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A NEW METHOD FOR APPLYING VAT TO FINANCIAL SERVICES

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While many methods of taxing financial services on VAT have been developed in recent decades, none are considered definitive. This article proposes a new approach to taxing financial services that has desirable properties and could be applied practically: The "mobile-ratio" method. This method devises a periodic update ratio to allocate the financial margin of the firm to each financial transaction, obtaining near-complete taxation of the value added by financial services. This simple, neutral method can be easily administered. This approach will be of interest to public economists and policy-makers seeking to increasing VAT revenue and improving VAT efficiency and neutrality.

Key words: Financial services, VAT exemption, mobile-ratio method

JEL classification: H21, H23, G2

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I. INTRODUCTION

According to KPMG, value added tax (VAT) has been implemented in over 150 countries since the 1960s.[1] However, in most countries financial services are exempt from VAT due to the difficulty in calculating financial value added and the lack of an accurate method for taxing financial services. With the considerable growth of the financial sector in recent decades, this exemption has led to lower tax revenue and distortions in the economies of these countries. In this paper, we address this problem using a novel and simple approach that can be easily implemented and administered. This method reduces distortion and allows near-complete taxation of global financial consumption, collecting the product of the standard VAT rate and the financial value added.

In a seminal paper, Ernst and Young (2009) state that banks possess information on the margins added or subtracted for each financial transaction, and thus could theoretically apply the VAT rate to these margins and tax their customers. The authors note the potential complexity of such a strategy, which would require a "more rigorous and consistent approach" than that proposed by Ernst and Young.[2] This is precisely the objective of this paper: to propose an accurate and consistent method based upon a simple but rigorous extrapolation of this idea. By observing national and business accounts, we have developed an approach that taxes financial services using a rate that obtains near-complete taxation of the value added of each financial transaction. The value added of the financial entity is calculated by an accounts-based method, and is reallocated to each transaction using a

[1] https://home.kpmg.com/us/en/home/services/tax/indirect-taxes/value-added-tax.html

[2] Ernst and Young (2009) also note that financial institutions would be reluctant to reveal the information they possess. Hence it would be necessary to base the tax on margins for the most recent historical period (last year, quarter or month). They are also aware that historical data require some degree of aggregation. To allocate the financial margin to each loan or deposit Ernst and Young (2009) propose dividing it equally between both.

"mobile-ratio", which changes periodically. Each transaction is taxed applying the general VAT rate.[3] This method is thus transaction-by-transaction-based.

The "mobile-ratio method" fulfills all the desirable criteria that exemption does not. By fully deducting the input VAT, it completely eliminates business over-taxation, tax cascading, and VAT-induced integration incentives. Applying financial VAT to businesses-to-businesses (B2B) services and businesses-to-consumers (B2C) services at a rate higher than zero eliminates under-taxation of consumers and thus increases revenues. Taxing B2B and B2C services also eliminates the differences between taxable and exempt services. This simple, transaction-by-transaction-based method distributes the value added among transactions through the use of the mobile-ratio. Moreover, unlike financial transaction taxes or the Financial Activities Tax, our proposal applies VAT, rather than a different (separate) tax, to financial services, thus reducing distortions. Furthermore, because this approach would also be applied to financial services between non-financial businesses that occur without financial intermediation, it would not cause disintermediation (and hence a reduction in the tax base).

The paper is divided into five sections. Section II addresses the problems inherent to the current exemption approach and the features of other existing methods under which financial services are fully or partially taxed. In section III we present our approach: section III.A describes the "mobile-ratio" method and section III.B provides some illustrative numerical examples. The main differences between our approach and existing methods are discussed in section IV, and section V provides our final conclusions.

[3] For a discussion on the tax rates to be applied to financial transaction services, see Lockwood and Yerushalmi (2017).

