weighed Average (1)	Labour cost per worker* (2)	Relative cost (2)/(1)**
	Physical	Advertising	IT	Training				
1983	0.27	0.48	0.60	0.33	0.33	0.33	15	1.00
1984	0.31	0.53	0.60	0.41	0.37	0.37	17	1.01
1985	0.33	0.63	0.59	0.38	0.40	0.40	18	1.03
1986	0.32	0.64	0.57	0.41	0.40	0.40	25	1.40
1987	0.36	0.72	0.56	0.52	0.44	0.44	27	1.41
1988	0.35	0.75	0.56	0.50	0.43	0.43	30	1.58
1989	0.44	0.82	0.57	0.56	0.51	0.51	32	1.44
1990	0.47	0.85	0.57	0.58	0.52	0.52	32	1.39
1991	0.55	0.92	0.56	0.60	0.59	0.59	33	1.27
1992	0.60	0.99	0.55	0.61	0.62	0.62	33	1.19
1993	0.59	1.10	0.55	0.66	0.63	0.63	35	1.27
1994	0.54	1.14	0.53	0.68	0.59	0.59	37	1.44
1995	0.53	1.17	0.52	0.79	0.58	0.58	39	1.51
1996	0.58	1.22	0.51	0.83	0.62	0.62	40	1.47
1997	0.52	1.22	0.49	0.85	0.57	0.57	41	1.61
1998	0.54	1.22	0.48	0.87	0.59	0.59	42	1.60
1999	0.46	1.23	0.47	0.88	0.53	0.53	42	1.80
2000	0.32	1.26	0.46	0.89	0.42	0.42	44	2.34
2001	0.58	1.30	0.47	0.95	0.62	0.62	46	1.65
2002	0.62	1.33	0.46	0.93	0.65	0.65	48	1.68
2003	0.64	1.40	0.46	1.00	0.67	0.67	50	1.68

Average cumulative growth

1983-1989	8.50%	9.04%	-0.82%	8.96%	7.12%	13.23%	6.11%
1989-1994	3.72%	6.72%	-1.47%	3.74%	2.91%	2.85%	-0.06%
1994-1999	-2.98%	1.41%	-2.41%	5.11%	-2.15%	2.34%	4.49%
1999-2003	8.09%	3.33%	-0.49%	3.32%	6.01%	4.32%	-1.68%

* Thousands of current euros.

** Relative unit costs normalized to 1 in 1983.

TABLE 15. FLOW OF INPUT SERVICES, ALL BANKS, 1983-2003. (Thousands of CURRENT euros).

Year	Non-Human Capital				Human Capital		Free Equity
	Physical	Advertising	IT	Total	Training	Labour Cost	
1983	1664703	157195	379779	2201677		3115257	252431
1984	1831468	179950	458204	2469622		3524618	417596
1985	1740344	213323	600067	2553734		3980917	667382
1986	1653796	226374	649523	2529693		5077594	847785
1987	1685868	266244	769669	2721781		5489228	1405043
1988	1866871	285550	878680	3031101		6218930	1536322
1989	2380769	346089	1100397	3827255		6826345	1699218
1990	2820471	425377	1289259	4535107		7431275	1992687
1991	3930721	490417	1426319	5847457		7578979	1965486
1992	4503118	522812	1494801	6520731	64515	7612564	2149683
1993	4735865	593115	1495989	6824969	80804	7976678	2677031
1994	4309544	617491	1423961	6350996	93084	8242428	2435191
1995	4303359	637557	1431988	6372904	111950	8486529	2772966
1996	5094479	680083	1469864	7244426	124577	8805011	3005943
1997	4457550	699027	1564695	6721272	139519	9169548	3251919
1998	4388116	696668	1742845	6827629	151970	9580591	3330615
1999	3711643	694420	1899435	6305498	160359	9878842	2914284
2000	2465004	701454	1970929	5137387	172440	10305388	3487677
2001	3686591	713851	2101093	6501535	190910	10838256	4310218
2002	3376840	696088	2093489	6166417	191651	11106983	4544640
2003	3077739	702037	2065575	5845351	208349	11326508	4511414

Average cumulative growth

1983-1989	5.96%	13.15%	17.73%	9.22%		13.07%	31.78%
1989-1994	11.87%	11.58%	5.16%	10.13%		3.77%	7.20%
1994-1999	-2.99%	2.35%	5.76%	-0.14%	10.88%	3.62%	3.59%
1999-2003	-4.68%	0.27%	2.10%	-1.89%	6.54%	3.42%	10.92%

TABLE 16. FLOW OF INPUT SERVICES, COMMERCIAL BANKS, 1983-2003. (Thousands of CURRENT euros).

