Taxation of Financial Services: VAT, FAT or WHAT?

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Abstract

The main objective of this thesis is to investigate the economic effects of imposing the value added tax (VAT) on financial services.

Over the past decades a strong debate has been going on whether the VAT should and especially could be imposed on the financial services that traditionally have been exempt from it. The exemption seems to be widely perceived as undesirable because of the number of important distortions that it leads to. At the same time, the administrative and technical difficulties associated with imposing the VAT on financial services have been preventing many countries from making changes in the existing VAT treatment of the financial sector. There is also a number of theoretical arguments in favor of the exemption. Some economists take a step back from the implementation problems and pose a question whether the financial services should be taxed at all. The main argument against introducing the VAT on financial services is that the tax might create additional distortions, for example distortions in households' consumption vs. saving decisions as a result of change in relative price of saving.

Nevertheless, many countries seem to recognize that the distortions associated with the VAT exemption of financial services are much more important to deal with than the ones that might potentially occur when the exemption is lifted. The only issue that no country has managed to fully overcome yet is the technical and administrative complexity of imposing the VAT on margin-based financial services.

In the tax literature we find various proposals on how the issue of technical complexity associated with applying the VAT on financial services can be solved. In the model presented in this thesis I use two of the proposed methods, namely the Cash-Flow Method and the Option to Tax. I set up and solve a two-period consumption-investment model, where a monopolistic bank supplies intermediation services between borrowers (firms) and lenders (households). I incorporate both cash-flow taxation and option to tax into the model as possible solutions to the issue of technical and administrative complexity of taxation of financial services. In particular, I compare two cases: with and without VAT on financial services, using the latter as a benchmark for the analysis. I show that in the benchmark case the market solution to the optimization problem leads to a marginal welfare loss, measured by the deviation of the market solution from the social optimum. Applying the VAT on financial

services brings the market allocation closer to the socially optimal allocation, thus reducing the marginal welfare loss in the economy. This becomes possible due to the input VAT rebates that the firms are entitled to when the exemption is lifted. The marginal welfare loss will always be smaller when the VAT is imposed, as long as the probability of opting in is positive.

Preface

First of all, I wish to thank my enthusiastic supervisor, Jon Vislie, professor at the Department of Economics at the University of Oslo, for his useful insight, inspiration, support and helpful guidance during the whole process of writing this thesis. I also wish to express my gratitude for his idea for the title.

I also would like to thank Vidar Christiansen, professor at the Department of Economics at the University of Oslo, for his valuable comments and advice.

I have to say that working on this thesis has been the most exciting part of my studies. I would like to thank the Department of Economics for creating a good learning environment and giving me the opportunity to be a part of it.

All the remaining mistakes and misprints are my own responsibility.

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Irina Alexeeva

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1 Introduction

The value added tax is the most common form of the indirect taxation in many countries, which generally applies to all final consumption. There are, however, some groups of goods and services that are exempt from VAT. Among them is a wide range of financial services, such as insurance, intermediation services between lenders and borrowers, payment transactions, etc. The exemption implies two things: first, the suppliers of financial services are not allowed to charge VAT on such services; and second, the suppliers of financial services do not receive credit for the VAT paid on inputs used in the production of such services.

Over the last decades an intense debate has been going on whether the value added tax should and especially could be imposed on the financial services that traditionally have been exempt from it. On the one hand, the exemption seems to be generally perceived as undesirable, as it causes a number of important economic distortions and violates the neutrality of the VAT-system. On the other hand, the administrative and technical difficulties of taxing financial services have made the exemption to be settled upon as the only feasible alternative. Such technical difficulties arise from the fact that many financial services are priced implicitly, which makes it problematic to define their "correct" value added. There is also a number of theoretical arguments in favor of the VAT exemption of the financial sector.

The value added tax is recognized to be one of the main sources of public finance, meaning that the revenues from VAT are widely used for public consumption and investment, as well as public transfers. The growth of financial sector in many countries has been rapidly increasing. For instance, the financial sector in the U.S. has grown from 7.3% of GDP in 1999 to 8.4% of GDP in 2007. In the UK the intermediation services have grown from 3,9% of GDP in 1970 up to 7,9% of GDP in 2005. The European Union's financial sector has increased from 2.7% of GDP in 1970 to 5.5% in 2005 (Lockwood, 2010). Such trends in growth and development of financial sectors attract even more attention to the issue of VAT exemption of financial services. This attention is very often concentrated around the additional tax revenues that the VAT on financial services would contribute with. In Norway, for example, the expansion of the VAT to the financial sector is estimated to contribute to government revenues with about NOK 8 billion for 2014 (Norwegian Ministry of Finance, 2013).

In designing the VAT system one should make certain that the tax on financial services neither results in worsening the distortions that are already present in the economy, nor contributes to creating new ones. These issues have been addressed in a number of theoretical works devoted to optimal taxation of financial services. Among them are papers by Lockwood (op. cit.), Boadway and Keen (2003), Chia and Walley (1999), Grubert and Mackie (1999), Jack (2000), and Auerbach and Gordon (2002). The authors of these works share the view that while taxation of explicitly priced financial services (for example, services paid for by fixed fees and commissions) is desirable and thus, should be implemented, the tax on implicitly priced services, such as financial intermediation services between borrowers and lenders, should remain zero. The main arguments behind this conclusion are that taxation of intermediation services imposes distortions on saving decisions (Jack, op. cit., Auerbach and Gordon, op. cit., Chia and Whalley, op. cit.), financial services are not final goods and thus should not be subject to a consumption tax (Grubet and Mackie, op. cit.), taxation of margin-based financial services leads to violation of the production efficiency theorem of Diamond and Mirrlees (1971) (Boadway and Keen, op. cit., Lockwood, op. cit.).

One of the objectives of this master thesis is to examine these issues and show that financial services should be included into the VAT base. I set up a two-period consumption-investment model where a monopolistic bank supplies financial intermediation services between borrowers (firms) and lenders (households). In particular, I show that imposing VAT on margin-based financial services brings the market solution to the optimization problem closer to the one that is socially optimal.

To address the issues of technical feasibility of the financial sector taxation, I use the cash-flow approach in imposing VAT on financial services. Since it has been recognized that this approach is associated with large administrative and compliance costs, which could potentially become a severe burden for many financial institutions, I present a short overview on how such costs could be reduced, as well as introduce the option to tax into the model.

The thesis is organized as follows. The next section discusses the distortions caused by VAT exemption of the financial services. Section 3 presents the reasons behind financial sector VAT exemption. Section 4 outlines the main principles of the cash-flow approach, as well as some solutions to the issues associated with it. The main features of the option to tax-proposal are described in section 5, while section 6 presents theoretical arguments supporting

the exemption. The model and its main results are presented in Section 7, while section 8 discusses some incentive issues associated with the option to tax. Section 9 presents a short overview of the latest proposals on taxation of financial services in Norway. Section 10 concludes.

2 Distortions caused by VAT exemption of the financial services

It has been recognized in the tax literature that VAT exemption of financial services has a number of undesirable consequences that lead to some important market distortions. One of such consequences is **tax cascading** that occurs as a result of financial institutions and their business customers not being able to recover VAT paid on the purchased inputs. Exemption implies that financial institutions are not allowed to charge VAT on their services as well as they are not allowed to get VAT credits for the purchased inputs, like computers, office equipment, etc. That does not mean that the prices that financial institutions charge on their services contain no VAT. In fact, they certainly do so. Being unable to recover VAT from purchased inputs, financial institutions pass it on through the prices to their clients. The problem is that under exemption it is not only financial institutions that are not allowed to get VAT credits for purchased inputs, but also those to whom they sell financial services. Hence, businesses that use financial services as productive inputs have to pay higher price for such services than what they would have paid if financial sector had been subject to VAT. When selling their products, businesses charge VAT on their value added, which already contains some of the VAT from financial services. In this way, hidden VAT travels through the whole production and distribution chain forward to the final consumers, giving them no choice but to pay VAT on VAT, thus leading to tax cascading. Figure 1 provides with an illustrative example.

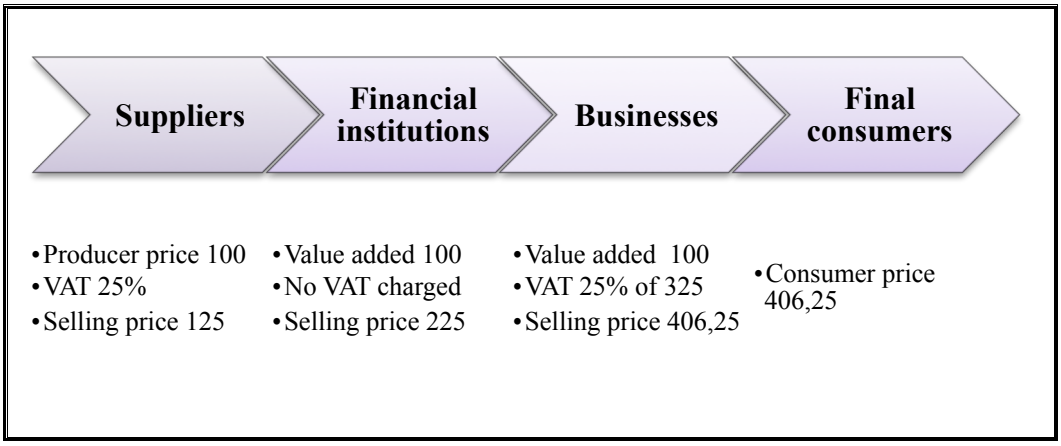

Figure 1. Tax cascading

All this goes in contradiction with main VAT principles, namely neutrality of VAT and its proportionality to the prices. In addition, hidden VAT becomes a tax on production,

something that is considered more than undesirable by tax policy makers. This last point is largely supported in the tax theory by the production efficiency theorem, which prescribes that: "the optimal tax structure includes no intermediate good taxes, since these would prevent efficiency" (Diamond and Mirrlees, op. cit., p. 24). The intuition behind the production efficiency argument could be that in the absence of the right for VAT rebates, businesses might have incentives to substitute financial services by other inputs or just reduce the use of such services in the production (for example, buy less insurance than what is socially desirable). Another possibility is that businesses might choose to self-produce financial services, something that could potentially result in **efficiency costs** for the economy as a whole.

On the other hand, the VAT exemption of financial sector makes its services relatively cheaper in comparison to other goods and services. This applies mainly to financial institutions' customers who are also VAT-exempt (for example, households and not VAT-registered businesses). As a result, such price differences might result in too high demand for financial services, something that would make financial sector grow faster, than what is socially desirable.

Another distortion, pointed out by Huizinga (2002), is related to the fact that not all countries have VAT on consumption goods (for example, USA). This puts financial institutions in the countries with VAT at disadvantage in terms of competition between banks. Such **competitive disadvantage** would be truly reduced if financial institutions in the countries with VAT could be able to receive VAT rebates on the purchased inputs, i.e. if the VAT exemption was lifted.

Finally, VAT exemption of the financial sector creates some **administrative disadvantages** for financial institutions. This is because not all financial services are VAT exempt, for example investment consulting services or safety box rentals are subject to VAT, implying that the VAT on inputs that are used in production of such services is creditable. Hence, financial institutions have to bear an extra administrative cost related to determining which inputs are actually used in production of exempt services and thus are subject to VAT rebates, and which are not.

The fact that the present-day VAT system causes these types of distortions gives clear signals to tax policy makers that something has to be changed. Indeed, we find numerous proposals

in the tax literature on how these distortions could be mitigated, if not altogether eliminated. Different countries have made attempts to compensate for VAT exemption of the financial sector by imposing special taxes on banks and other suppliers of financial services. Box 1 outlines some of the international practices in taxation of the financial sector.

Box 1. International practices in taxation of financial services.[1]

This box presents a short overview over some of the international practices in the taxation of financial services.