II. PROBLEMS WITH THE CURRENT EXEMPTION AND OTHER METHODS FOR TAXING FINANCIAL SERVICES

A. Exemption

Many authors have discussed the inclusion of financial services intermediation in the VAT base (Grubert and Krever, 2012 and Lockwood, 2014). The main argument against inclusion assumes that these kinds of services do not enter the consumer utility function, and are thus considered a form of investment (Grubert and Mackie, 2000). Nevertheless, as Edgar (2001) concludes, the consensus position in the literature is that financial services are viewed as taxable consumption. Some authors support this position by noting that the provision of financial services generates value-added and uses up real resources (Hoffman, Poddar and Whalley, 1987; Barham, Poddar and Whalley, 1987). Chia and Whaley (1999) explain that financial services lower the transaction costs of intertemporal trade. Jack (2000) argues that the desirability of applying VAT to financial services depends on whether the fees for such services are explicit. He distinguishes between intermediation fees, which are proportional to interest payments (i.e., implicit fees such as the financial margin, which are not appropriate to tax), and fees for the provision of services (i.e., explicit fees and commissions, which are appropriate to tax). Rousslang (2002) suggests that optimal taxation depends on customer behavior. Since customers use financial services to move private consumption across time, he concludes that optimal taxation specifically depends on, firstly, whether there is an efficiency cost to moving tax revenue across time, and secondly, whether a tax on financial services increases the amount of these services per unit of the linked private consumption. If only the answer to the first question is positive, the author argues financial services to consumers should be taxed at least as highly as consumption. For Boadway and Keen (2003), the taxation of financial services depends on how the services in question enter into the pattern of observable net trades. Finally, Auerbach and Gordon (2002) theoretically demonstrate the

optimality of applying VAT to financial services in the same manner in which it is applied to other sectors. According to Merrill (2011), VAT should be applied to financial services if real resources are used to provide them. Mirrlees *et al.* (2011) also provide arguments relating to safety (for example, in deposits) and convenience (carrying a credit card instead of cash).

Currently, financial services are exempt from VAT in most countries, mainly due to the difficulty in calculating the value added and the complexity of the existing methods used to do so. Nonetheless, as Zee (2006 p.80) states, exemption has not relieved financial entities of all compliance costs: to the extent that some of their fee–based services are taxed, they still need to calculate the creditable portion of their input tax.

Edgar (2001) outlines the main arguments for the exemption. First, the application of VAT to financial intermediation charges results in double taxation of a portion of the time-value return to saving. This distorts the choice between current and future consumption. Second, the charges to be taxed are not easily observable or measurable. Third, even if observable, it would be impossible to accurately allocate these charges among consumers. As Huizinga (2002) states, the exact taxable financial margin is not known, as data on the cost of the funds and the risk premium are difficult to calculate on a transaction-by-transaction basis. Therefore, the value added by interest margins, bid-ask spreads, and insurance for each transaction is unknown.

However, exempting financial services from VAT results in several distortions. First, financial entities cannot deduct all their input VAT for non-financial operations[4] and therefore try to add this amount to their prices, and hence to customers. This results in over-

[4] In Spain, for instance, a share of the full input VAT of the financial services can be credited under the corporation tax.

taxation of businesses (Avi-Yonah, 2009), but under-taxation of households.[5] Second, it creates incentives for vertical integration to avoid non-recoverable input VAT.[6] Furthermore, distinguishing between exempt and non-exempt transactions represents a compliance cost and makes taxation more complex.

As Huizinga (2002) suggests, over-taxation of businesses and under-taxation of final consumers would have a positive effect on the demand for financial services by businesses (which would lower interest rates on borrowing and receive credits for input VAT), and would have a negative effect on households (taxation would increase consumer prices). On the supply side, López Laborda and Peña (2017a) show that the indirect taxation of financial services does not affect the size of the financial sector.

In addition to distorting the economy, exemption generally has negative implications for tax revenue. Since financial services are not taxed, no tax is collected on the value added of this type of service, except for the tax collected on business inputs (Gendron, 2008). Studies of the effects of applying VAT to financial services by Huizinga (2002), the European Commission (2011), and PWC (2011) estimated additional VAT collection for Europe ranging from 6 billion to 15 billion euros. De la Feria and Lockwood (2010) estimated an irrecoverable input VAT for Spain would raise €1,575.85 million in 2006. According to OECD (2014), the consumption of insurance and financial services in Spain reached €25,192 million in 2006; accordingly the VAT paid would be roughly €4,031 million (applying the VAT rate of 16 percent that was in effect in that year), and the VAT collected in Spain in 2006 would be €2,455 million, achieving an additional VAT collection of more than 0.1 percent of the Spanish GDP.