Year	Non-Human Capital				Human Capital		Free Equity
	Physical	Advertising	IT	Total	Training	Labour Cost	
1983	1189863	62267	221870	1474000		2128393	202293
1984	1287570	70263	251419	1609252		2360594	344841
1985	1190242	82350	318480	1591072		2642954	542009
1986	1115098	92220	345727	1553045		3144284	646731
1987	1108695	109509	400899	1619103		3406490	1084602
1988	1255677	111194	440982	1807853		3829841	1131720
1989	1605458	138054	553360	2296872		4169509	1251798
1990	1793463	191199	665073	2649735		4566183	1601371
1991	2674311	234538	781181	3690030		4715041	1509152
1992	3052628	252388	844336	4149352	32824	4858222	1595166
1993	3216965	291916	869581	4378462	42321	4989086	1935740
1994	2880297	304262	818587	4003146	48247	4985874	1657397
1995	2839943	315224	804497	3959664	57551	5081738	1868450
1996	3252687	339311	793252	4385250	62261	5196791	1932244
1997	2744795	351793	849471	3946059	70199	5357944	2049678
1998	2580407	338211	954961	3873579	75821	5523471	2080983
1999	2166778	331134	1062334	3560246	78010	5581300	1682141
2000	1305049	324849	1105953	2735851	79561	5669658	2242173
2001	1902495	322903	1148273	3373671	85261	5822154	2756903
2002	1653239	306897	1130631	3090767	85586	5657418	2823408
2003	1453949	299857	1096934	2850740	92892	5575809	2708612

Average cumulative growth

1983-1989	4.99%	13.27%	15.23%	7.39%		11.21%	30.38%
1989-1994	11.69%	15.80%	7.83%	11.11%		3.58%	5.61%
1994-1999	-5.69%	1.69%	5.21%	-2.35%	9.61%	2.26%	0.30%
1999-2003	-9.97%	-2.48%	0.80%	-5.56%	4.37%	-0.02%	11.91%

TABLE 17. FLOW OF INPUT SERVICES, SAVINGS BANKS, 1983-2003. (Thousands of CURRENT euros).

Year	Non-Human Capital				Human Capital		Free Equity
	Physical	Advertising	IT	Total	Training	Labour Cost	
1983	474840	94928	157910	727678		986864	50138
1984	543899	109687	206785	860371		1164024	72756
1985	550103	130973	281587	962663		1337963	125373
1986	538698	134154	303797	976649		1933310	201053
1987	577173	156735	368770	1102678		2082738	320441
1988	611194	174356	437698	1223248		2389089	404602
1989	775310	208035	547037	1530382		2656836	447420
1990	1027008	234179	624187	1885374		2865092	391317
1991	1256410	255880	645138	2157428		2863938	456334
1992	1450490	270424	650466	2371380	31691	2754342	554516
1993	1518900	301200	626408	2446508	38483	2987592	741290
1994	1429247	313230	605374	2347851	44837	3256554	777794
1995	1463417	322333	627491	2413241	54400	3404791	904516
1996	1841792	340772	676612	2859176	62315	3608220	1073699
1997	1712755	347234	715224	2775213	69320	3811604	1202241
1998	1807709	358457	787884	2954050	76149	4057120	1249632
1999	1544864	363285	837101	2745250	82350	4297542	1232143
2000	1159955	376605	864976	2401536	92880	4635730	1245504
2001	1784096	390948	952820	3127864	105649	5016102	1553315
2002	1723601	389191	962859	3075651	106065	5449565	1721233
2003	1623790	402181	968641	2994612	115457	5750699	1802802

Average cumulative growth

1983-1989	8.17%	13.08%	20.71%	12.39%		16.51%	36.48%
1989-1994	12.23%	8.18%	2.03%	8.56%		4.07%	11.06%
1994-1999	1.56%	2.96%	6.48%	3.13%	12.16%	5.55%	9.20%
1999-2003	1.25%	2.54%	3.65%	2.17%	8.45%	7.28%	9.51%

TABLE 18. INTERNAL, EXTERNAL AND TOTAL SERVICE COST, ALL BANKS, 1983-2003.
Thousands of CURRENT euros

Year	INTERNAL	EXTERNAL		TOTAL
		Outsourced	Total	
1983	5569365		691933	6261298
1984	6411836		792306	7204142
1985	7202033		888187	8090220
1986	8455072		1003257	9458329
1987	9616052		1156044	10772096
1988	10786353		1323631	12109984
1989	12352818		1455758	13808576
1990	13959069		1709167	15668236
1991	15391922		1975149	17367071
1992	16282978		1957613	18240591
1993	17478678		2117025	19595703
1994	17028615		2063733	19092348
1995	17632399		2092222	19724621
1996	19055380		2142861	21198241
1997	19142739		2213065	21355804
1998	19738835		2297888	22036723
1999	19098624	245179	2353384	21452008
2000	18930452	358724	2570597	21501049
2001	21650009	430519	2712530	24362539
2002	21818040	428124	2790620	24608660
2003	21683273	441892	2795909	24479182
<i>Average cumulative growth</i>				
1983-1989	13.28%		12.40%	13.18%
1989-1994	6.42%		6.98%	6.48%
1994-1999	2.29%		2.63%	2.33%
1999-2003	3.17%	14.73%	4.31%	3.30%

TABLE 19. INTERNAL, EXTERNAL AND TOTAL SERVICE COST, COMMERCIAL BANKS, 1983-2003.
Thousands of CURRENT euros

Year	INTERNAL	EXTERNAL		TOTAL
		Outsourced	Total	
1983	3804686		487687	4292373
1984	4314687		550361	4865048
1985	4776035		610229	5386264
1986	5344060		682647	6026707
1987	6110195		782588	6892783
1988	6769414		904362	7673776
1989	7718179		943884	8662063
1990	8817289		1102571	9919860
1991	9914223		1288544	11202767
1992	10602740		1233233	11835973
1993	11303288		1331008	12634296
1994	10646417		1284714	11931131
1995	10909852		1267911	12177763
1996	11514285		1249299	12763584
1997	11353681		1253912	12607593
1998	11478033		1254395	12732428
1999	10823687	131696	1250521	12074208
2000	10647682	242614	1411250	12058932
2001	11952728	304702	1478783	13431511
2002	11571593	286101	1477967	13049560
2003	11135161	289779	1438021	12573182
<i>Average cumulative growth</i>				
1983-1989	11.79%		11.01%	11.70%
1989-1994	6.43%		6.17%	6.40%
1994-1999	0.33%		-0.54%	0.24%
1999-2003	0.71%	19.72%	3.49%	1.01%

