Productivity and Cost-Efficiency in the Financial Sector

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INTRODUCTION AND SUMMARY

From a macro-economic point of view, an efficient financial sector is essential. Part 2 of this Monetary Review provides an analysis of productivity and cost-efficiency in the Danish financial sector, cf. Abildgren et al. (2013). This overview article presents a non-technical summary of the most important findings and conclusions of the analysis.

From 1948 to 1980, labour productivity in the financial sector, measured by the ratio of domestic lending or financial assets to employment, was roughly unchanged, while substantial productivity advances have been achieved since 1980. However, in recent years banks' (excl. mortgage banks) domestic lending relative to employment has fallen.

Compared with the rest of the EU, Denmark is among the member states with the highest total assets or domestic lending per employee in the credit institution sector. This should, however, be viewed in the context of the large Danish mortgage banking sector. In terms of the cost-to-income ratio, Danish credit institutions are in the middle of the range.

For a number of years, the average labour earnings level in the Danish financial sector has been higher than in other segments of the economy. Most of the additional labour earnings in the financial sector reflect the educational composition of employees, the complexity of job functions, geography, etc. Other factors may also provide for the relatively high earnings in the financial sector, for instance high productivity or high earnings capacity due to efficient utilisation of highly educated, specialised labour. Conversely, the ownership structure of the financial sector or the absence of strong potential foreign competition in financial services could dampen the pressure for efficient cost control and equalisation of additional earnings over time.

Comparisons with foreign studies indicate that estimated earnings differentials between the financial sector and other industries in Denmark are roughly in line with those abroad.

Since 1988, the Danish financial sector has been subject to a special payroll tax, currently accounting for 10.9 per cent of the payroll. Other things being equal, such payroll tax should contribute to relatively lower earnings in the financial sector than in other industries. Viewed in isolation, payroll tax provides an incentive for the financial sector to replace labour by, for instance, capital (e.g. through automation of labour-intensive processes).

The productivity and cost-efficiency of individual banks can be compared based on key accounting figures for input (e.g. staff costs and administrative expenses) and output (e.g. total lending). An analysis shows that some Danish banks are fully able to match the efficiency of the most efficient foreign banks. However, in terms of efficiency, some Danish banks – primarily in the Danish Financial Supervisory Authority's groups 3 and 4 – are some distance away from the most efficient Danish banks. The consolidation in the Danish banking sector in recent years has helped to improve its average efficiency.

FINANCIAL SECTOR LABOUR PRODUCTIVITY

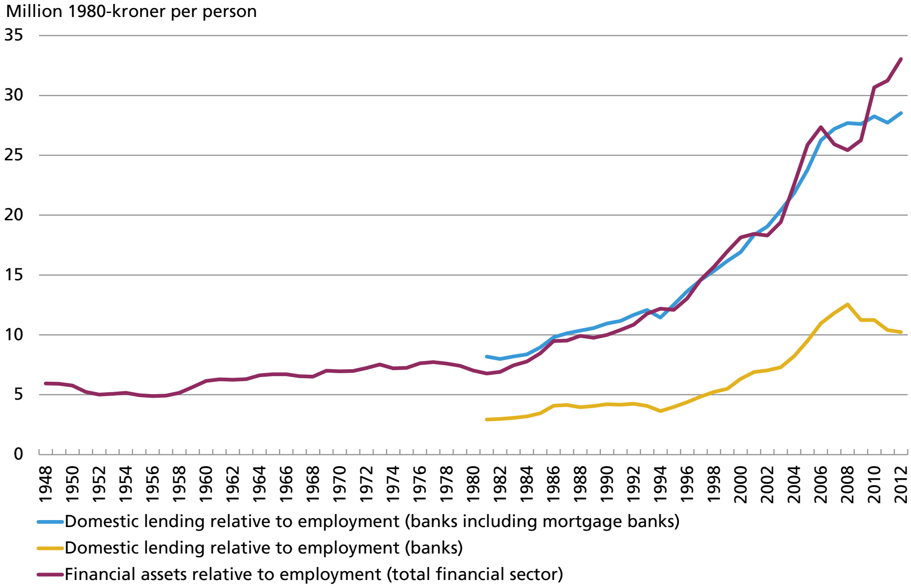
An initial, rough indicator of developments in labour productivity in the financial sector can be obtained by looking at domestic lending (or financial assets) adjusted for general price developments relative to employment, cf. Chart 1. Calculated in this way, labour productivity was more or less unchanged from 1948 to 1980, while annual growth rates have averaged some 4-5 per cent since 1980.