In **Denmark** the wage costs in the financial sector are subject to compensatory taxes. Such taxes are supposed to work as substitutes for the VAT. However, they fail to capture the value added created through the profits in the financial sector. Moreover, as Huizinga (op. cit.) points out, they contribute to even larger over-taxation of businesses, since the additional wage taxes cannot be recovered by financial institutions' business customers. In 2013 Denmark also imposed a special taxation of non-life insurance premiums.

France has also introduced special taxes on wages in the financial sector.

Non-life insurance premiums in **Finland** are subject to the tax at the same rate as the VAT on other goods and services (with some exceptions). Special taxation is also applied to securities' trading that takes place in unregulated markets.

In **Germany** a special bank tax was imposed on banks' liabilities side. Larger financial institutions have to pay this tax at a higher rate.

In **Iceland** and **Israel** both labor inputs and large profits in the financial sector are subject to additional compensatory taxation.

In **New Zealand** most financial services are VAT-exempt. The exception is fire and general insurance, which is subject to New Zealand Goods and Services Tax (GST). In order to mitigate some of the distortions related to over-taxation of businesses, New Zealand has introduced zero-rating of financial services supplied to GST-registered business customers, whose taxable supplies account to 75% of total supplies. Financial services provided to other

[1] The information presented in Box 1 is collected from various sources, among others, from Schenk (2010), Huizinga (2002) and Keen (2011).

businesses and final consumers stay VAT-exempt.

Financial services in **Quebec** are zero-rated, meaning that financial institutions charge no VAT on their services, but still are allowed to recover the VAT on purchased inputs. The zero-rating of financial services is combined with additional taxation on wages and capital inputs in the financial sector.

Some of the taxation forms mentioned in Box 1, namely taxation of profits and remuneration in financial institutions, has been referred to by the IMF as a Financial Activity Tax (FAT) (Keen, 2011). The IMF has considered several forms of the FAT, as possible solutions to the problems related to the VAT exemption of the financial sector, but recognized that all of them suffer from a number of substantial issues. For example, imposing the FAT on financial institutions does not eliminate tax cascading, since no mechanism for input VAT credits has been developed for the FAT. Other issues are related to international adjustment and choosing the proper tax base (see Devereux, 2011).

Still the obvious solution to the problems related to the exemption would be, of course, to introduce VAT on all financial services, and give financial institutions and businesses the right to reclaim VAT paid on inputs. Unfortunately, it is not that simple…

3 Why is it difficult to apply VAT to financial services?

Value added tax is a general sales tax, which in principle is to be applied to all final consumption. What is the value added generated by, say, a firm that produces and sells office equipment? Well, it is the total value of its sales minus the total value of the purchased inputs that the firm used in its production process. The calculation of these values should not pose any problem for such a firm, since it is rather straightforward. Then the value added will be reflected in the explicit price that the firm will charge for the produced equipment. Hence, the most common approach of levying VAT is via the invoice-credit method, where VAT is calculated as a proportion of the price of a good or a service.

But what about a firm or institution that produces and sells financial services? In principle, if provided financial service is charged by a fixed fee or a commission, than the application of VAT should not cause any difficulties. The challenge starts when one attempts to apply VAT on margin-based financial services, for example intermediation between lenders and borrowers. The main problem is that it is rather difficult to attach an explicit price to such services, and therefore calculate the value added created by them. There are several reasons for that:

First of all, most financial firms/institutions use largely a different type of inputs than firms that produce office equipment, namely capital. Pricing financial capital is not as straightforward, since most financial institutions do not “purchase” capital, but rather acquire it in the capital markets or by taking in deposits. And what is the price paid for a deposit? One could suggest that it should be the deposit rate that the financial institution, say, a bank, promises to the depositor. This is not correct, since the deposit interest rate reflects not only the direct cost to the bank of taking in a deposit, but also all the services that the bank provides to the depositor. The value of these services is reflected in the lower deposit interest rate. Pricing a loan creates similar difficulties, since interest rate on loans includes some compensation for the risk of default, i.e. a loan-specific risk premium. So while in a perfect world the value added created by financial services would be equal to the spread between the loan interest rate and the deposit rate, in our not so perfect world it is difficult to verify “what part of the variance in lending rates reflects profits (which should be subject to VAT) and

what part reflects the risk premium (which should not be subject to VAT since it is part of the cost of inputs)" (Huizinga, op. cit., p. 504).

Even if the issue of dividing the spread into its components could be overcome, there is another problem, namely how to allocate the value added between lenders and borrowers. For example, if a lender (a depositor) is a private household and the borrower is a VAT registered firm, then the latter would have the right to receive a VAT credit on the purchased inputs. The question is how much of the value added created by the financial intermediation service is actually provided to the borrower and how much is enjoyed by the lender. In principle, one could use a reference interest rate to address this issue. Here the reference interest rate (or "world" interest rate, or "pure" interest rate) represents the opportunity cost of lenders and borrowers, i.e. the interest rate at which the borrower could have borrowed and the lender could have lent, if they chose not to use financial institution as an intermediary. For example, Poddar and English (1997) suggest that the "pure" interest rate could be the rate of return that the government can earn on its cash balances. At the same time, Norwegian Ministry of Finance, in their proposition for the National Budget 2014, suggest that the reference rate (they call it benchmark interest rate) could be different for each financial institution. In particular, they suggest that such institutions should be permitted to calculate their own benchmark rates, and be allowed to use them after being approved by the authorities (Norwegian Ministry of Finance, op. cit.).

In order to see how the reference rate helps to allocate the value added between lenders and borrowers, consider the following example:

Assume there is no risk of default, and a bank receives deposits from households and issues loans to the VAT registered business customers. For simplicity, we also assume that there are no material inputs used by the bank, i.e. the only input factor is labor. Suppose, that the deposit rate is 2%, the interest rate on loans is 10% and the reference interest rate is 7%. Then the value added generated by the intermediation services of the bank is 10% - 2% =8% of the deposits. These 8% should be allocated between the borrowers and the lenders. Especially, this allocation will be important to the borrowers, the VAT registered businesses, since they have the right to receive VAT credit on purchased inputs (in our case it is capital borrowed from the bank). Using the reference interest rate, we see that the value added provided to the borrower is 10% - 7% = 3% of the loan, and the valued added provided to the depositor is 7%

- 2% = 5%. Thus if the VAT rate is 25% and the amount borrowed from the households and lent to the business customers is 10000NOK, then:

Value added created by the bank	10000 X 0.08 = 800 NOK
Total VAT	800 x 0.25 = 200 NOK
Value added provided to the depositor	10000 x 0.05 = 500 NOK
VAT paid by the depositor	500 x 0.25 = 125 NOK
Value added provided to the borrower	10000 x 0.03 = 300 NOK
VAT paid by the borrower (and then recovered)	300 x 0.25 = 75 NOK

Note that the sum of the value added provided to the lender and the borrower equals the total value added created by the intermediation services of the bank, and the sum of VAT paid by the borrower and the lender equals the total VAT charged by the bank. As noted before, the 75 NOK that the borrower has to pay in VAT can be recovered, since the borrower is a registered business customer.

The difficulties described above have been presented by many tax economists as the main reason for financial services to be and stay exempt from VAT. The question, though, remains: Can these technical difficulties be overcome, conceptually and practically? Conceptually the problems associated with applying VAT to financial services might be solved using Cash-flow method (Poddar and English (op. cit.), Huizinga (op. cit.), Zee (2005)). Whether this solution is practical depends on when the question is asked. The answer to it in 1998 would probably be: “Not likely”. However the advances of the modern IT systems and developments in information technology during last decades truly make the cash-flow approach implementable not only conceptually, but also practically.

The main principles of the cash-flow taxation are introduced in the next section. More detailed description of the method can be found in “Taxation of Financial Services Under a Value-Added Tax: Applying the Cash-Flow Approach” by Poddar and English (op. cit.).

4 Cash flow method

Perhaps the most developed version of the cash-flow method for taxation of margin-based financial services belongs to Satya Poddar and Morley English. The method suggests that all inflows to financial institutions should be treated as taxable sales, while all outflows should be treated as purchases of taxable inputs. The authors show that such method of taxation is fully compatible with the standard credit-invoice form of VAT, which is applied to non-financial goods and services (Poddar and English, op. cit.). In addition, the method exhibits some other desirable features. For instance, applying the cash flow taxation resolves the so-called "dividing-the-margin" issue, i.e**.** there is no need to disaggregate the margin to its components in order to identify the value-added. Moreover, the cash-flow method fully eliminates tax cascading on financial services supplied to businesses.

In order to better understand how the cash-flow taxation would work in the financial sector, we can look at an example of applying the method on the financial intermediation services between lenders and borrowers.

Cash flow method – example

Suppose there is a bank that provides intermediation services between borrowers and lenders. Borrowers and lenders are either private households (i.e. not VAT registered consumers of financial services), or businesses (VAT registered customers). The interest rates offered by the bank, as well as the reference rate and the VAT rate in the example are as follows:

Interest rate on deposits	2%
Interest rate on loans	4%
Reference interest rate	3%
VAT rate	25%

There are two periods in the example. In the beginning of the first period both households and businesses place their deposits in the bank and take loans from the bank. In the second period the loans are repaid and the deposits are withdrawn. In addition, it is assumed that the

bank has the opportunity to use other sources of capital (for example, interbank market, government bonds, etc.) All the cash inflows and cash outflows, as well as VAT to be paid or received, in the first period are collected in Table 1:

	Bank inflows	**Bank outflows**	**VAT**
Period 1			
Deposits from households	1000		250
Deposits from businesses	1000		250
Lending to households		(2000)	(500)
Lending to businesses		(2000)	(500)
Other sources of capital	2000		500
Subtotal	**4000**	**(4000)**	**0**

Table 1. Banks's cash flows and VAT credits/liabilities in the first period

Note that brackets around a number mean that this number is negative.

In the first period 2000 in total deposits (from households and businesses), as well as 2000 from other sources of finance, are registered as bank's cash inflows and are thus subject to 25% VAT, i.e. the bank is subject to incoming VAT equal to 1000. At the same time, the loans that the bank provides to households and businesses (total amount of 4000) are bank's cash outflows. The VAT on the loans is thus registered as outgoing VAT, allowing the bank to receive input tax credit in amount of 1000. In the first period VAT on inflows and outflows cancel out, so that the net VAT liability is zero.

Bank's cash flows and tax liabilities in the second period are presented in Table 2:

	Bank inflows	Bank outflows	VAT
Period 2			
Loan repayment from households	2000		500
Loan interest	80		20
Loan repayment from businesses	2000		500
Loan interest	80		20
Deposit withdrawal by households		(1000)	(250)
Deposit interest		(20)	(5)
Deposit withdrawal by businesses		(1000)	(250)
Deposit interest		(20)	(5)
Repaying to other sources		(2000)	(500)
Interest on other sources		(60)	(15)
Total	**4160**	**(4100)**	**15**
Total value of services	**= 60**		
VAT	**= 15**		

Table 2. Bank's cash flows and VAT credits/ liabilities in the second period

In the second period bank's inflows consist of loan repayments (principal plus the interest) in total amount of 4160. This amount is treated as revenues from sale. The bank is then subject to incoming VAT in amount of 1040. Deposit withdrawals, as well as interest payments and repayment to other sources of finance, are bank's outflows treated as purchase. The VAT on these outflows (4100*0.25=1025) can be recovered by the bank. However, since the VAT on

the cash inflow associated with paid interest on loans is larger than the outgoing VAT on deposit interest (1040-1025=15), the bank faces a tax liability in amount of 15, which is 25% of the total value of the intermediation service supplied by the bank.

The VAT system allows businesses to rebate the VAT paid on inputs used in production of final goods. In order to recover the VAT paid on financial services from the bank, business customers would have to use an accounting system that is similar to the one that is used by the bank, and thus calculate the recoverable VAT based on the cash inflows and outflows. Table 3 shows how this calculation would be carried out.