TABLE 20. INTERNAL, EXTERNAL AND TOTAL SERVICE COST, SAVINGS BANKS, 1983-2003.
Thousands of CURRENT euros

Year	INTERNAL	EXTERNAL		TOTAL
		Outsourced	Total	
1983	1764680		204247	1968927
1984	2097151		241945	2339096
1985	2425999		277958	2703957
1986	3111012		320610	3431622
1987	3505857		373457	3879314
1988	4016939		419269	4436208
1989	4634638		511875	5146513
1990	5141783		606596	5748379
1991	5477700		686605	6164305
1992	5680238		724381	6404619
1993	6175390		786017	6961407
1994	6382199		779020	7161219
1995	6722548		824311	7546859
1996	7541095		893562	8434657
1997	7789058		959153	8748211
1998	8260802		1043493	9304295
1999	8274935	113483	1102863	9377798
2000	8282770	116110	1159347	9442117
2001	9697281	125818	1233749	10931030
2002	10246449	142023	1312654	11559103
2003	10548113	152113	1357888	11906001
<i>Average cumulative growth</i>				
1983-1989	16.09%		15.31%	16.01%
1989-1994	6.40%		8.40%	6.61%
1994-1999	5.19%		6.95%	5.39%
1999-2003	6.07%	7.32%	5.20%	5.97%

TABLE 21. COMPARISON OF ECONOMIC AND BOOK VALUE OF PHYSICAL CAPITAL. THOUSANDS OF CURRENT EUROS.

Year	ALL BANKS				COMMERCIAL BANKS				SAVINGS BANKS			
	Num Obsv.	Replacement Value	Book Value	Replacement / Book (%)	Num Obsv.	Replacement Value	Book Value	Replacement / Book (%)	Num Obsv.	Replacement Value	Book Value	Replacement / Book (%)
1983	162	7071095	7071095	100	87	5334307	5334307	100	75	1736788	1736788	100
1984	163	7431460	7267467	102	88	5520483	5393810	102	75	1910977	1873657	102
1985	165	7417290	7079897	105	89	5433444	5173348	105	76	1983846	1906549	104
1986	165	7522446	7007454	107	89	5415764	5022206	108	76	2106681	1985248	106
1987	163	7581852	6925637	109	87	5377877	4880209	110	76	2203976	2045428	108
1988	161	10397828	9420647	110	85	7519166	6823272	110	76	2878662	2597374	111
1989	161	11944164	10473763	114	86	8604890	7520279	114	75	3339274	2953484	113
1990	152	14350646	12499342	115	89	9342884	7881220	119	63	5007762	4618122	108
1991	147	20283200	17732406	114	92	14396871	12399781	116	55	5886329	5332625	110
1992	144	21535943	18961093	114	92	15244472	13318844	114	52	6291471	5642250	112
1993	142	22548673	19449407	116	92	15864112	13542049	117	50	6684561	5907358	113
1994	138	23557996	19936608	118	88	16523258	13811669	120	50	7034738	6124939	115
1995	139	24366749	20281540	120	90	16859001	13837172	122	49	7507748	6444368	117
1996	134	26944771	22713173	119	85	18126892	15026331	121	49	8817878	7686841	115
1997	132	26329654	21969785	120	83	17081294	13973428	122	49	9248360	7996357	116
1998	126	25488014	21463972	119	77	15852093	13104011	121	49	9635921	8359961	115
1999	122	25955667	22013417	118	74	15898872	13365006	119	48	10056795	8648411	116
2000	114	25025376	21251495	118	68	14076817	12230027	115	46	10948559	9021468	121
2001	110	24584634	20466215	120	65	12993827	11070019	117	45	11590806	9396196	123
2002	105	24226327	19681927	123	60	12205781	10079016	121	45	12020547	9602911	125
2003	100	24562545	19405645	127	55	12045558	9567162	126	45	12516986	9838483	127