The post-1980 period has been characterised by increased market orientation in the financial sector following liberalisation and internationalisation. Conversely, in the pre-1980 period, quantitative credit restrictions, such as lending limits for banks and mortgage banks, foreign-exchange control, etc., were key economic policy instruments.

Lifting of restrictions on cross-border capital flows and deregulation of the financial sector in Denmark during the 1980s provided considerable welfare gains. These gains were the result of lower prices and a larger range of financial products due to increased competition and higher labour productivity in the financial sector. Moreover, the lifting of restrictions gave households and firms better opportunities for planning savings, consumption and investment.

DOMESTIC LENDING AND FINANCIAL ASSETS RELATIVE TO FINANCIAL SECTOR EMPLOYMENT

Chart 1



Note.: Deflated by the consumer price index. Financial assets comprise lending by banks (including mortgage banks), members' assets in investment associations and financial assets of insurance and pension companies.
Source: Abildgren et al. (2013).

In recent years, the ratios of domestic lending to employment for banks (including mortgage banks) have been stagnant or shown a weak trend compared with previously. This reflects that the ratio of domestic lending to employment has actually fallen in case of banks (excluding mortgage banks).

It should be noted, however, that simple measures such as financial assets or lending per employee are very summary in nature and highly incomplete indicators of productivity. For instance, under outputs, the "quality" involved is not taken into account. As a case in point, it may be debated whether lending of different credit quality should be given the same weight. For example, if the banking sector goes through a period of strong growth with lending of increasingly poor credit quality, causing systemic risks to build up in the financial sector, the lending volume per employee is not the most appropriate indicator of the efficiency of the banking system. Furthermore, these indicators are very summary in nature, based on financial sector total assets (statement holdings), which do not include e.g. the volume of financial transactions (number of payment transfers, number of securities transactions, etc.) or securities trading advice, etc.

DANISH BANKS VERSUS FOREIGN BANKS

Table 1 shows a number of summary indicators of productivity and cost-efficiency in the Danish credit institution sector compared with credit institutions in other EU 15 member states.

Disregarding countries known as international financial centres (Luxembourg and Ireland), Denmark is among the group of countries with the highest total assets per employee in the credit institution sector. The same applies to domestic lending per employee. However, the high Danish levels of total assets and domestic lending per employee should be seen in the context of high domestic savings in pension funds and a well-developed mortgage system with good opportunities for mortgage equity withdrawal.

Denmark is among the group of countries with the largest number of inhabitants per ATM. Other things being equal, a large number of inhabitants per ATM indicates less use of cash, which is cost-intensive for

INDICATORS OF CREDIT INSTITUTION PRODUCTIVITY AND COST-EFFICIENCY IN SELECTED COUNTRIES

Table 1

	Total assets per employee	Domestic lending per employee	Domestic deposits per employee	Payment transactions per employee	Cost-to-income ratio	No. of inhabitants per local branch	No. of inhabitants per ATMs
No.	Million euro	Million euro	Million euro	No. of transactions	Per cent	Persons	Persons
1.	IE: 35.4	**DK: 11.4**	NL: 8.2	FI: 107,856	ES: 48	NL: 6,784	SE: 2,773
2.	LU: 32.7	SE: 10.9	BE: 7.4	SE: 64,121	FI: 52	GB: 5,418	FI: 2,444
3.	FI: 26.5	NL: 10.1	ES: 6.5	NL: 56,589	LU: 53	SE: 5,049	NL: 2,210
4.	**DK: 25.8**	FI: 8.7	LU: 6.5	LU: 43,763	SE: 56	IE: 4,307	**DK: 2,057**
5.	NL: 24.1	IE: 7.2	GB: 6.3	FR: 43,390	PT: 58	**DK: 3,967**	IE: 1,498
6.	SE: 23.2	ES: 6.9	IE: 6.1	BE: 41,885	GR: 61	FI: 3,847	GR: 1,357
7.	GB: 21.0	IT: 6.3	FI: 5.6	GB: 40,713	GB: 61	GR: 3,111	LU: 1,193
8.	FR: 18.5	GB: 6.3	SE: 5.2	**DK: 39,345**	**DK: 63**	BE: 2,904	IT: 1,170
9.	BE: 18.1	FR: 5.5	IT: 5.0	AT: 31,340	IT: 63	LU: 2,585	FR: 1,116
10.	ES: 15.3	BE: 4.8	DE: 4.8	PT: 30,865	AT: 68	DE: 2,258	AT: 1,011
11.	IT: 13.6	PT: 4.4	FR: 4.6	DE: 27,639	FR: 69	AT: 1,893	DE: 991
12.	AT: 12.5	DE: 4.3	AT: 3.9	ES: 24,797	BE: 73	IT: 1,826	GB: 960
13.	DE: 12.5	AT: 4.2	**DK: 3.8**	IE: 21,842	DE: 73	FR: 1,703	ES: 821
14.	PT: 9.7	GR: 4.0	PT: 3.8	IT: 13,999	NL: 89	PT: 1,685	BE: 708
15.	GR: 7.7	LU: 2.5	GR: 3.1	GR: 3,255	IE: 126	ES: 1,211	PT: 635