	Businesses inflows	**Businesses outflows**	**VAT**
Period 1			
Loan	2000		500
Deposit		(1000)	(250)
Subtotal	**2000**	**(1000)**	**250**
Period 2			
Loan repayment		(2000)	(500)
Loan interest		(80)	(20)
Deposit withdrawal	1000		250
Deposit interest	20		5
Subtotal	**1020**	**(2080)**	**(265)**
Total	**3020**	**(3080)**	**(15)**

Table 3. Business customer's cash flows and VAT credits/liabilities

In the first period the business customer is subject to net VAT liability of 250, which is 25% of the difference between business customer's cash inflow associated with the loan from the

bank, and cash outflow associated with the deposit placed in the bank. In the second period the customer is entitled to VAT credit of 520-255=265. This means that in total he receives VAT credit of 15, which is exactly 25% of the value added provided to the business customer by he bank (0.25*(3080-3020) =15).

The government revenues from the VAT would be then:

Government revenues	
Period 1 Tax	250
Interest earned at 3%	7.5
Period 2 Tax (15 - 265)	(250)
Total	7.5

Table 4. Government revenues

Government revenues in amount of 7.5 are exactly equal to 25% of the value of the banking services to household depositors: (1000*1.03-2000*1.03+2080-1020)*0.25=7.5.

So, why are we still not enjoying all the merits of the cash flow taxation of the financial services? Indeed, the cash flow method has received a large portion of critique for a number of substantial drawbacks associated with it. The most serious of these is the presence of large administrative and compliance costs, which businesses would have to bear in order to calculate their deductible tax on inputs purchased from the financial institutions. (VAT-registered firms would have to perform all the accounting operations and calculations by their own means, thus significantly reducing the benefits from input VAT credits). Hence, such costs would be especially burdensome for small and medium-sized enterprises. In addition, cash flow tax would impose some extra borrowing requirements on businesses. That is because the tax would have to be paid on every cash inflow (for example, a loan from a bank), thus increasing the amount needed for financing this tax. Finally, the cash-flow method fails to take into account tax rate changes, which would be especially significant in the period of introducing the tax.

As the solution to these issues, Poddar and English (op. cit.) developed another version of the cash flow method, which they called ”Truncated Cash-Flow Method with Tax Calculated Account”. The method implies that all the cash-flow computations would be carried out by financial institutions, thus relieving businesses from the large compliance costs. Financial institutions would also issue a periodic tax invoice which they would send to their business customers, thus allowing them to claim tax credit on the purchased inputs. At the same time, the use of tax calculated accounts (TCA) would allow businesses and financial institutions to defer the tax payments on capital inflows by debiting them to the TCA. The same would also apply to the tax credits on capital outflows. At the end of the reporting period the balance on the TCA would be adjusted for interest rate changes, and the amounts to be paid/recieved would be calculated.

The truncated cash-flow method with TCA was piloted in a number of finacial companies in Europe during 1996-1998. “The results of the study indicated that the TCA method was **technically feasible**, but concerns were raised regarding disclosure of proprietary information, application to complex financial instruments, and cost of implementation” (Merrill, 2011, p. 175).

As a possible solution to some of the issues mentioned above, Huizinga (op. cit.) came up with a proposal of a simplified TCA method, suggesting that all financial services to business customers should be zero-rated. This would imply no tax charged for the services supplied to businesses by financial institutions, and hence, no tax credit claimed by businesses for the purchased services. Applying TCA method with zero-rating would solve the issue of disclosure of proprietary information, since no invoices would be sent to business customers, and thus no information about implicit pricing (which is considered proprietary by some financial institutions) would have to be shared. Moreover, the introduction of this method would truly decrease the compliance costs associated with TCA system, since the accounts related to business customers would be excluded from the system.

In spite of the technical feasibility of the cash-flow taxation of the financial services, no country has adopted any of the versions of this method. Considerable compliance costs are claimed to be the main reason for that, as noted by IMF (see IMF, 2010). Unfortunately, there is not much discussion in the tax literature about whether concerns for too high compliance costs can justify the consequences of the distortions that the exempt treatment of the financial services causes for the economy as a whole. As Arthur Kerrigan at the European Commission

stated: “As is sometimes the case, issues that are perceived as either technically complex or politically sensitive stall on the question of whether there is a really pressing problem to be addressed” (Kerrigan 2010, p. 10).

As mentioned above, high compliance costs remain the main stumbling point for applying the cash flow method of taxation on financial services. So how could a specific country deal with the presence of those? The problem is that whereas for some financial institutions such costs would not necessarily represent a large burden, other financial institutions might find them hard to bear. Unfortunately, there is not much empirical evidence on the matter. That is why we could only assume that the ones that could potentially cope with administrative and compliance costs when following the cash-flow approach of taxation, are large financial institutions, which are believed to be dependent on purchase of large amounts of taxable inputs (computers, office equipment, renting office space, etc.). For such institutions the net benefit from VAT credits on purchased inputs (VAT credits minus the compliance costs) might be positive. Hence, they might prefer to be allowed to charge VAT on their services. One of the proposals from the European Commission that takes into account this possibility, namely “option to tax” proposal, is the subject of the next section.

5 Option to tax (O2T)

The VAT exemption systems in Norway and in Europe are much alike, also with respect to financial services. The consequences of VAT exemption of financial services in the European Union, as well as feasible alternatives to exemption, have been one of the topical subjects for debate in the tax literature, especially during the last decade. In the 1990s the European Commission started working on developing the methods of including financial services into the VAT system. This was the EC's attempt to address the problem of "hidden VAT" that leads to tax cascading and thus creates a number of economic distortions. Among the proposed methods was, for example, full taxation of financial services by using the cash-flow approach. As mentioned above, this method was pilot tested in the late 1990s, but never adopted due to its complexity and considerable compliance costs. As a result, the European Commission developed a new proposal that would allow financial institutions to opt into taxation of the most of the exempt services (except for insurance) (see European Commission, 2006). The motivation behind this proposal was the EC's recognition that: "Rather than imposing mandatory taxation of financial services, granting O2T to financial institutions would allow them the flexibility to develop the procedures and systems for taxation of their services on an elective basis" (European Banking Federation, 2009, p. 54).

So, how does it work? The Member States are allowed to introduce the O2T on all or part of the financial services. Then financial institutions that are situated in the countries with O2T may choose whether to exercise the option or not. Those institutions that choose to exercise the option are then allowed to claim VAT credits on purchased inputs used in production of their services. At the same time, the tax charged on the services purchased by businesses, may also be recovered if such services are used as inputs in production. The O2T is either irrecoverable, or binding for a certain period of time.

The option to tax does not seem to have evoked much interest by the member states, as only few countries have introduced it, to some limited extent. For example, in Belgium the O2T is only applied to payment and receipt transactions, while in France financial institutions have a right to charge VAT on almost all financial services (except for such services as granting loans, some services related to operating with securities and foreign currency, etc.). In Germany financial institutions may opt for taxation of all exempt services, but only when they are provided to business customers.

The main reasons for so little interest in introducing O2T are believed to be lack of clarity and guidance on how to implement the option, as well as uncertainty about the effects of the O2T on the input tax deductions (Feria and Lockwood, 2009). For instance, among the aspects of O2T that are perceived to stay unclear are: whether O2T is to be exercised on a transaction-by-transaction basis or be applied to transactions of a given category or all categories; whether O2T should apply to financial services supplied only to business customers or to both businesses and households; and finally, how the tax base is to be determined (European Banking Federation, op. cit.).

All in all, the O2T is a relatively new proposal that has not gone through much empirical testing. The lack of clarity in its design, as well as differences in its interpretation, are quite understandable, since the system is meant to be as uniform as possible within the European Union, but still be operational in several different countries that might not necessarily have the same interests regarding their financial sectors. In their final report to European Banking Federation Ernst and Young state that: ”The Commission appears for the moment to have deliberately chosen to leave the door open for all variants of the O2T, other than the requirement that it should be available in all Member States and that there should be greater uniformity or consistency in its application” (European Banking Federation, op. cit., p. 57).

The VAT regulations in Norway do not allow financial institutions to opt into taxation of any of their services. Nevertheless, option to tax is not a completely unknown phenomenon in Norway. For example, farming and agricultural holdings, as well as non-businesses that develop water supply and sewage, may choose to opt into taxation of their goods and services. The same applies to lessors of buildings or plants used by VAT registered businesses (KPMG, 2013).

In the model presented in this thesis I assume that the O2T is also offered to financial institutions. This assumption is quite theoretical/hypothetical, and is not supported by any empirical evidence or testing results from Norway. In other words, we do not know with certainty whether O2T would work for the financial sector in Norway or not. Neither do we know whether O2T would have desirable effects on the Norwegian economy, i.e. whether introducing the option would result in increased tax revenues and mitigated distortions caused by the exemption. However that may be, O2T might be a decent candidate for addressing the issue of high compliance costs associated with the introduction of the cash-flow taxation to the financial sector, and hence, is worth considering.

Before introducing the model, there is one more issue that needs to be addressed, namely the theoretical perspective on the VAT exemption of financial services. Beside large compliance costs associated with imposing of VAT on margin-based financial services, there might be, in fact, another reason for financial services to stay VAT exempt. This reason finds its roots in theory of optimal taxation. As mentioned in the introduction, there is a number of theoretical arguments in favor of VAT exemption of margin-based financial services. Some of these arguments are introduced in the next section.

6 Why should financial services not be taxed?

Beside the technical reasons for VAT exemption of financial services there is a number of theoretical arguments suggesting that financial sector should continue to be exempt from VAT. For example, Grubert and Mackie (op. cit.) argue that since financial services do not provide any direct utility to their consumers, but merely are an intermediate good, then following the production efficiency theorem of Diamond and Mirrlees, they should not be taxed. This argument, however, has received a portion of critique and was labeled as "unqualified" (Boadway and Keen, op. cit.). In particular, if one were to follow Grubert and Mackie's logics, then such goods as bus tickets, cutlery or tooth brushes should not be taxed as well, since they do not yield direct utility to consumers, but rather perform a function of intermediary goods: for instance, a tooth brush serves as an instrument to keep one's teeth healthy, but does not provide any utility by just having it.

Another theoretical argument supporting VAT exemption of financial services states that taxing margin-based financial services would increase the relative prices of such services, thus creating an additional distortion (Jack, op. cit., Chia and Whalley, op. cit.). The supporters of this argument claim that a consumption tax on all other goods will automatically increase the cost of financial services. And if the size of the interest rate spread that financial institutions use to finance their services is fixed, then the price for these services will increase as well. Thus in order to maintain the choice between current and future consumption undistorted, one should not apply VAT on interest margins, but only on financial services charged for by fixed fees and commissions.

Similar conclusions can be found in the papers by Auerbach and Gordon (op. cit.) and Boadway and Keen (op. cit.), where the authors use a two-period consumption-investment model to show that intermediation margins should not be taxed, while fixed payment services (for example use of a credit card) should be subject to a uniform consumption tax. Lockwood (2010) uses a dynamic general equilibrium model to solve a tax design problem and comes to a similar conclusion for one commodity case (in the case with many commodities he finds that the payment services do not necessarily need to be taxed at the same uniform rate as other commodities).

All these authors build their conclusions on the assumption that the interest rate spread is a fixed value. In the model presented in this thesis I relax this assumption, letting the spread to vary with the level of savings. In particular, I choose a somewhat different approach to addressing the issue of taxation of the margin-based financial services, namely by showing that imposing a consumption tax on financial services does not necessarily result in the socially optimal allocation of resources, but brings the market allocation closer to the one that is socially optimal.