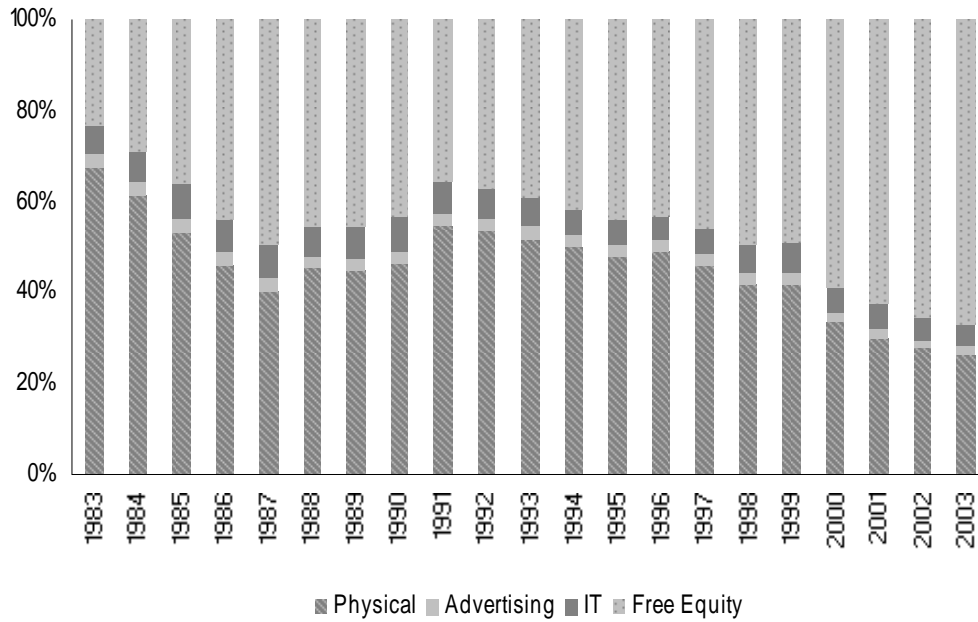
TABLE 22. Operating Margin and Efficiency measures, 1983-2003. (Thousands of CURRENT euros)

Year	All Banks			Commercial Banks			Savings Banks			All Cost/Assets (replacement cost) (%)	
	Operating margin	Efficiency Ratio (%)	All Cost/Assets (replacement cost) (%)	Operating margin	Market share (%)	Efficiency Ratio (%)	All Cost/Assets (replacement cost) (%)	Operating margin	Market share (%)		Efficiency Ratio (%)
1983	7746934	80.82	3.78	5385941	69.52	79.70	3.62	2360993	30.48	83.39	4.20
1984	8831197	81.58	3.60	6069886	68.73	80.15	3.40	2761311	31.27	84.71	4.10
1985	9595950	84.31	3.65	6533797	68.09	82.44	3.47	3062153	31.91	88.30	4.09
1986	10833640	87.31	3.92	7315846	67.53	82.38	3.62	3517794	32.47	97.55	4.59
1987	12451764	86.51	4.06	8266704	66.39	83.38	3.77	4185060	33.61	92.69	4.70
1988	13853574	87.41	3.97	9414815	67.96	81.51	3.74	4438759	32.04	99.94	4.44
1989	15339495	90.02	3.83	10358813	67.53	83.62	3.66	4980682	32.47	103.33	4.15
1990	17027523	92.02	3.90	11441812	67.20	86.70	3.80	5585711	32.80	102.91	4.11
1991	18674622	93.00	3.83	12336518	66.06	90.81	3.78	6338104	33.94	97.26	3.94
1992	20103591	90.73	3.64	12787050	63.61	92.56	3.68	7316541	36.39	87.54	3.56
1993	22324011	87.78	3.33	14072106	63.04	89.78	3.23	8251905	36.96	84.36	3.52
1994	20911321	91.30	3.12	12291254	58.78	97.07	3.03	8620067	41.22	83.08	3.27
1995	21757745	90.66	2.95	12676141	58.26	96.07	2.83	9081604	41.74	83.10	3.17
1996	23249855	91.18	2.97	13285142	57.14	96.07	2.82	9964713	42.86	84.65	3.22
1997	24293905	87.91	2.79	13754625	56.62	91.66	2.60	10539280	43.38	83.01	3.11
1998	25698370	85.75	2.61	14636443	56.95	86.99	2.42	11061927	43.05	84.11	2.94
1999	26089897	82.22	2.33	14519389	55.65	83.16	2.14	11570508	44.35	81.05	2.63
2000	28729956	74.84	2.10	16238439	56.52	74.26	1.97	12491517	43.48	75.59	2.30
2001	33757160	72.17	2.19	19725279	58.43	68.09	2.04	14031881	41.57	77.90	2.39
2002	33724288	72.97	2.07	18934169	56.14	68.92	1.91	14790119	43.86	78.15	2.28
2003	34240307	71.49	1.83	18209352	53.18	69.05	1.64	16030955	46.82	74.27	2.11
<i>Average cumulative growth</i>											
1983-1989	11.39%	1.80%	0.20%	10.90%	-0.48%	0.80%	0.17%	12.44%	1.06%	3.57%	-0.16%
1989-1994	6.20%	0.28%	-4.10%	3.42%	-2.78%	2.98%	-3.75%	10.97%	4.77%	-4.36%	-4.76%
1994-1999	4.43%	-2.09%	-5.85%	3.33%	-1.09%	-3.09%	-7.01%	5.89%	1.46%	-0.49%	-4.36%
1999-2003	6.80%	-3.50%	-5.96%	5.66%	-1.14%	-4.65%	-6.68%	8.15%	1.36%	-2.18%	-5.59%

*Includes labour costs, non-labour costs and external services.