[5] The incidence of VAT is an unsettled question. Some authors find that the pass-through of a lower VAT rate to lower prices for the consumers has never been fully realized (European Commission, 2003; Benedek *et al.* 2015).

[6] As a commentator has suggested, the incentives for vertical integration are not very relevant due to the large share of the wages and salaries and the evidence of outsourcing in the financial sector.

In terms of equity, the effects of the taxation of financial services are also unclear. There is a positive effect on income redistribution due to the fact that high-income earners are the most frequent consumers of financial services (Huizinga, 2002), as well as a negative effect, since low-income earners pay higher interest than high-income individuals. Huizinga (2002) simulated a roughly proportional effect on low and high-income households, while López-Laborda and Peña (2017b) find a progressive impact on income distribution.

There are several other important economic consequences of the exemption. De la Feria and Walpole (2009) describe the reduction of VAT efficiency due to erosion of the VAT base and breaking of the VAT chain. One such example is "creeping exemption", the temptation for other sectors to claim more exemptions due to the existence of an exemption in the financial sector. The authors also describe the bias towards foreign providers: financial intermediaries are tempted to acquire services from foreign providers if they have no VAT or their exports are zero-rated because financial institutions reduce their input VAT by doing so (Keen, Krelove and Norregard, 2016). Furthermore, individuals will also be tempted to acquire financial services from foreign providers due to the cascading effect on the price of domestic financial services.

The current regime also has legal consequences, as reported by the European Commission (2007a) and De la Feria and Walpole (2009). One consequence is definitional and interpretative problems: determining the scope of an exemption is a problematic task, and whether new Internet-based financial products and transactions fall within the scope of the exemption is questionable. These problems have increased compliance and administrative costs. Another legal consequence is the difficulty in calculating the recoverable input VAT and the apportionment of the tax. Most financial institutions engage in a range of activities, some of which are taxable and some of which are exempt. The key difficulty is calculating the creditable VAT. Planning and aggressive tax avoidance strategies induced by the

exemption should also be considered (De la Feria and Walpole, 2009). The main methods used to curtail VAT costs are minimizing VAT inputs by acquiring fewer services subject to VAT, and maximizing VAT output by increasing taxable VAT supplies.

B. Methods for taxing financial services

Several approaches have been developed to tax financial services, and many have been tested in different countries. However, no method has been widely accepted. While some approaches are considered conceptually acceptable (e.g., the cash-flow method with a tax calculation account (TCA) and the modified reverse-charging approach), these are complex methods and have proven unviable in practice. Simpler methods such as zero-rating or the taxation of explicit fees and commissions do not result in significant tax revenue, while others such as the full invoicing method result in a lack of liquidity. Others (the subtraction method and the addition method) are incompatible with the credit-invoice method used under the general VAT. Of the existing methods, we prefer separate tax rates with tax on commissions; this allows for near-complete taxation of financial value-added, is a relatively simple and practical method, and is fully compatible with the credit-invoice method.

Below we will briefly discuss each of these methods, ordered from less to more theoretically accurate. We start with modifications of exemption, then we continue showing excess or partial-taxation approaches, and finally, full-taxation methods. Table 1 shows the different methods used in international practice.

1. The zero-rating approach

The *zero-rating approach* consists of applying a zero rate to financial services and full crediting of input VAT. This method avoids cascading but does not address the under-taxation of consumers, and zero-rating B2B (business-to-business) transactions does not eliminate the need to allocate input VAT between taxable and exempt transactions, which

generates complexity (Zee, 2005; Merrill, 2011; Keen, Krelove and Norregard, 2016). Gendron (2008) shows that this approach significantly reduces the distortion and complexity relative to other methods, but finds two principal disadvantages: first, final consumers are taken out of the VAT net, and second, zero rating produces a loss of revenue relative to exemption, because the revenue from taxing inputs under the exemption system is lost. A further distortion arises because zero rating distorts the relative prices of taxable and zero-rated services, which generates a new non-neutral effect. Gendron (2016) describes another disadvantage: the potential increase in fraud and an increased risk of tax-planning behavior.