Note: BE = Belgium, DK = Denmark, FI = Finland, FR = France, GR = Greece, NL = Netherlands, IE = Ireland, IT = Italy, LU = Luxembourg, PT = Portugal, ES = Spain, GB = United Kingdom, SE = Sweden, DE = Germany, AT = Austria. Total assets of credit institutions have been calculated as total assets at year-end 2012 in the MFI sector, excl. central banks and certificates issued by money-market funds (held by residents in the currency area). Domestic lending and deposits have been calculated at end-June 2013 and are excl. of outstanding balances with MFIs. Payment transactions relate to transactions in 2012, involving non-MFIs. As far as Denmark is concerned, payment transactions comprise credit transfers (giro, in-payment forms and credit transfers between banks – credit transfers within the same bank are not included), direct debit (Betalingsservice and Leverandørservice), cheques and card payments (Dankort and international payment cards). The cost-to-income ratio has been calculated as an average over the years 2008-2012 and based on consolidated statistics in which foreign branches and subsidiaries are included in figures.

Source: ECB and Danmarks Nationalbank.

the banking system compared with electronic payment solutions. By international standards, consumers in Denmark and the other Nordic countries make relatively few cash payments, cf. Payments Council (2013).

In terms of the ratio of total accounting costs to income or payment transactions per employee, Denmark tends to be in the middle of the range. The same more or less applies to the number of local branches. Other things being equal, a high number of inhabitants per local branch indicates that few human resources are dedicated to customer service.

In terms of payment transactions per employee, it should be mentioned, however, that a few large banks represent a substantial portion of the Danish banking sector and that credit transfers within the same bank are not included in the Danish figures, while, in principle, they are included in the figures of other countries.

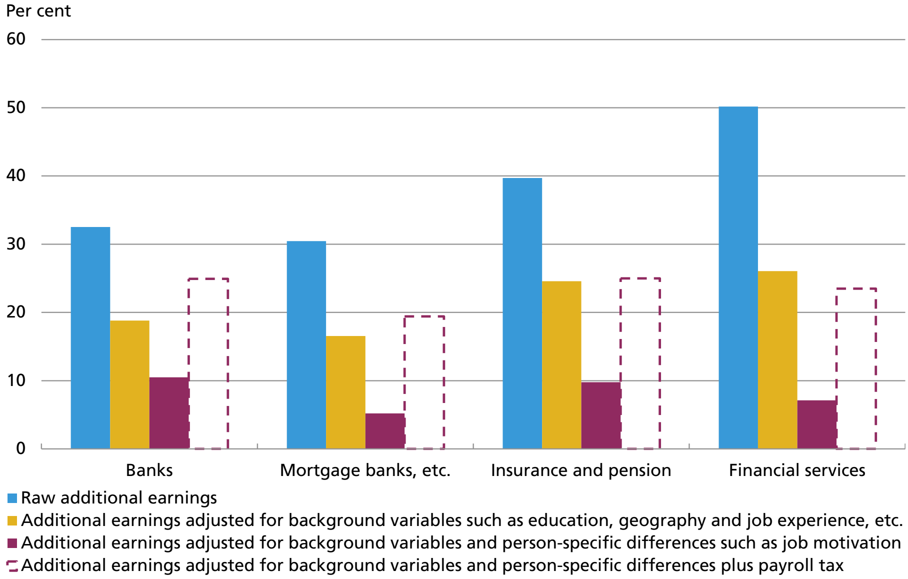
As regards the cost-to-income ratio, a high cost ratio usually provides an indication of potential savings options in a competitive market for financial services. In less competitive markets, low cost ratios are also obtainable if high prices can be charged for services that do not reflect a correspondingly high product quality, etc.