Figure 1: Composition of the total capital stock in the Spanish Financial System, 1983-2003.
Current euros

Total sample of banks



Commercial banks



Savings banks

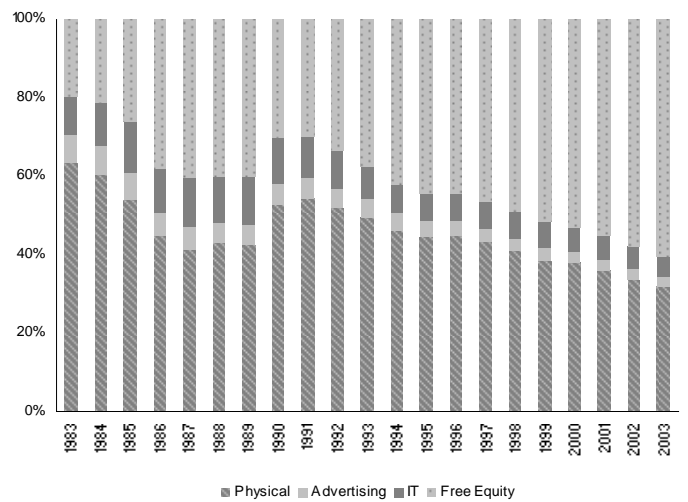
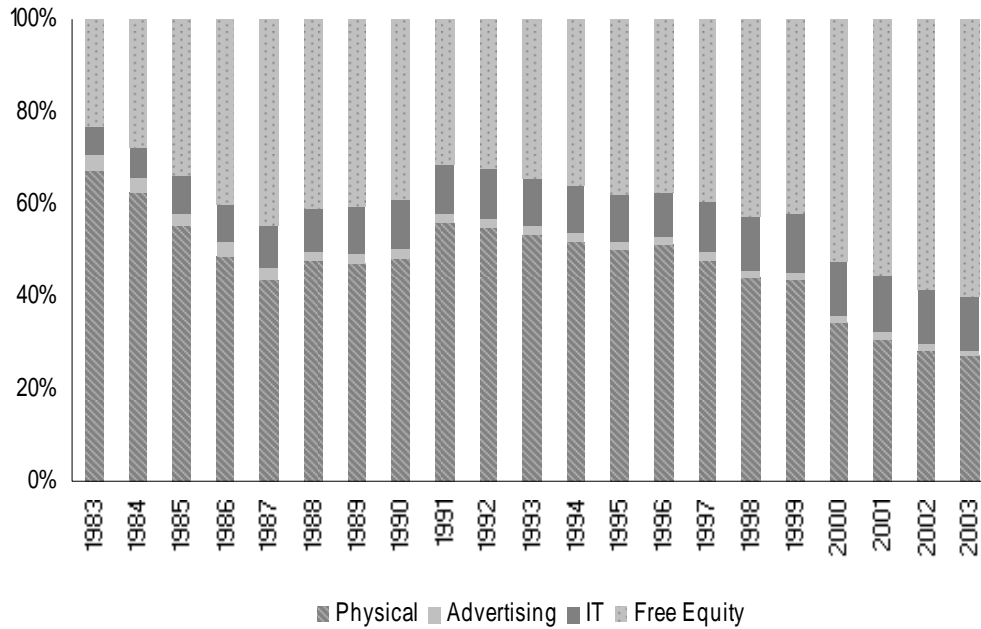
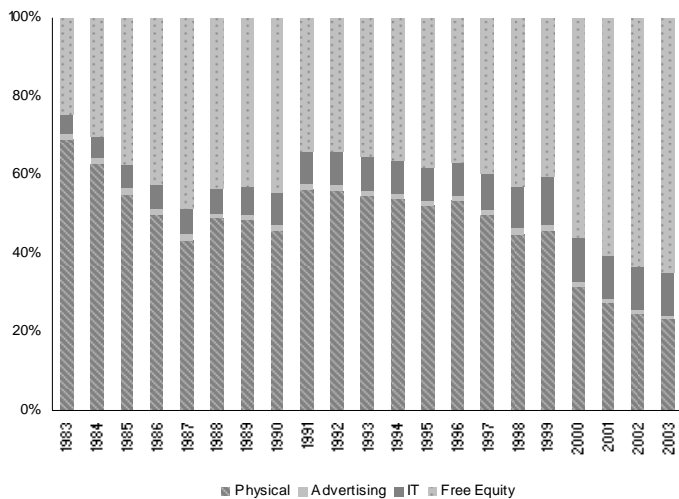


Figure 2: Composition of the total capital stock in the Spanish Financial System, 1983-2003.
Constant euros of 1983