7 The model

We are looking at a two-period consumption-investment model with three types of agents: households, firms and a monopolistic (and monopsonistic) bank. In the first period households allocate their disposable income between consumption and saving, and firms produce consumption goods by using labor from households and some given amount of capital as inputs. Households' savings are deposited in the bank. In the second period the initial capital is run out, and firms have to borrow capital from the bank. Households' labor and borrowed capital are then used in the production of the consumption good. At the end of the second period firms pay back the loans (principal plus the interest) to the bank, and the bank pays back deposits (principal plus the interest) to households. It is assumed that households own both the firms and the bank, so that all the profits from firms' and bank's activities are transferred to households at the end of each period. There is no uncertainty or risk in the model, so that all actions and outcomes are perfectly predictable at any point of time, and all the agents are able to commit to their optimal behavior at the beginning of the first period.

7.1 The benchmark

As a benchmark I look first at the situation when there are no taxes in the economy.

I assume that in each period there is a fixed amount of time (equal to 1), which is to be divided between leisure, work and, in the second period, time/labor appropriated by the bank. Hence, we have:

$$1 = L_1 + l_1 = L_2 + l_2 + B,$$

where L_1 and L_2 are labor inputs in the production of the consumption good in the corresponding periods, l_1 and l_2 denote the amount of leisure in the corresponding period, and B is labor used in banking.

In the model it is assumed that the banking sector is labor intensive (labor is the only input used in the production of financial services). The labor is used for administering deposits and loans, as well as looking for the projects to finance and ensuring that every loan is repaid.

Since the amount of loans will also depend on the size of deposits, we can assume (for simplicity), that the size of B is proportional only to the amount of loans, K. Hence, we have:

$$B = \alpha K \text{, with } \alpha > 0 . \quad (1)$$

7.1.1 Households

In each period households supply labor and receive real wage w. Households are assumed to be identical, with preferences represented by the intertemporal utility function:

$$U = u(C_1, l_1) + \beta u(C_2, l_2),$$

where C_1 and C_2 stand for consumption of the good in the first and the second periods, and β is the discount factor. The utilities are assumed to be strictly increasing and strictly quasiconcave in their arguments.

At the end of the first period, households have to allocate their disposable income between consumption and savings. By savings it is meant that households open deposit accounts in the bank. Deposits are assumed to earn the interest rate, r^d, per unit of deposits, and are to be withdrawn at the end of the second period.

In each period households supply labor and receive labor income Y, such that:

$$Y_1 = w_1 L_1 = w_1(1 - l_1)$$

$$Y_2 = w_2(L_2 + B) = w_2(1 - l_2)$$

Households' disposable income thus comes from labor income and firms' maximized profits. In the first period households decide how much of the disposable income will be consumed and how much will be deposited in the bank. Hence, the first-period budget constraint is:

$$C_1 + S = w_1 L_1 + \pi_1 = w_1(1 - l_1) + \pi_1 \Leftrightarrow C_1 = w_1(1 - l_1) + \pi_1 - S ,$$

where S is households' savings deposited in the bank, and π_1 is firms' profit in the first period.

In the second period households consume the returns from savings, labor income from working, as well as firms' and bank's profits, so that the second period budget constraint is:

$$C_2 = w_2\left(L_2 + B\right) + (1 + r^d)S + \pi_2 + \Pi = w_2(1 - l_2) + (1 + r^d)S + \pi_2 + \Pi,$$

where r^d is the interest rate on deposits, and Π is the profit of the bank.

It is assumed that the consumption good produced in the second period is consumed in the same period. The price for the good is equal to 1 in both periods. Moreover, all the capital used in the production of the consumption good is assumed to depreciate at the end of the second period. Since there is no uncertainty in the model, households are able to plan and commit to their optimal consumption and leisure paths, as well as the optimal saving, at the beginning of the first period.

Households' decision problem is then to maximize the utility subject to their budget constraints, i.e.:

$$\underset{C_1, C_2, l_1, l_2}{Max}\ U = u(C_1, l_1) + \beta u(C_2, l_2)$$

$$\text{subject to } \begin{cases} C_1 = w_1(1 - l_1) + \pi_1 - S \\ C_2 = w_2(1 - l_2) + (1 + r^d)S + \pi_2 + \Pi \end{cases}$$

Inserting for C_1 and C_2 into the utility function gives the following maximization problem:

$$\underset{S, l_1, l_2}{Max} V(S, l_1, l_2) := u(w_1(1 - l_1) + \pi_1 - S, l_1) + \beta u(w_2(1 - l_2) + (1 + r^d)S + \pi_2 + \Pi, l_2)$$

The first order conditions of this problem are:

$$\frac{\partial V(S, l_1, l_2)}{\partial l_1} = \frac{\partial u}{\partial C_1}\left(-w_1\right) + \frac{\partial u}{\partial l_1} = 0 \tag{2}$$

$$\frac{\partial V(S, l_1, l_2)}{\partial l_2} = \beta\frac{\partial u}{\partial C_2}\left(-w_2\right) + \beta\frac{\partial u}{\partial l_2} = 0 \tag{3}$$

$$\frac{\partial V(S, l_1, l_2)}{\partial S} = -\frac{\partial u}{\partial C_1} + \beta\frac{\partial u}{\partial C_2}\left(1 + r^d\right) = 0 \tag{4}$$

Rearranging (2) and (3) we get:

$$\frac{\frac{\partial u}{\partial l_1}}{\frac{\partial u}{\partial C_1}} = w_1 \qquad \text{and} \qquad \frac{\frac{\partial u}{\partial l_2}}{\frac{\partial u}{\partial C_2}} = w_2$$

These are intratemporal optimality conditions which show that at the optimum the marginal rate of substitution between consumption and leisure in each period must be equal to the relative price for labor in the same period, i.e. that the required amount of consumption goods for working one extra hour must be equal to the real wage.

Rearranging the terms in (4) gives:

$$\frac{\frac{\partial u}{\partial C_1}}{\beta \frac{\partial u}{\partial C_2}} - 1 = r^d \tag{5}$$

This is the intertemporal optimality condition. The LHS is the required rate of return from savings, which is the number of next period consumption units one must receive in compensation for one unit reduced consumption in the first period[2]; whereas the RHS is the realized rate of return from savings which is equal to the deposit interest rate.

7.1.2 Firms

There is a representative firm, which produces a consumption good, X, in both periods by the use of labor and capital. The production technology is $F(K,L)$. The firm faces decreasing returns to scale and operates in a competitive market. In the first period the firm is endowed with some amount of capital that is used as an input (together with labor) in production of the consumer good in the first period.

The profit in the first period can be then written as:

$$\pi_1 = F(K_0, L_1) - w_1 L_1,$$

[2] Minus one so as to get at relative rate or percentage.

where K_0 is the initial capital endowment of the firm, exogenously given. For simplicity it is assumed that this initial capital stock has no value outside the firm.

The firm thus chooses the amount of labor in order to maximize the profit. The optimum will be characterized by the following condition:

$$\frac{\partial F(K_0, L_1)}{\partial L_1} = w_1 \tag{6}$$

The condition tells us that at the optimum the marginal product of labor is equal to the real wage.

It is assumed that the capital used in the production in the first period depreciates totally. Thus at the end of the first period the firm borrows new capital from the bank in order to use it as input in the production of the consumption good in the second period. At the end of the second period the firm has to pay back $(1+r^l)$ per unit of capital to the bank, where r^l is the interest rate on loans. So the firm's profit in the second period is:

$$\pi_2 = F(K, L_2) - w_2 L_2 - (1+r^l)K ,$$

where K is the amount of capital borrowed from the bank.

The firm maximizes the profit with respect to labor and capital, so that in the optimum we get:

$$\frac{\partial F(K, L_2)}{\partial L_2} = w_2 \tag{7}$$

$$\frac{\partial F(K, L_2)}{\partial K} = 1 + r^l , \tag{8}$$

where, as before, the conditions ensure that the marginal products of the inputs are equal to their corresponding prices.

7.1.3 Monopolistic bank

The monopolistic/monopsonistic bank is assumed to demand labor in the second period. The amount of labor used by the bank is proportional to the amount of loans, i.e. $B = \alpha K$, where $\alpha > 0$. The bank is assumed to have zero equity and face a downward sloping demand function for loans and an upward sloping deposit function. This implies that the amount of savings that households deposit in the bank, is a function of the deposit rate, so that:

$$S = S(r^d), \text{ with } S'(r^d) \geq 0,$$

while the amount of loans issued by the bank is a function of the interest rate on loans, so that:

$$K = K(r^l), \text{ with } K'(r^l) < 0.$$

It is assumed that the bank has no other funding sources than the deposits from households. Hence, the bank chooses amount of loans and deposits (K,S) to maximize its profit subject to the feasibility constraint[3]:

$$\underset{K,S}{Max}\,\Pi(K,S) = r^l(K)K - r^d(S)S - \alpha w_2 K \text{ subject to } K \leq S$$

The Lagrangian function for this problem is:

$$L(K,S) = r^l(K)K - r^d(S)S - \alpha w_2 K - \lambda(K - S),$$

where λ is the Lagrangian multiplier associated with the feasibility constraint.

The solution to the problem is characterized by the following first order conditions:

$$\frac{\partial L(K,S)}{\partial K} = \frac{dr^l}{dK}K + r^l(K) - \alpha w_2 - \lambda = 0$$

$$\frac{\partial L(K,S)}{\partial S} = -\frac{dr^d}{dS}S - r^d(S) + \lambda = 0,$$

as well as the complementary slackness conditions:

[3] The bank's feasibility constraint, $K \leq S$, implies that the bank has no other sources of finance than deposits from households.

$$\lambda > 0, \ (\lambda = 0, \text{ if } K < S)$$

$$K \leq S$$

If $K < S$, then $\lambda = 0$, which implies that:

$$-\frac{dr^d}{dS}S - r^d(S) = 0 \Rightarrow r^d(S) = -\frac{dr^d}{dS}S = -\frac{S}{S'(r^d)} < 0,$$

which is impossible, since deposit interest rate is assumed to be strictly positive and $S'(r^d) \geq 0$.

Hence, we must have that:

$$K = S \tag{9}$$

This means that if the bank chooses $K < S$, than it will always be better off increasing amount of loans, as long as $r^l > r^d$. The bank cannot lend larger amount than what it has in deposits. Hence, condition (9) must hold in equilibrium.

Rearranging the first order condition gives:

$$\left.\begin{aligned} &\frac{1}{K'(r^l)}K(r^l) + r^l - \alpha w_2 = \lambda \\ &\frac{1}{S'(r^d)}S(r^d) + r^d = \lambda \end{aligned}\right\} \Rightarrow r^l - r^d = \alpha w_2 + \frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K} > 0, \tag{10}$$

where ε_S is the price elasticity of deposits, and ε_K is the price elasticity of loans, defined as:

$$\varepsilon_S := El_{r^d}(S(r^d)) = \frac{r^d}{S(r^d)}S'(r^d) > 0$$

$$\varepsilon_K := -El_{r^l}(K(r^l)) = -\left(\frac{r^l}{K(r^l)}K'(r^l)\right) > 0$$

It is assumed that the price elasticities are constant. In particular, I assume that the price elasticity of deposits is positive, but smaller than one (inelastic supply of deposits from households). The last assumption seems to be generally supported in the literature. For example, Beznoska and Ochmann (2011) perform an empirical study based on data from Germany, where they investigate the effects of changes in interest rates on household savings

and estimate the price elasticity of savings at around zero. Elmendorf (1996) in his survey uses an indirect approach in estimating the interest elasticity of savings. He uses, among others, a basic life-cycle model, which generates interest elasticity around 0.5.[4]

Condition (10) shows that the monopolistic bank will set the volume of loans and deposits in such a way that the intermediation margin (the difference between loan and deposit rates) does not only reflect the marginal cost associated with labor input, but also the inverse elasticities of demand for loans and deposits. The margin will be higher the smaller the elasticities are, which in turn will depend on the degree of bank's market power. If the bank has control over the whole market, then the demand elasticities are expected to be very low, thus giving the bank high economic profits reflected in large spreads.