FINANCIAL SECTOR EARNINGS COSTS

Raw earnings levels show that, since the early 1980s, average earnings in the financial sector have tended to be higher than in the rest of the economy. Abildgren et al. (2013) conduct a detailed study of the earnings level in the financial sector relative to that of other industries.

This analysis shows that a substantial portion of the earnings differential can be attributed to factors such as differences in education levels, job functions, job experience and geography. For instance, a relatively high percentage of financial sector employees live in the Greater Copenhagen area, where living costs are generally higher than in the rest of the country. The analysis also indicates that part of the earnings differential is due to other person-specific differences between financial sector employees and employees in other industries, e.g. job motivation. These person-specific differences could possibly be accounted for by utilising the fact that a number of financial sector employees changed industries during the period 2000-10 – the period covered by the calculations. This provides information on whether employees who are high earners in the financial sector were also high earners working in other industries.

FINANCIAL SECTOR ADDITIONAL EARNINGS DURING THE PERIOD 2000-2010 Chart 2



Note: Estimates of raw additional earnings are derived from column 1 in Table 5.1. Additional earnings adjusted for background variables are derived from column 5 in Table 5.1, while additional earnings adjusted for background variables and unobservable differences are derived from column 2 in Table 5.2, i.e. incl. individual fixed effects. Parameter estimates, γ, have been converted to per cent as $100[exp(\gamma) - 1]$. Payroll tax has been calculated simplified based on the 2013 level, i.e. 10.9 per cent of the total payroll, shown in the chart as a percentage of earnings per hour worked for an average employee outside the financial sector. Thus the chart disregards that, to some extent, payroll tax is also paid in some industries outside the financial sector.

Source: Abildgren et al. (2013).

Allowing for these factors, the earnings level in the Danish financial sector is about 5-10 per cent higher than in other industries, cf. Chart 2.

Since 1988, the Danish financial sector[1] has been subject to a special payroll tax, currently accounting for 10.9 per cent of the payroll. Other things being equal, such payroll tax should contribute to relatively lower earnings in the financial sector than in other industries. Viewed in isolation, payroll tax provides an incentive for the financial sector to replace labour by, for instance, capital (e.g. through automation of labour-intensive processes).

It should be noted that in the calculations underlying Chart 2, only the highest completed, formal public-sector education has been included – not double education degrees or private-sector continuing education. The latter is particularly prevalent in the financial sector, cf. Danish Employers' Association for the Financial Sector (2011). An analysis con-

1 Few other countries have similar taxes. For many years, France has had *taxe sur les salaires*, while the UK introduced a kind of payroll tax in 2010, but only on bonuses of some size.

ducted by the Danish Insurance Association (2008) shows that part of the earnings differential can be attributed to private-sector continuing education in the financial sector.

However, other factors point in the opposite direction. For instance, the hourly earnings variables used in the analysis do not include fringe benefits that are prevalent in the financial sector, such as attractive staff loans, etc.

In general, a relatively high level of earnings should be based on relatively high productivity and earnings capacity. Abildgren et al. (2013) examine the relationship between earnings and the income-to-cost ratio of Danish banks. The analysis shows that additional earnings are higher in banks with a high income-to-cost ratio. This indicates that part of the additional earnings in the banking sector is due to (unobservable) differences between banks. For example, some banks may be better than others at promoting cooperation and synergies between employees, which is reflected in a better bottom line. Ultimately, this is also to the benefit of employees through higher labour earnings.

Potential competition is important as a mechanism for ensuring that additional earnings that are not based on higher corporate earnings and productivity are ironed out over time. For a small, open economy like Denmark, potential foreign competition is particularly important. Looking at the banking sector, most foreign banks in Denmark have a parent company in another Nordic country. The explanation is that the Nordic region is relatively homogenous in terms of culture, languages, legislation, traditions and product ranges. Conversely, such "entry barriers" could make it difficult for banks from other European countries to enter the Danish market and gain a foothold in Denmark, which has also opted out of the euro. Viewed in isolation, this weakens potential competition, which is key in a highly regulated sector such as finance.