Total sample of banks



Commercial banks



Savings banks

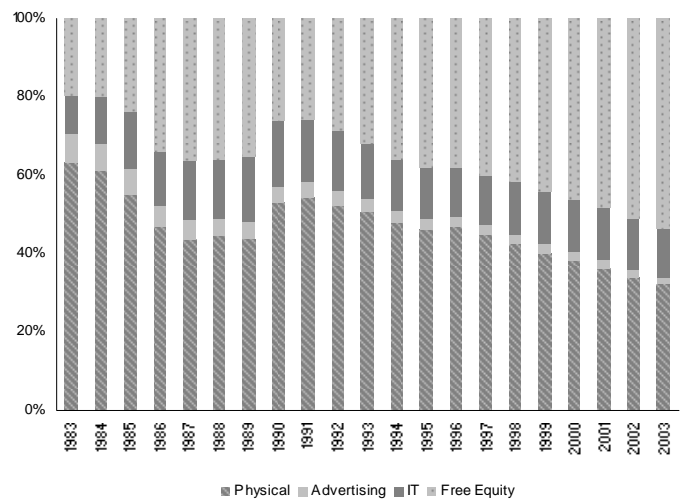
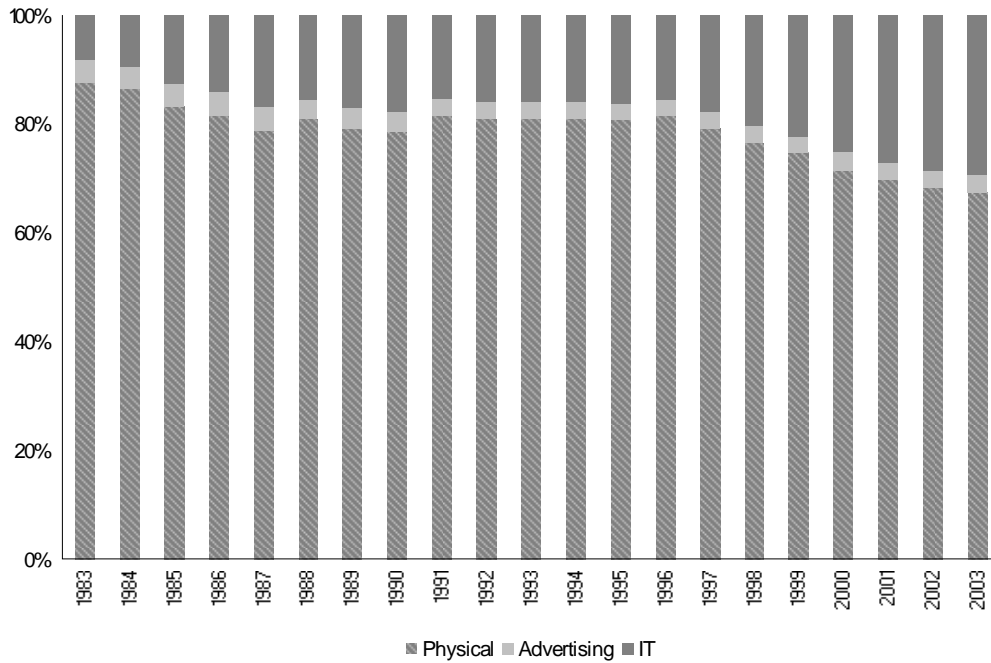


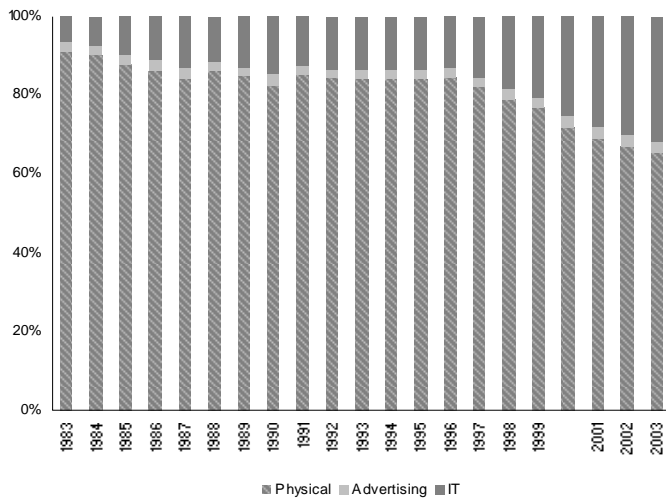
Figure 3: Capital stock per worker, 1983-2003.
Thousands of constant euros of 1983

- Total capital stock per worker in the Spanish Financial System

Total sample of banks



Commercial banks



Savings banks

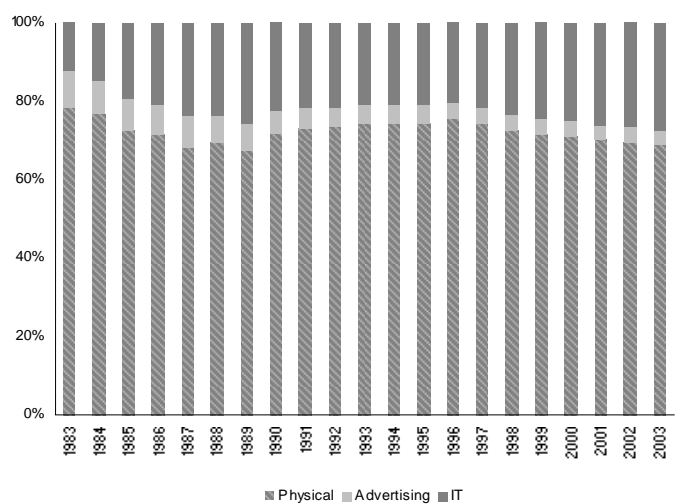
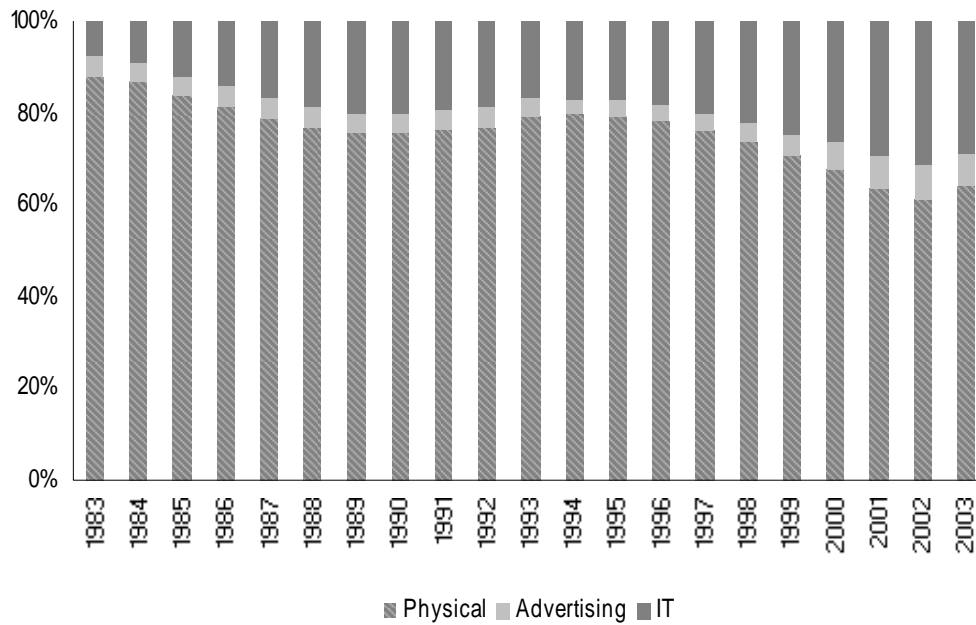