2. Exemption with input credits

This approach, also known as *partial input recovery*, is an intermediate method between exemption and zero-rating, and allows crediting of a percentage of the input VAT. By establishing this percentage, the input allocation problem disappears. The cascading effect is also totally or partially eliminated, but the problem of under-taxation of consumers remains (Zee, 2006; Gendron, 2008; Merrill, 2011).

3. Option to tax

The *option to tax* method gives financial entities the option to apply VAT to financial services. If an entity decides not to tax, the exemption method is applied. If it opts to tax, then financial services are taxed using the VAT method of the country in question. Each financial entity chooses the most profitable option. This method is useful for financial entities that provide services mostly to businesses, and then apply for a large amount of creditable VAT (Pons, 2006; Gendron, 2008). The European Commission (2007b) proposes broadening of the option to tax insurance services. The features of this method also depends on the approach applied when financial services are taxed.

4. Full invoicing method

Bakker and Chronican (1985) developed the *full invoicing* method, in which the full amount of the transaction is taxed, including either the nominal amount of the transaction (as deposits and withdrawals) or the actual value added of the transaction (fees and commissions).[7] Bird and Gendron (2005) and Gendron (2008) note that this approach causes liquidity problems due to the excessive and inefficient taxation of capital, while capital requirements make the method infeasible. Nonetheless, it can be argued that taxing capital would correct the negative externalities of generating a large financial sector.

5. Taxation of explicit fees and commissions

The main advantage of taxing explicit fees and commissions is that they are easy to tax. However, the financial margin is still exempt, and thus not all financial value added is taxed. Furthermore, complete elimination of under-taxation of consumers is not achieved, collection levels are low, and incentives for substituting margins for fees are created. If only explicit fees are taxed, financial entities can decrease the amount of the fee in order to avoid taxation, and increase the amount of the non-taxed implicit margins. Furthermore, the distinction between non-exempt and exempt services generates many compliance costs. Bird and Gendron (2005) consider this method a variant of the *full invoicing* method in which nominal amounts and implicit fees are still exempt.

6. Gross interest method

Under the *gross interest* method, VAT is assessed on gross lending interest. Usually, more than the implicit fee of the loan is taxed, because the full interest, and not only the part of the interest that represents the fee, is taxed and therefore, capital gains are also taxed. This system has drawbacks and disadvantages: lenders can claim the full credit input VAT but

[7] This method was improved by the cash-flow method (see below).

financial entities cannot, resulting in a cascading effect (Mullins, 2006). The implicit fee on other financial services such as deposits is not taxed. Therefore, under-taxation of consumers partially remains, and the differentiation between taxable and exempt services is not eliminated. Incentives to substitute non-taxed margins or fees for taxable margins are also created.

7. Subtraction, net operating income and addition methods

The *subtraction* approach is an accounts-based method whereby value added is calculated as the difference between revenues and deductible purchases. Developed by Bakker and Chronican (1985), the *net operating income* method takes the net operating income as the tax base. This is the sum of net interest plus margins and explicit fees and commissions. It is similar to the subtraction method (Bird and Gendron, 2007). The *addition* method is an accounts-based method under which value added is calculated as the sum of wages, cost of capital, and profits. Gendron (2008) shows that these methods are accounts-based, meaning they are incompatible with the credit-invoice method, and hence do not allow registered businesses to claim the VAT paid on purchases. Nonetheless, the addition method is considered a simple solution, as shown by Bird and Gendron (2005). They posit that the subtraction method is simpler than other alternatives, but requires complex rules to distinguish between financial and non-financial businesses. Unless these methods are applied to all goods, business distortions and irrecoverable input VAT remain.