Estimated earnings differentials between the financial sector and other industries in Denmark are roughly in line with those abroad, cf. Carruth, Collier and Dickerson (2004), Björklund et al. (2007) Philippon and Reshef (2012) and Célérier and Vallée (2013). The economic literature provides a number of other explanations of why earnings levels in certain industries, e.g. the financial sector, may be higher than those of other industries for a number of years.

Some explanations could be that an industry has an ownership structure, e.g. dispersed ownership (for instance due to employee shares, shares associated with customer loyalty programmes and guarantor certificates), ownership or voting right restrictions, etc. that could dampen active ownership pressure to improve cost-efficiency, cf. Black and Strahan (2001). As a case in point, under dispersed ownership, owners may find it difficult to coordinate their wishes for efficient cost control. In a Danish context, other examples are financial enterprises owned by associations and foundations, which may cause similar corporate governance issues in relation to cost control, cf. Andersen (1999).

It is a well-known fact that a high concentration of firms in the same industry, e.g. the IT or pharmaceutical industries, in a limited geographical area can generate positive externalities, which may lead to high corporate earnings and well-paid jobs. For instance, global financial centres such as London or New York provide the basis for offering highly specialised, private continuing education courses that are open to individual firms. Outside these centres, there is no basis for providing education offers to the same extent or of the same high quality. A high concentration of firms in the same industry also attracts highly educated, specialised labour, which cannot be utilised as efficiently – and paying the same high earnings – in less specialised firms outside the hub. A number of these factors may also apply to a regional financial hub such as Copenhagen, cf. Oxford Research (2009).

Additional earnings in the financial sector could also reflect growing demand for more specialised labour, e.g. as a result of increased focus on risk management and demand for more complex financial products and advisory services, cf. Philippon and Reshef (2012). Growing demand for specialists could have had a knock-on effect on other earnings in the financial sector.

Additional earnings may also reflect an element of "efficiency earnings", cf. Shapiro and Stiglitz (1984) and Lindbeck and Snower (1986). By paying earnings above the market level, an employer is able to attract and retain the best talents. This may be particularly important in an industry with specialised labour and a high element of job-specific competencies and may help to explain additional earnings in the financial sector, provided these factors are more prevalent in this sector than in other industries.

RELATIVE EFFICIENCY OF INDIVIDUAL BANKS

The productivity of individual banks can be compared using an "efficient frontier analysis". The mindset behind this approach is a comparison of a number of key accounting figures for individual banks' inputs (e.g. staff costs and administrative expenses) and outputs (e.g. total lending). The efficient frontier consists of banks that produce the most output with a given set of inputs, and the distance of other banks from the efficient frontier can then be measured based on a relative efficiency score.

MODELS TO ASSESS THE RELATIVE PRODUCTIVITY OF INDIVIDUAL BANKS Box 1

The two most widely used methods for efficiency analysis are Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA).

The difference between DEA and SFA is in the calculation of the efficient frontier. DEA is a linear programming technique, where the efficient frontier is constructed as linear combinations of actually observed combinations of inputs and outputs. In SFA, the efficient frontier is estimated econometrically as a function of observed combinations of inputs and outputs.

The advantage of SFA over DEA is that SFA allows that part of the variation in inputs and outputs may be due to random fluctuations or measurement errors, while DEA attributes the entire variation to differences in efficiency. The drawback, on the other hand, is that, in principle, SFA requires specification of a functional form of the production function, while DEA is based exclusively on linear combinations of data.

The models are described further in Kuchler (2013), which also contains more detailed results than the ones presented in this article.

Abildgren et al. (2013) perform an efficient frontier analysis of the accounts of all Danish banks since 2001. This analysis is based on the two most commonly used methods of efficiency analysis: Data Envelopment Analysis (DEA) and Stochastic Frontier Analysis (SFA), cf. Box 1.