Figure 3: Capital stock per worker, 1983-2003.

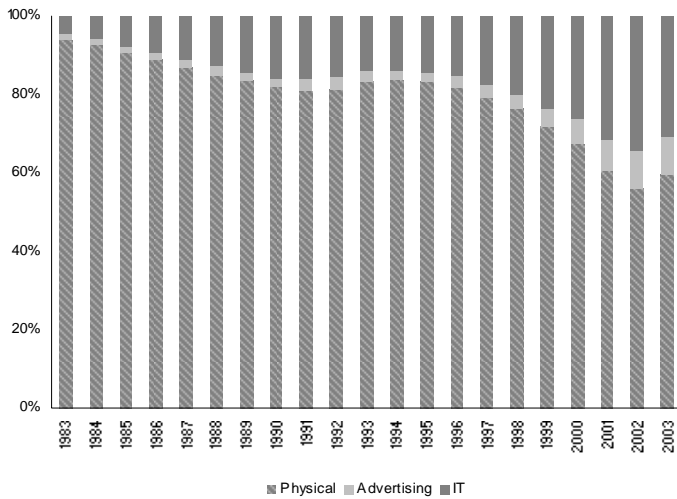
Thousands of constant euros of 1983 (cont'd)

- Average capital stock per worker across banks

Total sample of banks



Commercial banks



Savings banks

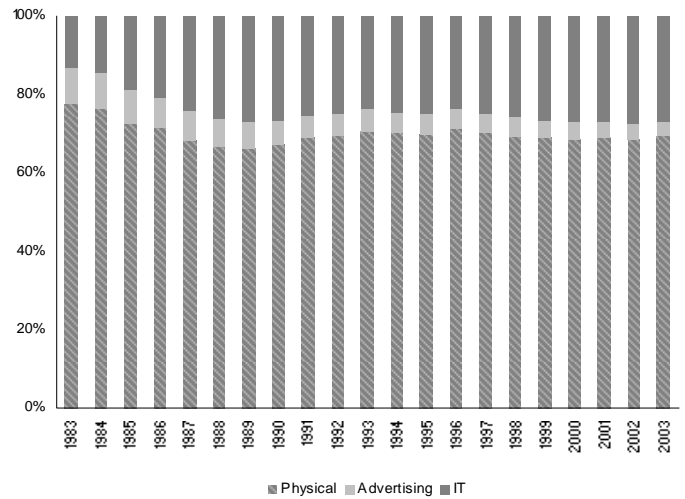
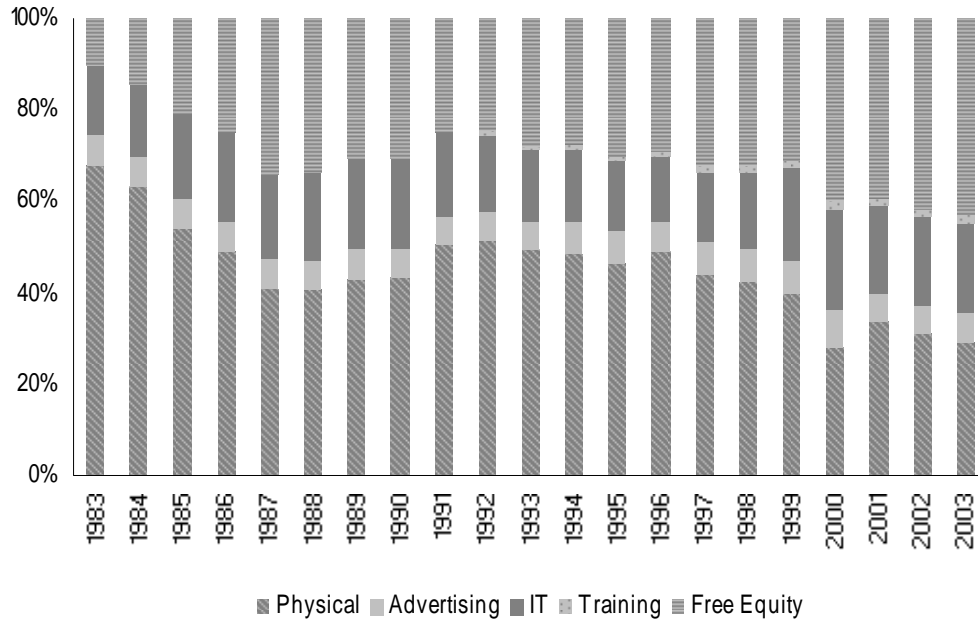
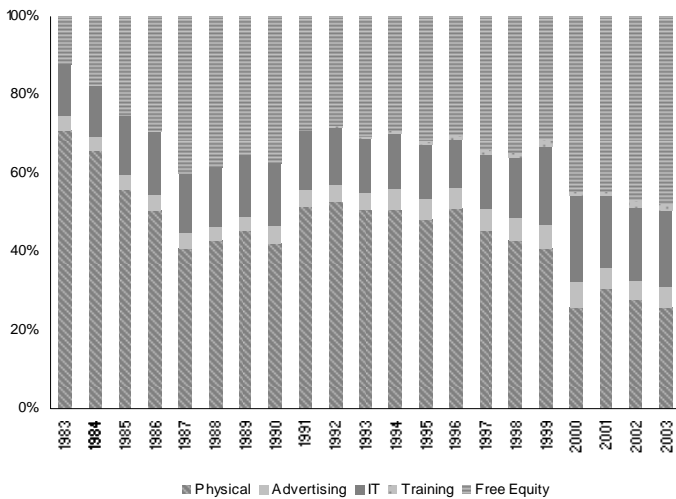