7.1.4 Market equilibrium

Given households' optimal labor supply and savings decision, the set of equilibrium prices $\{r^d, r^l, w_1, w_2\}$ will be determined by the following market clearing conditions:

$$X_1 = F(K_0, L_1) = S + C_1 \tag{11}$$

$$X_2 = F(K, L_2) = C_2 \tag{12}$$

$$1 = L_1 + l_1 \tag{13}$$

$$1 = L_2 + l_2 + B, \tag{14}$$

where (11) and (12) are clearing conditions for the consumption goods markets in the first and the second periods; and (13) and (14) are labor market clearing conditions in the first and the second periods.

Inserting (1) and (9) into the market clearing conditions and rearranging the terms, we get:

$$C_1 = F(K_0, L_1) - \frac{B}{\alpha} \tag{15}$$

[4] The goal of the survey by Elmendorf (1996) is not to show that interest elasticity of savings is less than one. In particular, the author's main point is that such elasticity cannot be estimated with certainty, but nevertheless, is more likely to be positive.

$$C_2 = F\left(\frac{B}{\alpha}, L_2\right) \tag{16}$$

$$l_1 = 1 - L_1 \tag{17}$$

$$l_2 = 1 - L_2 - B \tag{18}$$

In the next subsection the social planner will determine the optimal allocation of resources in the economy by maximizing households' utility subject to the conditions (15)-(18).

7.1.5 Social optimum

To see how the market allocation differs from the socially optimal allocation I next turn to the optimization problem of the social planner, whose decision problem is to maximize households' utility subject to (15)-(18). Hence, the social planner solves:

$$\underset{B,L_1,L_2}{Max}\, v(B,L_1,L_2) := u\left(F(K_0,L_1) - \frac{B}{\alpha}, 1 - L_1\right) + \beta u\left(F\left(\frac{B}{\alpha}, L_2\right), 1 - L_2 - B\right)$$

First order conditions of the problem are:

$$\frac{\partial v(B,L_1,L_2)}{\partial L_1} = \frac{\partial u}{\partial C_1}\frac{\partial F(K_0,L_1)}{\partial L_1} - \frac{\partial u}{\partial l_1} = 0 \tag{19}$$

$$\frac{\partial v(B,L_1,L_2)}{\partial L_2} = \beta\left(\frac{\partial u}{\partial C_2}\frac{\partial F(K,L_2)}{\partial L_2} - \frac{\partial u}{\partial l_2}\right) = 0 \tag{20}$$

$$\frac{\partial v(B,L_1,L_2)}{\partial B} = -\frac{\partial u}{\partial C_1}\frac{1}{\alpha} + \beta\left(\frac{\partial u}{\partial C_2}\frac{\partial F(K,L_2)}{\partial K}\frac{1}{\alpha} - \frac{\partial u}{\partial l_2}\right) = 0 \tag{21}$$

Rearranging (19) and (20) we get:

$$\frac{\frac{\partial u}{\partial l_1}}{\frac{\partial u}{\partial C_1}} = \frac{\partial F(K_0,L_1)}{\partial L_1} \tag{22}$$

$$\frac{\frac{\partial u}{\partial l_2}}{\frac{\partial u}{\partial C_2}} = \frac{\partial F(K,L_2)}{\partial L_2} \tag{23}$$

These conditions tell us that at the optimum the marginal rate of substitution between consumption and leisure in each period must be equal to the marginal product of labor in the same period.

Rearranging the terms in (21) and inserting for $\frac{\partial u}{\partial l_2}$ from (23) we get:

$$\frac{\partial u}{\partial C_1}\frac{1}{\alpha} = \beta\frac{\partial u}{\partial C_2}\frac{\partial F(K,L_2)}{\partial K}\frac{1}{\alpha} - \beta\frac{\partial u}{\partial C_2}\frac{\partial F(K,L_2)}{\partial L_2} \Rightarrow \frac{\partial u}{\partial C_1} = \beta\frac{\partial u}{\partial C_2}\left[\frac{\partial F(K,L_2)}{\partial K} - \alpha\frac{\partial F(K,L_2)}{\partial L_2}\right]$$

The last condition can be written as:

$$\frac{\frac{\partial u}{\partial C_1}}{\beta\frac{\partial u}{\partial C_2}} = \frac{\partial F(K,L_2)}{\partial K} - \alpha\frac{\partial F(K,L_2)}{\partial L_2} \tag{24}$$

Condition (24) shows that at the social optimum the marginal rate of substitution between consumption in the first and the second period must equal to the difference between the marginal product of capital and the marginal product of labor used in the banking sector.

Inserting (7)-(8) and (10) into (24) gives:

$$\frac{\frac{\partial u}{\partial C_1}}{\beta\frac{\partial u}{\partial C_2}} - 1 = \frac{\partial F(K,L_2)}{\partial K} - \alpha\frac{\partial F(K,L_2)}{\partial L_2} - 1 = r^l - \alpha w_2 = r^d + \frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K} \tag{25}$$

Recall that the market's allocation is characterized by (5) $\frac{\frac{\partial u}{\partial C_1}}{\beta\frac{\partial u}{\partial C_2}} - 1 = r^d$. Hence, comparing (5) and (25) gives us the difference between the socially optimal allocation and the market allocation in the no-tax case, i.e.:

$$\Delta_{noVAT} = \left(r^d + \frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K} \right) - r^d = \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K} \right) > 0,$$

where Δ_{noVAT} shows by how much the market allocation deviates from the social optimum.

This deviation is positive due to the distortions caused by the presence of the market power in the economy, and can be perceived as the marginal welfare loss that occurs due to the difference between the price and the marginal cost. Indeed, if there was a competitive banking sector in this economy, then the spread between deposit interest rate and the interest rate on loans would be just equal to the marginal cost associated with the use of labor input in the production of financial services, i.e. $r^l - r^d = \alpha w_2$. In that case, the difference between the socially optimal allocation and the market allocation would be zero. The problem is that the bank, being entitled with some market power, is only concerned about its own profits. Hence, we can expect that it will set such prices (or such quantities) that maximize these profits. The social planner, on the other hand, is concerned about the total welfare surplus, and thus chooses the allocation of resources so that this surplus is maximized. This conflict of the objectives of the bank and the social planner results in the marginal welfare loss for the economy, which in the model is measured by Δ_{noVAT}.

7.2 Introducing VAT

In this section I introduce VAT on the financial intermediation services with the opportunity for financial institutions to opt into taxation. Since there is only one bank in this model, then the fraction of financial institutions that will opt into taxation is interpreted here as the probability that a bank will choose to be taxed.

In imposing VAT on financial services in the model I use the cash-flow approach. The decision on incorporating the O2T into this model is justified by the presence of large compliance costs associated with introduction of cash-flow VAT on financial services. As was discussed earlier, while such costs would be a heavy burden for some financial institutions, others would find benefits from tax rebates higher than administrative and compliance costs caused by introduction and maintenance of new accounting systems.

For now, I leave the claim that there will be banks with incentives to opt into taxation, as a wild guess. In section 8 I will return to this issue.

7.2.1 Monopolistic bank

Assume that with probability θ the bank will choose to charge VAT on its services and get VAT credit for the purchased inputs; and with probability $(1-\theta)$ the bank will choose to continue being exempt from VAT.

If the bank chooses to opt in, it has to bear a compliance cost $C(K)$, measured in units of labor, where $C(K)$ is assumed to be strictly increasing and strictly concave.

Imposing the VAT on financial services will normally change the prices for such services. Let $\bar{r}^l$ denote the new interest rate on loans, and $\bar{r}^d$ denote the new deposit rate. These are the prices that firms and households meet whenever they purchase financial services from a bank that has opted into taxation.

Let τ be the VAT rate, then bank's expected net cash flow can be written as:

$$Z(K,S) = \theta(1-\tau)\left(\bar{r}^l(K)K - \bar{r}^d(S)S - \alpha w_2 K - w_2 C(K)\right) +$$

$$+(1-\theta)\left(r^l(K)K - r^d(S)S - \alpha w_2 K\right) =$$

$$= \theta(1-\tau)\left(\bar{r}^l(K)K - \bar{r}^d(S)S\right) + (1-\theta)\left(r^l(K)K - r^d(S)S\right) - \theta(1-\tau)w_2 C(K) - (1-\theta\tau)\alpha w_2 K$$

The bank maximizes the expected net cash flow subject to the feasibility constraint: $K \le S$, which will be binding at the optimum.

The Lagrangian function of this optimization problem is:

$$L(K,S) = \theta(1-\tau)\left(\bar{r}^l(K)K - \bar{r}^d(S)S\right) + (1-\theta)\left(r^l(K)K - r^d(S)S\right) - \theta(1-\tau)w_2 C(K) -$$
$$-(1-\theta\tau)\alpha w_2 K - \lambda\left(K - S\right)$$

The solution to this problem is characterized by the following first order conditions:

$$\frac{\partial L(K,S)}{\partial K}=\theta(1-\tau)\left(\frac{d\overline{r}^{l}}{dK}K+\overline{r}^{l}\right)+(1-\theta)\left(\frac{dr^{l}}{dK}K+r^{l}\right)-\theta(1-\tau)w_2C'(K)-(1-\theta\tau)\alpha w_2-\lambda=0$$

$$\frac{\partial L(K,S)}{\partial S}=\theta(1-\tau)\left(-\frac{d\overline{r}^{d}}{dS}S-\overline{r}^{d}\right)+(1-\theta)\left(-\frac{dr^{d}}{dS}S-r^{d}\right)+\lambda=0,$$

The first condition can be written as:

$$\theta(1-\tau)\frac{1}{K'(\overline{r}^{l})}K(\overline{r}^{l})+\theta(1-\tau)\overline{r}^{l}+(1-\theta)\frac{1}{K'(r^{l})}K(r^{l})+(1-\theta)r^{l}-$$
$$-\theta(1-\tau)w_2C'(K)-(1-\theta\tau)\alpha w_2=\lambda\Rightarrow$$

$$\Rightarrow\theta(1-\tau)\frac{\overline{r}^{l}}{-\varepsilon_K}+\theta(1-\tau)\overline{r}^{l}+(1-\theta)\frac{r^{l}}{-\varepsilon_K}+(1-\theta)r^{l}-\theta(1-\tau)w_2C'(K)-(1-\theta\tau)\alpha w_2=\lambda \quad (26)$$

Rearranging the terms in the second condition gives:

$$\theta(1-\tau)\frac{1}{S'(\overline{r}^{d})}S(\overline{r}^{d})+\theta(1-\tau)\overline{r}^{d}+(1-\theta)\frac{1}{S'(r^{d})}S(r^{d})+(1-\theta)r^{d}=\lambda$$

$$\Rightarrow\theta(1-\tau)\frac{\overline{r}^{d}}{\varepsilon_S}+\theta(1-\tau)\overline{r}^{d}+(1-\theta)\frac{r^{d}}{\varepsilon_S}+(1-\theta)r^{d}=\lambda \quad (27)$$