8. Financial Activities Tax

Another financial services tax is the *Financial Activities Tax* (FAT), developed by Keen, Krelove and Norregard, (2010) and discussed by Burman *et al.* (2016). This tax is separate from the VAT and taxes profits and remuneration in the financial sector by using the addition method. There are three alternative versions of the same FAT designed to address

different financial distortions. FAT1 aims to eliminate the exemption of the financial sector under the VAT. FAT2 taxes all rents generated in the financial sector. FAT3 aims to discourage risk-taking by taxing only rents in excess of some still high rate of return.

9. Separate tax rates

The *separate tax rates* method, developed by Bakker and Chronican (1985), taxes the proportion of the interest that reflects the service charge on each type of transaction over the total amount of the transaction. As a result, different tax rates are applied to different transactions. An improved method for developing countries has been proposed by Bird and Gendron (2005). This is the *hybrid* system, which combines the separate tax rates method and the taxation of explicit fees and commissions. There are some difficulties in calculating implicit tax rates by type of transaction. This method is discussed in depth in section IV.

10. Cash flow: basic and variant methods

In the *cash flow* method, developed by Hoffman, Poddar and Whalley (1987) and explained by Poddar and English (1997), all cash inflows from financial transactions are considered taxable sales on which VAT must be remitted to the administration, and all cash outflows are treated as taxed purchases on which VAT is refunded by the tax administration. Although conceptually accurate, the pure cash flow method has some disadvantages, as the authors acknowledge. First, the requirement that borrowers pay tax on cash inflows creates additional borrowing requirements. Second, registered businesses have to calculate input VAT credits for cash outflows. This constitutes a compliance cost for medium-sized businesses. Third, the correct amount of the tax is charged only if all cash flows are subject to the same VAT rate.

The *cash flow method with TCA (Tax Calculation Account)* is a variant of the cash flow method, designed to address the practical difficulties of the latter by deferring payment

or the tax credits. This variant solves the first and third problems of the pure cash flow method noted above. Poddar and English (1997) and Edgar (2001) describe the main features of this modified approach. First, VAT payable on cash inflows received in a financial transaction by financial institutions and registered businesses is debited to the TCA. Second, VAT creditable on cash outflows paid in a financial transaction by financial institutions and registered businesses is credited to the TCA. Third, banking interests are adjusted by the short-term government borrowing rate (i.e., the "indexing rate"), as a proxy for the pure interest rate. Poddar and English (1997) argue that the short-term Treasury bill rate would be a good approximation for the pure interest rate. They propose using the same indexing rate for all transactions, regardless of the maturity of the transaction or other aspects. Fourth, after the TCA closes out, the balance in the account that is payable or refundable is periodically determined by subtracting an amount equal to the value of the financial transaction at the end of the period multiplied by the VAT rate.

Nonetheless, this method still has some disadvantages. The first one is the tax payment deferral, since VAT is only collected when the deposit/loan is withdrawn/repaid.

The second issue is related to narrowing the tax base. TCA excludes financial transactions between non-financial businesses from the tax base. This could encourage the erosion of the tax base and generates difficulties in distinguishing between financial and non-financial entities (Ernst and Young 1998).

The third disadvantage is related to compliance and administrative issues. The European Commission (1997) points out the compliance burden for businesses of recording credit and debit entries in the TCA and the conceptual and administrative difficulties for applying the indexing adjustment for each transaction. While the "truncated" TCA (a variant of the TCA in which only financial institutions are required to calculate the tax) is easier to administer due to the smaller number of taxpayers (non-financial businesses do not have to

apply TCA), in this method the compliance costs for financial institutions and the issue of the choice of the indexing rate remains. Therefore, the use of TCA involves compliance costs for financial institutions (Gendron, 2008; Kerrigan, 2010). Nevertheless, modern information and communication technologies could diminish these costs, and Mirrlees *et al.* (2011) consider the TCA a serious option.

With regard to the issue of the choice of the indexing rate, under the basic cash flow method the indexing rate operates implicitly. However, complex rules are needed with the TCA approach when the indexing rate is outside the range of lending and deposit rates, due to the use of the same rate for all transactions as proposed by Poddar and English (1997). This requires the collection of VAT from non-registrants, since if the depositor is not a registrant and the deposit rate is above the indexing rate, the financial institution should pay VAT to the depositor, and the financial entity should not be allowed to claim a deduction for it. As European Commission (1997: p. 126) points out, "further analysis is required" due to this reason. The use of an indexing rate matched to the maturity of the contract would solve this problem but was concluded to be "not feasible" in practice (Ernst and Young 1998).