Figure 4: Flows of capital services in the Spanish Financial System, 1983-2003.
Current euros.

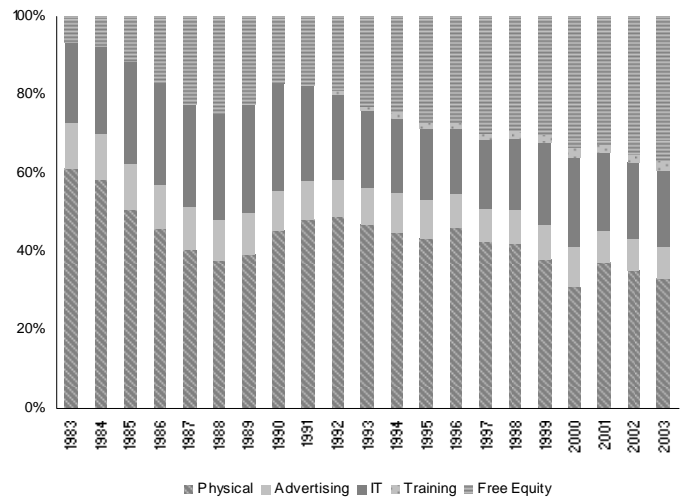
Total sample of banks



Commercial banks



Savings banks



APPENDIX

TABLE A: COVERAGE OF THE SAMPLE WITHIN THE POPULATION

	Commercial Banks						Savings Banks					
	Number of Workers			Number of Branches			Number of Workers			Number of Branches		
	Sample	Total	Proportion	Sample	Total	Proportion	Sample	Total	Proportion	Sample	Total	Proportion
1983	158583	170512	93.00%	15063	16197	93.00%	65674	67085	97.90%	9857	10069	97.90%
1984	160266	164330	97.53%	15854	16547	95.81%	68177	69438	98.18%	10192	10445	97.58%
1985	155700	161621	96.34%	16082	16741	96.06%	70225	71042	98.85%	10591	10802	98.05%
1986	150637	157805	95.46%	15928	16657	95.62%	67177	72707	92.39%	10556	11066	95.39%
1987	148617	155334	95.68%	15939	16642	95.78%	69378	74530	93.09%	11535	11760	98.09%
1988	148637	154696	96.08%	16062	16843	95.36%	72848	78023	93.37%	11937	12260	97.37%
1989	149549	155658	96.08%	16327	16827	97.03%	77553	83026	93.41%	12834	13176	97.41%
1990	150243	157010	95.69%	16255	17075	95.20%	79785	84609	94.30%	13144	13650	96.30%
1991	155601	161987	96.06%	17151	18019	95.18%	79230	83359	95.05%	13822	14039	95.05%
1992	153521	159281	96.38%	17670	18254	96.80%	82007	82900	98.92%	14134	14298	98.85%
1993	147445	152845	96.47%	17004	17836	95.34%	81839	82710	98.95%	14211	14493	98.05%
1994	144816	151174	95.79%	17098	17712	96.53%	82904	83758	98.98%	14581	14888	97.94%
1995	143926	148946	96.63%	17593	17987	97.81%	83393	84336	98.88%	14994	15222	98.50%
1996	137187	142827	96.05%	17365	17812	97.49%	86504	87370	99.01%	15865	16103	98.52%
1997	133688	139198	96.04%	17374	17646	98.46%	89277	90153	99.03%	16631	16645	99.92%
1998	130613	135164	96.63%	17318	17544	98.71%	92932	93812	99.06%	17579	17594	99.91%
1999	123322	127889	96.43%	16713	16997	98.33%	96387	97276	99.09%	18341	18349	99.96%
2000	117799	122374	96.26%	15643	15873	98.55%	100789	101718	99.09%	19270	19285	99.92%
2001	113804	118722	95.86%	14569	14817	98.33%	104747	105593	99.20%	19830	19848	99.91%
2002	108911	114040	95.50%	13836	14128	97.93%	106909	107745	99.22%	20332	20349	99.92%
2003	105029	111793	93.95%	13777	14116	97.60%	109269	110243	99.12%	20877	20895	99.91%

NOTE: Data of the bank population come from the "Boletín Estadístico" published by the Bank of Spain.

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