Combining (26) and (27) we get:

$$\theta(1-\tau)\frac{\overline{r}^{l}}{-\varepsilon_K}+\theta(1-\tau)\overline{r}^{l}+(1-\theta)\frac{r^{l}}{-\varepsilon_K}+(1-\theta)r^{l}-\theta(1-\tau)w_2C'(K)-(1-\theta\tau)\alpha w_2=$$
$$=\theta(1-\tau)\frac{\overline{r}^{d}}{\varepsilon_S}+\theta(1-\tau)\overline{r}^{d}+(1-\theta)\frac{r^{d}}{\varepsilon_S}+(1-\theta)r^{d}\Rightarrow$$
$$\Rightarrow\theta(1-\tau)\left(\overline{r}^{l}-\overline{r}^{d}\right)=\theta(1-\tau)\left(\frac{\overline{r}^{d}}{\varepsilon_S}+\frac{\overline{r}^{l}}{\varepsilon_K}\right)+(1-\theta)\underbrace{\left(\frac{r^{d}}{\varepsilon_S}+\frac{r^{l}}{\varepsilon_K}+r^{d}-r^{l}\right)}_{-\alpha w_2}+$$
$$+(1-\theta\tau)\alpha w_2+\theta(1-\tau)w_2C'(K)\Rightarrow$$
$$\Rightarrow\theta(1-\tau)\left(\overline{r}^{l}-\overline{r}^{d}\right)=\theta(1-\tau)\left(\frac{\overline{r}^{d}}{\varepsilon_S}+\frac{\overline{r}^{l}}{\varepsilon_K}\right)+\theta(1-\tau)w_2C'(K)+\theta(1-\tau)\alpha w_2$$

$$\Rightarrow\overline{r}^{l}-\overline{r}^{d}=\alpha w_2+\left(\frac{\overline{r}^{d}}{\varepsilon_S}+\frac{\overline{r}^{l}}{\varepsilon_K}\right)+w_2C'(K)>\alpha w_2+\left(\frac{r^{d}}{\varepsilon_S}+\frac{r^{l}}{\varepsilon_K}\right)=r^{l}-r^{d} \quad (28)$$

Condition (28) tells us that with VAT on financial services, the bank will take into account the compliance costs while solving the maximization problem.[5] Hence, the prices on deposits and loans will change in such a way that the intermediation margin becomes larger than in the no-tax case. Larger margins imply that the interest rate on loans increases and/or deposit interest rate decreases, i.e. $\bar{r}^l \geq r^l$ and $\bar{r}^d \leq r^d$. The first order effect of these price changes would be that firms demand less financing from the bank, thus reducing bank's lending. The supply of deposits would also decrease as the result of lower return to households from deposits. However, as shown in the next subsection, the changes in loan interest rate will be compensated by the input VAT rebates that the firms are entitled to after the exemption is lifted. This compensation will "restore" the effective price that the firms pay for capital, thus causing no substantial changes in firm's demand, and hence, bank's lending. What about the bank's liability side? In the model it is assumed that the interest elasticity of savings is lower than one. That means that changes in the interest rate on deposits will have very small effects (if any) on the supply of deposits from households, thus leading to no substantial changes on the bank's liability side either.

7.2.2 Firms

When the VAT exemption of the financial services is lifted, the firms are allowed to claim the VAT credit on the purchased inputs.

Assume that the reference interest rate used by the bank to calculate the value added provided to firms and households, is equal to R, such that:

$$\bar{r}^l > R > \bar{r}^d$$

Then the share of VAT that was paid by the firm is:

$$\tau(\bar{r}^l - R)K$$

[5] Since the price elasticities of loans and deposits are assumed to be constant, and the new prices for loans and deposits have changed in different directions, I can assume that $\left(\frac{\bar{r}^d}{\varepsilon_S} + \frac{\bar{r}^l}{\varepsilon_K}\right) \approx \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right)$.

Since the VAT exemption does not longer apply to financial services, then with probability θ the firm is allowed to get VAT credit, which is exactly equal to $\tau(\bar{r}^l - R)K$. Hence, in the second period the firm will solve the following maximization problem:

$$\underset{K,L_2}{Max}\,\pi_2 = \theta\left(F(K,L_2) - w_2L_2 - (1+\bar{r}^l)K + \tau(\bar{r}^l - R)K\right) + (1-\theta)\left(F(K,L_2) - w_2L_2 - (1+r^l)K\right) =$$

$$= F(K,L_2) - w_2L_2 - \theta(1+\bar{r}^l)K + \theta\tau(\bar{r}^l - R)K - (1-\theta)(1+r^l)K =$$

$$= F(K,L_2) - w_2L_2 + \theta\tau(\bar{r}^l - R)K - \left((1-\theta)(1+r^l) + \theta(1+\bar{r}^l)\right)K =$$

$$= F(K,L_2) - w_2L_2 + \theta\tau(\bar{r}^l - R)K - \left(1 + r^l + \theta(\bar{r}^l - r^l)\right)K$$

Then in the optimum we have:

$$\frac{\partial F(K,L_2)}{\partial L_2} = w_2 \tag{29}$$

$$\frac{\partial F(K,L_2)}{\partial K} = 1 + r^l + \theta(\bar{r}^l - r^l) - \theta\tau(\bar{r}^l - R) \tag{30}$$

Condition (29) is exactly the same as condition (7), so there will be no changes in the optimal allocation of labor, in comparison to the no-VAT case.[6] This is a rather expected result, since the VAT on financial services had no effect on the price for labor, i.e. the real wage. Condition (30), however, has changed relatively to the no-VAT case. As discussed in the previous subsection, the input VAT rebates that firms are entitled to after the exemption is lifted, allow the bank to set a higher price for loans without distorting firms' optimal choice of capital. For that to hold, we must have the last part of condition (30) equal to zero, i.e.:

$$\theta(\bar{r}^l - r^l) - \theta\tau(\bar{r}^l - R) = 0$$

Independently of the size of θ, this last condition will hold if:

$$(\bar{r}^l - r^l) = \tau(\bar{r}^l - R) \Rightarrow \tau = \frac{\bar{r}^l - r^l}{\bar{r}^l - R} < 1 \Rightarrow R < r^l, \text{ where } R = \frac{1}{\tau}r^l - \frac{1-\tau}{\tau}\bar{r}^l.$$

[6] For simplicity, I assume that labor and capital inputs are technically independent.

So the bank should choose the reference rate such that it is smaller than the interest rate on loans in the no-VAT case. In particular, if the bank chooses $r^d \le R \le r^l$, then independently of the size of θ firms' optimal choice of capital will be the same as in the no-VAT case, if

$$R = \frac{1}{\tau} r^l - \frac{1-\tau}{\tau} \bar{r}^l \ge r^d$$
$$\Rightarrow r^l - (1-\tau)\bar{r}^l \ge \tau r^d$$
$$\Rightarrow r^l - \tau r^d \ge (1-\tau)\bar{r}^l$$

$$\Rightarrow \bar{r}^l \le \frac{r^l}{1-\tau} - \frac{\tau r^d}{1-\tau}$$

Hence, the total effect on the amount of capital that the bank will lend to firms is somewhat ambiguous. This is because while higher loan rates would normally lead to lower demand from firms, recovered VAT on capital inputs would reduce the effective price of loans, thus reducing (or even eliminating) the effects from increased loan rates. With the "correct" choice of the reference rate and the new loan rate set by the bank, it seems to be possible for firms to maintain the same optimal choice of capital as in the no-VAT case.

7.2.3 Households

When the VAT exemption is lifted, with probability θ the households will face a new interest rate on deposits, namely $\bar{r}^d \le r^d$. Then the households' decision problem will be:

$$\underset{S,l_1,l_2}{Max} V(S,l_1,l_2) := \theta\left\{u(w_1(1-l_1)+\pi_1-S,l_1)+\beta u(w_2(1-l_2)+(1+\bar{r}^d)S+\pi_2+\Pi,l_2)\right\}+$$
$$+(1-\theta)\left\{u(w_1(1-l_1)+\pi_1-S,l_1)+\beta u(w_2(1-l_2)+(1+r^d)S+\pi_2+\Pi,l_2)\right\}$$

The solution to this problem is characterized by the following conditions:

$$\frac{\frac{\partial u}{\partial l_1}}{\frac{\partial u}{\partial C_1}} = w_1 \qquad \text{and} \qquad \frac{\frac{\partial u}{\partial l_2}}{\frac{\partial u}{\partial C_2}} = w_2,$$

$$\text{as well as } \frac{\frac{\partial u}{\partial C_1}}{\beta \frac{\partial u}{\partial C_2}} - 1 = r^d - \theta(r^d - \bar{r}^d) < r^d$$

The last condition[7] tells us that with any positive value of θ the realized return from saving will be smaller than in the no-VAT case. Normally, it would lead to decreased supply of deposits from households. However, with the assumption that the interest elasticity of savings is less than one, the amount of deposits from households will have no substantial (if any) effects from changes in deposit rates (at least in this model).

7.2.4 Market equilibrium

With the VAT on financial services and the option to tax, the market clearing conditions become:

$$C_1 = F(K_0, L_1) - \frac{B}{\alpha} \tag{31}$$

$$C_2 = F\left(\frac{B}{\alpha}, L_2\right) \tag{32}$$

$$l_1 = 1 - L_1 \tag{33}$$

$$l_2 = 1 - L_2 - B - \theta C\left(\frac{B}{\alpha}\right) \tag{34}$$

7.2.5 Social optimum

The social planner will now solve:

$$\underset{B,L_1,L_2}{Max}\, v(B, L_1, L_2) := u\left(F(K_0, L_1) - \frac{B}{\alpha}, 1 - L_1\right) + \beta u\left(F\left(\frac{B}{\alpha}, L_2\right), 1 - L_2 - B - \theta C\left(\frac{B}{\alpha}\right)\right)$$

The solution to this problem will be characterized by the following conditions:

[7] The denominator in the LHS of the last condition (in the required rate of return from saving) is treated here as the discounted **expected** marginal utility of the consumption in the second period.

$$\frac{\frac{\partial u}{\partial l_1}}{\frac{\partial u}{\partial C_1}} = \frac{\partial F(K_0, L_1)}{\partial L_1} \qquad \text{and} \qquad \frac{\frac{\partial u}{\partial l_2}}{\frac{\partial u}{\partial C_2}} = \frac{\partial F(K, L_2)}{\partial L_2}$$

$$-\frac{\partial u}{\partial C_1}\frac{1}{\alpha} + \beta\frac{\partial u}{\partial C_2}\frac{\partial F(K,L_2)}{\partial K}\frac{1}{\alpha} + \beta\frac{\partial u}{\partial l_2}\left(-1 - \theta C'(K)\frac{1}{\alpha}\right) = 0,$$

Where the last condition can be written as:

$$\frac{\frac{\partial u}{\partial C_1}}{\beta\frac{\partial u}{\partial C_2}} = \frac{\partial F(K,L_2)}{\partial K} - \left(\alpha + \theta C'(K)\right)\frac{\partial F(K,L_2)}{\partial L_2} \tag{35}$$

Hence, the difference between the socially optimal allocation and the market allocation with VAT on the financial services and the option to tax is:

$$\begin{aligned}
\Delta_{VAT} &= \frac{\partial F(K,L_2)}{\partial K} - \left(\alpha + \theta C'(K)\right)\frac{\partial F(K,L_2)}{\partial L_2} - (1 + r^d - \theta(r^d - \overline{r}^d)) = \\
&= 1 + r^l + \theta(\overline{r}^l - r^l) - \theta\tau(\overline{r}^l - R) - \left(\alpha + \theta C'(K)\right)w_2 - (1 + r^d - \theta(r^d - \overline{r}^d)) = \\
&= r^l + \theta(\overline{r}^l - r^l) - \theta\tau(\overline{r}^l - R) - \left(\alpha + \theta C'(K)\right)w_2 - r^d + \theta r^d - \theta\overline{r}^d = \\
&= (1-\theta)\left(r^l - r^d\right) + \theta\left(\overline{r}^l - \overline{r}^d\right) - \theta\tau(\overline{r}^l - R) - \left(\alpha + \theta C'(K)\right)w_2
\end{aligned} \tag{36}$$

Inserting (10) and (28) into (36) gives:

$$\Delta_{VAT} = (1-\theta)\left(\alpha w_2 + \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right)\right) + \theta\left(\alpha w_2 + \left(\frac{\overline{r}^d}{\varepsilon_S} + \frac{\overline{r}^l}{\varepsilon_K}\right) + w_2 C'(K)\right) - \theta\tau(\overline{r}^l - R) - \left(\alpha + \theta C'(K)\right)w_2 =$$

$$= \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) - \theta\left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) + \theta\left(\frac{\overline{r}^d}{\varepsilon_S} + \frac{\overline{r}^l}{\varepsilon_K}\right) - \theta\tau(\overline{r}^l - R)$$

With the assumption that $\left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) \approx \left(\frac{\overline{r}^d}{\varepsilon_S} + \frac{\overline{r}^l}{\varepsilon_K}\right)$, we get:

$$\Delta_{VAT} = \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) - \theta\tau(\overline{r}^l - R) < \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) = \Delta_{noVAT},$$

because $R < \overline{r}^l$ by assumption.