We will return to the cash flow method with TCA in section IV when discussing the properties of our proposed approach.

The *modified reverse-charging* approach developed by Zee (2005) applies a reverse charge, whereby a registered business collects VAT on inputs and outputs, taxing only the gross lending interest and establishing a "franking mechanism". On a transaction-by-transaction basis, the available credits are obtained applying a franking account based on three balances updated after each deposit or lending transaction.[8] Under the extended version

[8] The franking account is based on a declining-balance method that applies a VAT credit, which is equal to the product of the loan principal and the unclaimed reverse charge per unit of unlent deposit. The latter factor is equal to the fraction of the cumulated unclaimed reverse charge on the unlent deposit and the cumulated unlent deposits.

of this approach, both loan and deposit interest are taxed[9] and the allocation of the VAT between depositors and lenders is left to the banks. Both variants need to match deposits with loans, and require specific taxation for each transaction.

(Table 1)

Bird and Gendron (2005) claim that the main advantage of this approach is the full taxation of value added with little distortion. Gendron (2008) views modified reverse-charging as a variant of the TCA approach, and considers it to be complex and of undetermined applicability. There is a common complexity to both variants of the modified reverse-charging approach, because matching deposits with loans and the application of a transaction-specific rate result in high administrative costs, as does the TCA approach. Furthermore, there is a specific inaccuracy for each variant: under the basic approach, in order to apply the cumulated unlent deposits, the franking mechanism assumes that deposits are larger than loans, which is not always true. Furthermore, charging the full margin VAT to the lender leads to over-taxation of lenders and under-taxation of depositors. Under the extended version, the complex decision of allocating the VAT to lenders and depositors is arbitrarily left to the banks. This decision is similar to choosing the indexing rate in TCA.

III. A NEW METHOD FOR APPLYING VAT TO FINANCIAL SERVICES

A. Formulation of the mobile-ratio method

Bearing in mind the necessary trade-off between neutrality and accuracy on the one hand, and the need for administrative compliance simplification on the other (Bird and Gendron, 2005), we sought to design a balanced method that improves upon existing approaches. The resulting method should solve the problems described in section II.A, be

[9] This method is developed for traditional banking only (i.e., deposits and loans).

fully compatible with the credit-invoice method, and be simpler and more neutral than the different versions of the cash flow method proposed by Hoffman, Poddar and Whalley (1987), Poddar and English (1997) and Zee (2005), and the hybrid methods proposed by Bakker and Chronican (1985) and Bird and Gendron (2005). It should tax the consumption of financial services using the standard VAT rate, and should tax all financial services, not just those provided by financial institutions, as non-financial businesses also sometimes provide financial services to consumers or other businesses (Zee, 2006). We have developed a method that fulfills these criteria, referred to hereafter as the *mobile-ratio method.*

First, we will clarify some basic concepts. According to Eurostat (2013), financial services consist of the following financial intermediation, which includes financial risk management and the creation of liquidity (including insurance and pension services); financial auxiliaries' services, which are activities that facilitate risk management and liquidity creation; and other financial services, such as monitoring and security services.

The financial value added for entity *j* during the period *t* (hereafter, a quarter), $FVA_{j,t}$, is determined using the subtraction method by adding the financial margin ($FM_{j,t}$) plus the net fees and commissions ($EFC_{j,t}$, which includes all explicit fees and commissions, such as charges for brokerage services, trading in securities and foreign exchange), minus input costs ($IC_{j,t}$) and minus investment ($I_{j,t}$). This equates to the value added obtained by the addition method, consisting of the sum of profits ($P_{j,t}$) and wages and salaries ($WS_{j,t}$), plus the cost of capital in the previous period ($i_{j,t}K_{j,t-1}$), plus amortization ($A_{j,t}$), minus investment ($I_{j,t}$)

$$(1) \qquad FVA_{j,t} = FM_{j,t} + EFC_{j,t} - IC_{j,t} - I_{j,t} = P_{j,t} + WS_{j,t} + i_{j,t}K_{j,t-1} + A_{j,t} - I_{j,t}.$$