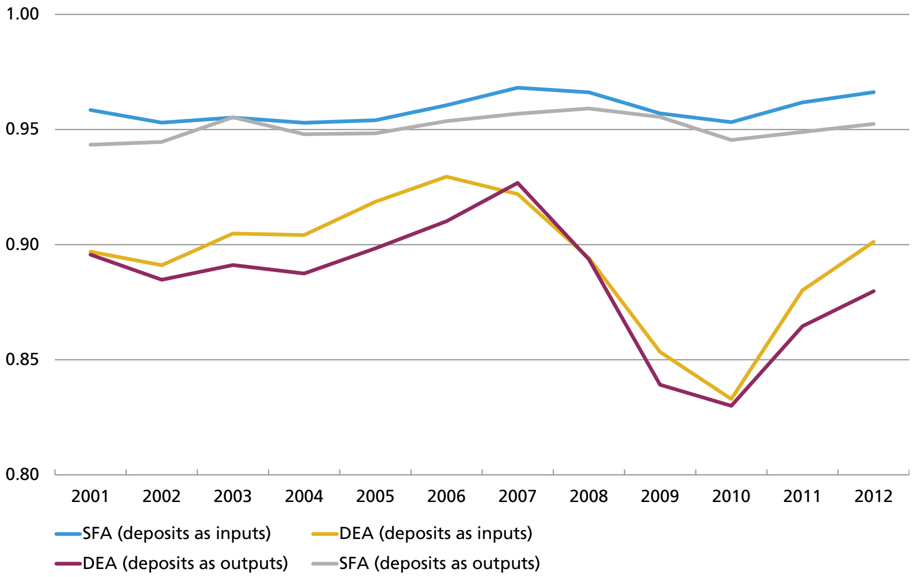
The literature does not agree on whether deposits should be considered as outputs from or inputs to the banking sector. Under the production approach, banks are seen as producers of deposit and loan accounts, using labour and capital, while, under the intermediation approach, banks are seen as financial intermediaries, providing lending based on inputs in the form of labour, capital and deposits. Therefore, calculations have been performed in which deposits are treated either as inputs or outputs. Calculations have also been conducted in which, using impairment losses, attempts have been made at taking into account the "quality of lending". The results of these calculations do not deviate substantially from those presented below.

Moreover, in the analysis of Danish banks, staff costs and administrative expenses and interest expenses are used as indicators of inputs, while interest income, fee and commission income, total lending and shares and bonds are used as indicators of outputs.

It should be emphasised that these methods are used to assess the relative efficiency of banks relative to other banks and the development in efficiency. The methods cannot be used to assess the development in the absolute efficiency of banks. In principle, the relative distance of a bank to the most efficient banks could narrow over time, and, at the same time, the most efficient banks could experience an absolute decrease in efficiency.

AVERAGE EFFICIENCY SCORE IN THE DANISH BANKING SECTOR, ESTIMATED USING DEA AND SFA

Chart 3



Note: Differences in levels and fluctuation sizes are attributable to methodological differences.
Source: Abildgren et al. (2013).

The analysis shows that the average relative efficiency score of the Danish banking sector increased in the run-up to the financial crisis, while it decreased during the crisis years of 2008-10, cf. Chart 3. The latter should be seen in the context of weaker output growth, while inputs were not adjusted to new, lower output levels at the same pace in all banks. In recent years, the average relative efficiency score has increased again, presumably reflecting that many banks are adjusting costs to the lower level of activity.

The significance of the consolidation in the sector is also evidenced in the fact that banks that either failed or were acquired by other banks in the period after 2008 were, on average, less efficient at the time of acquisition than the surviving banks. In other words, the consolidation in the sector has contributed to the increase in average efficiency seen over the last few years.

Furthermore, a supplementary analysis of banks that were acquired by the Financial Stability Company during and after the crisis shows that, in terms of efficiency, these banks did not deviate substantially from other banks before the crisis. Thus the pre-crisis increase in average efficiency was not driven by a few high-risk banks.

Although the average relative efficiency score of the sector has increased in recent years, the variation in relative efficiency across Danish banks still exists. Thus, in terms of efficiency, some Danish banks – primarily in the Danish Financial Supervisory Authority's groups 3 and 4 – are some distance away from the most efficient Danish banks.

In order to assess the efficiency of Danish banks in an international context, Abildgren et al. (2013) performed a supplementary analysis, covering 15 large Danish banks and approximately 200 banks in the EU 15, along with Norway and Switzerland, in 2012. In light of the special Danish mortgage banking sector, this analysis was conducted at consolidated level.[1] As indicators of inputs, interest expenses and number of employees are used, while interest income, operating income, total lending, shares and bonds are used as outputs. As in the case above, calculations were performed using total deposits either as inputs or outputs.

Results of an international benchmarking analysis like this one should be seen as indicative only, since cyclical variability, differences in framework conditions and other factors beyond the control of banks may influence results. The calculations indicate that some Danish banks are fully able to match the relative efficiency score of the most efficient foreign banks. However, in terms of efficiency, some Danish banks are some distance away from the most efficient Danish and foreign banks.

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