We see that the marginal welfare loss is reduced by the same amount as the VAT credits that the firms receive per unit of purchased capital, multiplied by the probability that the bank will opt into taxation. This result is rather intuitive, since applying the VAT on the bank's services eliminates distortions associated with the business use of these services. The production efficiency is restored, because the VAT paid on financial services, which are intermediary goods in firm's production process, is compensated (cancelled out) by the VAT credits that the firms are now entitled to.

We can also check whether the deviation between the market allocation and the social optimum in the VAT-case becomes smaller in comparison to the no-VAT case, when the bank manages to set the "correct" reference rate and the loan rate, so that condition (30) becomes $\frac{\partial F(K,L_2)}{\partial K} = 1 + r^l$, i.e. $\theta(\bar{r}^l - r^l) - \theta\tau(\bar{r}^l - R) = 0$. In this case we must have:

$$\tilde{\Delta}_{VAT} = \frac{\partial F(K,L_2)}{\partial K} - \left(\alpha + \theta C'(K)\right)\frac{\partial F(K,L_2)}{\partial L_2} - (1 + r^d - \theta(r^d - \bar{r}^d)) =$$
$$= 1 + r^l - \left(\alpha + \theta C'(K)\right)w_2 - (1 + r^d - \theta(r^d - \bar{r}^d)) =$$
$$= r^l - \alpha w_2 - \theta C'(K)w_2 - r^d + \theta r^d - \theta\bar{r}^d = \left(r^l - r^d\right) - \alpha w_2 - \theta C'(K)w_2 + \theta(r^d - \bar{r}^d) =$$
$$= \alpha w_2 + \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) - \alpha w_2 - \theta C'(K)w_2 + \theta(r^d - \bar{r}^d) =$$
$$= \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) - \theta\left(C'(K)w_2 - (r^d - \bar{r}^d)\right)$$

From (28) we know that if $\left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) \approx \left(\frac{\bar{r}^d}{\varepsilon_S} + \frac{\bar{r}^l}{\varepsilon_K}\right)$, then $C'(K)w_2 = \left(\bar{r}^l - \bar{r}^d\right) - \left(r^l - r^d\right)$. This implies that $\left(C'(K)w_2 - (r^d - \bar{r}^d)\right) > 0$, because $r^l < \bar{r}^l$ by assumption. Hence, we have that:

$$\tilde{\Delta}_{VAT} = \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) - \theta\left(C'(K)w_2 - (r^d - \bar{r}^d)\right) < \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) = \Delta_{noVAT}$$

So, we see again that with the VAT on the financial services the market solution to the optimization problem is brought closer to the social planner's solution, i.e. the welfare loss measured by the deviation of the market allocation from the social optimum, is reduced. The higher θ is, the smaller is the deviation, and hence, the smaller is the marginal welfare loss. For example, if all banks in the economy choose to opt into taxation (in the model, if the

probability that the bank will opt in is 100%), then inserting (28) into (36) and setting $\theta = 1$ we get:

$$\bar{\Delta}_{VAT} = \left(\bar{r}^l - \bar{r}^d\right) - \tau(\bar{r}^l - R) - \left(\alpha + C'(K)\right)w_2 =$$
$$= \alpha w_2 + \left(\frac{\bar{r}^d}{\varepsilon_S} + \frac{\bar{r}^l}{\varepsilon_K}\right) + w_2 C'(K) - \tau(\bar{r}^l - R) - \left(\alpha + C'(K)\right)w_2 =$$
$$= \left(\frac{\bar{r}^d}{\varepsilon_S} + \frac{\bar{r}^l}{\varepsilon_K}\right) - \tau(\bar{r}^l - R) < \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right) - \theta\tau(\bar{r}^l - R) = \Delta_{VAT},$$

since $\tau(\bar{r}^l - R) > \theta\tau(\bar{r}^l - R)$.[8]

7.3 Limitations

One obvious limitation of the model presented in the previous section is the absence of physical capital in the banking sector. The bank uses labor as the only input in production of financial services. If the bank were to use physical capital as the production input along with labor, then it would have to purchase this input from the firms, and pay VAT on every unit purchased (this is, of course, unless the provider of physical capital is not VAT-exempt). Then if the bank chose to opt into taxation, it would be allowed to recover the VAT paid on capital. So in principle, the model can be extended by adding capital into the banking sector. However, this extension will not change the main result, i.e. that imposing VAT on financial services brings optimal market allocation closer to the social optimum.

Another limitation is that the model is restricted to monopolistic banking sector. Indeed, one could expect that the analysis might be somewhat different for the fully competitive financial sector. The decision to give the bank in the model some market power was based on the fact that commercial banking industries in the real world do indeed contain many aspects of monopoly and monopolistic competition. Hence, including these aspects in the model ensures better approximation to the real world. Moreover, from a social point of view, some market power in the banking sector might be desirable. The reason is the importance of banks'

[8] Here I continue to assume that $\left(\frac{\bar{r}^d}{\varepsilon_S} + \frac{\bar{r}^l}{\varepsilon_K}\right) \approx \left(\frac{r^d}{\varepsilon_S} + \frac{r^l}{\varepsilon_K}\right)$.

charter value that serves as a factor that discourages banks from taking too much risk. The model presented in this thesis highlights this role of market power.

Finally, the model fails to capture the aspects connected to banks' incentives to opt into taxation. This limitation is closely related to the absence of physical capital in the model. In my analysis I merely assume that at least fraction θ of all the banks will be willing to opt in. The question then remains whether θ will always be positive, i.e. whether at least one bank will be better off opting into taxation of its financial services. This issue is the topic of the next section.

8 Banks' incentives to opt into taxation

As it was shown in the previous section, even if a small fraction of banks chooses to opt into taxation of their financial services, then the market's solution to the optimization problem will be brought closer to the socially optimal solution. One issue that the model presented in this master thesis, does not capture is whether the banks will at all have any economic incentives to choose to charge VAT on their services. Feria and Lockwood (op. cit.) examine this issue for the case with perfectly competitive financial sector and then for the case when there is some market power in the financial sector. In their paper they analyze the costs and benefits of the option to tax granted to financial services firms that sell a single homogeneous product. They conclude that a financial institution that sells services to tax-exempt customers will be always worse off by opting into taxation, both in the case with and without market power. Hence, if the customers of a financial firm are mostly represented by households sector or VAT-exempted businesses, then such firm will never have economic incentives to opt in.

On the other hand, if a financial institution is mainly engaged in business-to-business transactions, then the relative benefits from opting in are much higher than the relative costs associated with such option. This result applies to any case, independently of the degree of market power in the financial sector. Hence, financial institutions, that mostly supply services to VAT-registered customers, will always have strong incentives to opt into taxation.

Based on the theoretical analysis of Feria and Lockwood (Ibid.), I examine a somewhat mixed case, where a financial institution with market power (as in the model presented in this master thesis) has both VAT-registered and VAT-exempted customers, and is allowed to opt into taxation of its financial services. In my analysis I compare two cases:

1. The financial institution chooses to opt in;
2. The financial institution chooses to stay VAT-exempt.

Consider a monopolistic bank that supplies its financial services to households and businesses. It is assumed that the fraction γ of all bank's customers is represented by VAT-registered businesses, while the $(1-\gamma)$ share are VAT-exempt households. The bank uses labor and physical capital (for example, office equipment, computers, etc.) as inputs in the production of financial services. As in the paper by Feria and Lockwood (Ibid.), I assume that

one unit of output (a financial service) is produced by one unit of physical capital plus one unit of labor.

First I examine the case when **the bank chooses to stay VAT-exempt**.

Let r be the purchasing price for one unit of output[9], while the aggregate demand for financial services is represented by the function $D(r)$, which is decreasing in r. Then we must have that households demand financial services in amount equal to $(1-\gamma)D(r)$, while businesses' demand for financial services is $\gamma D(r)$. It is thus assumed that the price for one unit of financial services is the same for households and businesses.

The input prices are q for one unit of physical capital, and w for one unit of labor.

Suppose now that τ is the VAT rate in this economy. The bank purchases physical capital and hires labor to use it in the production of the output, and pays the VAT-inclusive price $(1+\tau)q$ per a unit of capital input and w per unit of labor. Then the bank's expected profit can be written as:

$$\pi^B = \gamma\left(r - w - (1+\tau)q\right)D(r) + (1-\gamma)\left(r - w - (1+\tau)q\right)D(r),$$

where the first part of the equation shows the bank's net revenue from supplying financial services to registered businesses, and the second part is the bank's net revenue from households. Since the selling price of financial services is the same for both households and businesses, we have that the bank's expected profit is:

$$\pi^B = \left(r - w - (1+\tau)q\right)D(r)$$

If the bank chooses to stay exempt from VAT, then its expected profit will be independent of the size of γ. The profit will be always positive, as long as the price of financial services is set above their marginal cost, namely:

$$r > w + (1+\tau)q$$

The question is whether the bank is able to earn higher profits by opting into taxation of its services.

[9] Here one unit of output is one unit of any financial service (for example, insurance service, a bank loan, investment consulting, etc.)

So I look at the case when **the bank chooses to opt into taxation**.

If the exemption is lifted, the bank can actually charge its business customers a higher price than r, without having losses in businesses' demand for financial services. This is because the option to taxation implies that businesses are allowed to recover VAT paid on the services supplied by the bank. Hence, suppose that now the price for financial services offered to business customers is equal to:

$$R = (1+\tau)r$$

Taking into account the input VAT credits that businesses are now entitled to, the effective price that business customers pay for financial services is equal to $\bar{R} = (1+\tau)r - \tau r = r$, i.e. the same as under the exemption. Since the price has remained effectively unchanged, then the demand for financial services from businesses also remains unchanged, i.e. $D(R) = D(r)$. Suppose also, that the households are charged the same price for financial services as before, namely r. Then the households' demand for financial services is equal to $(1-\gamma)D(r)$, while business customers' demand for financial services is $\gamma D(R) = \gamma D(r)$.

Opting into taxation implies that the bank is allowed to recover the VAT paid on the inputs used in the production of financial services. Hence, the bank's expected profit will be:

$$\Pi^B = \gamma\left(\frac{R}{1+\tau} - w - (1+\tau)q + \tau q\right)D(r) + (1-\gamma)\left(\frac{r}{1+\tau} - w - (1+\tau)q + \tau q\right)D(r),$$

where Π^B is the bank's expected profit when the bank chooses to opt into taxation, $\frac{R}{1+\tau}$ is the VAT-exclusive price of financial services supplied to businesses, and $\frac{r}{1+\tau}$ is the VAT-exclusive price of financial services supplied to households.[10] After opting into taxation the bank is entitled to the VAT rebates on inputs used in the production of financial services. Hence, the bank recovers $\gamma\tau qD(r)$ from supplying its services to businesses, and

[10] As mentioned above, r is the selling price of financial services supplied to households, i.e. the VAT-inclusive price. In this model I make the same assumption as in Feria and Lockwood (Ibid.), namely that independently of whether the bank chooses to opt into taxation or not, it keeps the selling price of financial services to households unchanged. Hence, the VAT-exclusive price is equal to $\frac{r}{1+\tau}$.

$(1-\gamma)\tau qD(r)$ from selling its services to households. Rearranging the terms in the expected profit condition and using the assumption that $R = (1+\tau)r$, we get:

$$\Pi^B = \gamma\left(r - w - q\right)D(r) + (1-\gamma)\left(\frac{r}{1+\tau} - w - q\right)D(r) = r\left(\gamma + \frac{1-\gamma}{1+\tau}\right)D(r) - \left(w+q\right)D(r) \Rightarrow$$

$$\Rightarrow \Pi^B = \left(\frac{1+\gamma\tau}{1+\tau}r - w - q\right)D(r)$$

In order for the bank to be better off opting into taxation, we must have: $\Pi^B \geq \pi^B$. Hence,

$$\left(\frac{1+\gamma\tau}{1+\tau}r - w - q\right)D(r) \geq \left(r - w - (1+\tau)q\right)D(r)$$
$$\Rightarrow \frac{1+\gamma\tau}{1+\tau}r - w - q \geq r - w - (1+\tau)q$$
$$\Rightarrow \frac{1+\gamma\tau}{1+\tau}r - r \geq q - (1+\tau)q$$
$$\Rightarrow \frac{\gamma - 1}{1+\tau}r \geq -q \Rightarrow \gamma r \geq r - (1+\tau)q$$
$$\Rightarrow \gamma \geq 1 - \frac{(1+\tau)q}{r}$$

So, with the sufficiently high share of business customers, namely with $\gamma \geq 1 - \frac{(1+\tau)q}{r}$, the bank will be better off if it chooses to opt into taxation of its financial services.

9 Taxation of financial services in Norway

In Norway, as in many other countries with VAT, a wide range of financial services is VAT exempt. It is recognized that the main reason for the exemption is technical complexity in identifying the value added for each specific transaction in the financial sector, as well as difficulties in defining the "correct" value added on margin-based financial services (NOU 2014: 13).

Nevertheless, Norway, as many other countries, is currently working on designing such a tax on financial services, which would both raise as few technical difficulties as possible, and retain most of the properties of the value added tax. In particular, two most favorable characteristics of the VAT are pointed out in Proposition No. 1 LS (2013-2014) to the Storting, namely neutrality of the tax with respect to domestic and foreign suppliers of financial services and input VAT rebates for business customers (Norwegian Ministry of Finance, op. cit.).

The Proposition suggested that normal VAT should be charged on financial services supplied in return for specific consideration (fixed fees, commissions, etc.), whereas margin-based financial services should be subject to another form of taxation, which would have as many properties of the VAT as possible. VAT registered businesses would be allowed to recover the VAT on financial services sold in return for specific consideration. At the same time, the suppliers of such services (financial institutions) would be able to recover VAT paid on inputs used in the production of such services. The Proposition emphasized that both types of financial services should be taxed at a same rate, whereas financial services provided for use abroad should be zero-rated, as such services are part of Norwegian export (Ibid.).

The main difference between the proposed tax on margin-based financial services and the VAT is that the former would apply to aggregate margin income (not separately on each transaction). This means that tax calculations would be performed, for example, once a year. Then if a financial institution pays taxes on both income from margin-based financial services and income from the services sold in return for fixed fees and commissions, then such institution should be entitled to full input VAT deductibility (Ibid.).

Finally, the Proposition suggested that the tax on margin-based financial services should only apply to not VAT registered customers (mainly households). This means that financial services supplied to businesses (VAT registered) should be zero-rated (Ibid.).

On the 2.December 2014 a new proposition on taxation of financial services has been presented by the Scheel Committee, cf. the NOU 2014: 13 Capital income taxation in an international economy (Chapter 9 Taxation of the financial sector). In general, the Committee expressed similar views as in the Proposition No. 1 LS (2013-2014). In particular, it was pointed out that the Ministry of Finance should continue working on the tax design for the financial sector. Moreover, the tax on margin-based financial services should be designed in such a way that it in the least possible way leads to distortions of the preferences between consumption and saving. This implies that:

1. Such tax should be introduced gradually;
2. The tax should retain the neutrality properties of the VAT;
3. The tax rate on margin-based financial services should not necessarily be the same as the VAT rate (It is possible that financial institutions' margin income should be taxed at a lower rate than the VAT rate).

The Committee emphasized that such tax should be introduced in the shortest possible time, even if it fails to retain most of the properties of the VAT in the short run. On this last point, the Committee believes that the distortions caused by the VAT exemption of the financial sector are much more severe, than the ones caused by non-neutrality of the tax on margin-based financial services, at least in the short run (NOU 2014: 13).

The Committee recognizes that the difference in the tax rates might lead to decrease in use of the services sold in return to a specific consideration, as well as increased margins. Therefore, it is preferable that all types of goods and services are subject to the same tax rate. However, if closer examination shows that it is difficult for financial institutions to replace fixed paid services by margin-based financial services, then different tax rates might be considered (Ibid.).

Finally, in order to be able to introduce the tax on financial services in shortest possible time, the Committee suggests that the new tax model should initially not distinguish between VAT registered and not VAT registered customers, i.e. the new tax model should be as easy to design as possible (Ibid.).

10 Conclusion

Over the last decades taxation of financial services has been one of the most intensely debated topics in the tax literature. A wide range of financial services in many countries is VAT exempt. The exemption seems to be generally perceived as undesirable, as it causes a number of important economic distortions and violates the neutrality of the VAT system. At the same time, imposing the VAT on financial services is associated with a number of technical and administrative issues, which no country so far has managed to solve. There is also a number of theoretical arguments in favor of the VAT exemption of the financial sector.

The main objective of this thesis has been to investigate the economic effects of imposing the VAT on financial services. In particular, I compared two cases: with and without VAT on financial services, using the latter as a benchmark for the analysis.

I have set up and solved a two-period consumption/investment model, where a monopolistic bank supplies intermediation services between borrowers (firms) and lenders (households). As possible solutions to the issue of technical and administrative complexity of taxation of financial services, I used both cash-flow taxation and option to tax in the model. In particular, I have shown that in the benchmark case (the situation where there is no VAT on financial services) the market solution to the optimization problem leads to a marginal welfare loss, measured by the deviation of the market solution from the social optimum. Applying the VAT on margin-based financial services, which in the model are represented by the intermediation services between borrowers and lenders, brings the market allocation closer to the socially optimal allocation, thus reducing the marginal welfare loss in the economy. This becomes possible due to the input VAT rebates that the firms are entitled to when the exemption is lifted. The marginal welfare loss will always be smaller when the VAT is imposed, as long as the probability of opting in is positive. It has been also shown that the higher is the probability that the bank will opt into taxation the larger is the reduction in the marginal welfare loss.

The model presented in the thesis has some limitations. First of all, there is no physical capital in the banking sector. Incorporating physical capital as one of the inputs that the bank uses in the production of its services could be one way to extend the presented model. Then it would be possible to include the input VAT rebates that the bank receives when the

exemption is lifted, into the analysis. This would also allow us to examine bank's incentives to opt into taxation within the model. Though incorporating physical capital into the model would add some interesting points into analysis, it would not change the main result, namely that imposing the VAT on financial services reduces the deviation between the market allocation and the social optimum. Another limitation is that the model is restricted to monopolistic banking sector. And though introducing fully competitive financial sector might somewhat change the results of the analysis performed in the thesis, giving the bank in the model some market power makes better approximation to the real world, as well as might be desirable from the social point of view.

Finally, I examined bank's incentives to opt into taxation by setting up another model, where it has been shown that a bank, whose customers are mainly VAT registered businesses, will always be better off opting into taxation. The opposite would apply to a bank, whose customers are mainly not VAT registered consumers (for example, households). Hence, it has been concluded that with a sufficiently high share of VAT registered customers, a bank will have incentives to choose to charge the tax on its services.

In the final part of the thesis I presented a short overview of the latest proposals on taxation of financial services in Norway. These proposals differ in some details from the tax policy introduced in this thesis, but have one common idea with the thesis: financial services should be subject to the VAT or any other form of taxation that manages to retain as many properties of the VAT as possible.

References

Auerbach, A. and R. Gordon (2002): Taxation of Financial Services under a VAT, *American Economic Review*, 92(3), 411-416.

Beznoska, M. and R. Ochmann (2011): The interest elasticity of household savings: a structural approach with German micro data, *Empirical Economics,* 45(1), 371-399.

Boadway, R. and M. Keen (2003): Theoretical perspectives on the taxation of capital and financial services, In P. Honahan (ed.) The Taxation of Financial Intermediation. World Bank and Oxford University Press, 31-80.

Chia, N-C. and J. Whalley, (1999): The tax treatment of financial intermediaries, *Journal of Money, Credit and Banking*, 3, 704-719

De la Feria, R. and B. Lockwood (2009): Opting for Opting In? An Evaluation of the European Commission's Proposals for Reforming VAT on Financial Services, *Fiscal Studies*, 31(2), 171-202.

Devereux, M.P. (2011): New Bank Taxes: Why and What Will Be the Effect?, in CESifo Venice Summer Institute 2012: Taxation of the Financial Sector, 21/07-2012, Venice.

Diamond, P.A. and J.A. Mirrlees (1971): Optimal Taxation and Public Production I: Production Efficiency, *The American Economic Review*, 61(1), 8-27.

Edgar, T. (2001): Exempt Treatment of Financial Intermediation Services Under a Value–Added Tax: An Assessment of Alternatives, *Canadian Tax Journal,* 49(5), 1133–219.

Elmendorf, D.W. (1996): The Effect of Interest Rate Changes on Household Saving and Consumption: a Survey, mimeo, Federal Reserve Board, http://www.federalreserve.gov/pubs/feds/1996/199627/199627pap.pdf, accessed 07/12-2014.

European Banking Federation (2009): Design and Impact of the 'Option to Tax' System for Application of VAT to Financial Services, http://www.ebf-fbe.eu/uploads/documents/publications/Reports/Others/D1925_EBF_-_EY_Final_Report_28_October_2009_TB-NT-2009-01580-01-E.pdf, accessed 23/10-2014.

European Commission (2006): *Consultation Paper on Modernising Value Added Tax Obligations for Financial Services and Insurances*, http://ec.europa.eu/taxation_customs/resources/documents/common/consultations/tax/modernising_vat_en.pdf, accessed 16/10-2014.

Grubert, H. and J.Mackie (1999): Must financial services be taxed under a consumption tax?, *National Tax Journal*, 53, 23-40.

Huizinga, H. (2002): Financial Services – VAT in Europe?, *Economic Policy*, 17, 499-534.

International Monetary Fund (2010): *Financial Sector Taxation: The IMF's Report to the G-20 and Background Material*, International Monetary Fund, http://www.imf.org/external/np/seminars/eng/2010/paris/pdf/090110.pdf, accessed 28/8-2014.

Jack, W. (2000): The treatment of financial services under a broad-based consumption tax, *National Tax Journal*, 53(4), 841-852.

Keen, M. (2011): Rethinking the Taxation of the Financial Sector, *CESifo Economic Studies*, 57, 1-24.

Kerrigan, A. (2010): The elusiveness of neutrality – why is it so difficult to apply VAT to financial services?, MPRA Paper No. 22748.

KPMG (2013): *Norway: VAT essentials*, http://www.kpmg.com/Global/en/IssuesAndInsights/ArticlesPublications/vat-gst-essentials/pages/norway.aspx#9, accessed 30/11-2014.

Lockwood, B. (2010): How should financial intermediation services be taxed?, Oxford University Centre for Business Taxation, Working Paper 10/14.

Merrill, P.R. (2011): VAT Treatment of the Financial Sector, *Tax Analysts,* 163-185.

NOU 2014: 13 Kapitalbeskatning i en internasjonal økonomi.

Poddar, S. N. and M. English (1997): Taxation of Financial Services Under a Value–Added Tax: Applying the Cash–Flow Approach, *National Tax Journal*, 50(1), 89–112.

Prop. 1 LS (2013-2014) Skatter, avgifter og toll 2014.

Schenk, A. (2010): Taxation of Financial Services (Including Insurance) Under a United States Value Added Tax, *Tax Law Review,* 63(2), 409.

Zee, H.H. (2005): A New Approach to Taxing Financial Intermediation Services Under a Value-Added Tax, *National Tax Journal*, 53(1), 77-92.