The financial margin is equal to the interest or banking margin (which includes the implicit margin of loans and deposits), $BM_{j,t}$, and the insurance margin, $IM_{j,t}$, and the bid-

ask spread (which reflects non-observable implicit fees for services such as forex transactions and derivatives, e.g., options, future contracts), $BAS_{j,t}$

(2) $$FM_{j,t} = BM_{j,t} + IM_{j,t} + BAS_{j,t}.$$

As Zee (2006) states, the financial margin (or "imputed" banking output) is also equal to the difference between interest receipts (e.g., loan interest, insurance premiums, gains from derivatives), $IR_{j,t}$, and interest payments (e.g., deposit interest, insurance claims, losses from derivatives), $IP_{j,t}$

(3) $$FM_{j,t} = IR_{j,t} - IP_{j,t}.$$

We define the total value of interest of entity j ($TVI_{j,t}$) as the sum of all interest transactions, i.e., interest receipts plus interest payments

(4) $$TVI_{j,t} = IR_{j,t} + IP_{j,t}.$$

Our method taxes the financial margin using a mobile-ratio approach and also directly taxes net explicit fees and commissions. Thus, all of the financial value added provided by banks and businesses is taxed, consistent with achieving a balance in the trade-off between neutrality and simplicity.

Under the mobile-ratio method, the tax base is constructed by applying the same ratio to each interest transaction. The ratio consists of the financial margin generated by financial services provided by business or bank *j* during the quarter *t-p* (denoted as $FM_{j,t-p}$, with *t-p* representing the quarter for which the information is available, and representing *t* the current quarter)[10] divided by the total value of interest of entity *j* for quarter *t-p* (denoted as $TVI_{j,t-p}$)

[10] In the initial quarter of activity businesses (financial institutions and non-financial businesses) would use the global ratio of the country from the previous quarter.

(5) $$\rho_{j,t} = \frac{FM_{j,t-p}}{TVI_{j,t-p}}.$$

In order to clarify the underlying concepts, we disaggregate the terms defined in (3) and (4)

(6) $$\rho_{j,t} = \frac{IR_{j,t-p} - IP_{j,t-p}}{IR_{j,t-p} + IP_{j,t-p}}.$$

The VAT revenue from the financial margin for entity j is

(7) $$FVAT_{j,t}(FM) = \sum_{i=1}^{n} \tau\rho_{j,t} VI_{ij,t} = \tau\rho_{j,t} \sum_{i=1}^{n} VI_{ij,t} = \tau\rho_{j,t} TVI_{j,t} = \\ = \tau FM_{j,t-p} \frac{TVI_{j,t}}{TVI_{j,t-p}},$$

where $VI_{ij,t}$ is the value of the interest of transaction[11] i of entity j at t, or $\sum_{i=1}^{n} VI_{ij,t} = TVI_{j,t}$, and τ is the general VAT rate. The fraction $\frac{TVI_{j,t}}{TVI_{j,t-p}}$ is roughly equal to 1, so VAT revenue from the taxation of financial services margin can be approximated as[12]

(8) $$FVAT_{j,t}(FM) \approx \tau FM_{j,t-p}.$$

Assuming $p=1$, the following equation is satisfied every year, with a delay of a quarter

[11] The financial transactions included are all current financial services supplied by financial entities and non-financial businesses including deposits, loans, life and non-life insurance, reinsurance, bid-ask spreads, brokerage activities, and investment services. Ideally, these transactions would also include every other kind of new financial product that appears in the future.

[12] We analyzed annual data from the World Bank Database, using a sample of the sum of the lending interest rate plus the deposit interest rate in Spain for the period 1979-2002, with p=1, and calculated that the mean fraction for the period is 0.95995, and it is equal to 1.03 for United Kingdom for the period 1968-1998, 1.022 for Germany for 1979-2002 and 1.016 for France for 1967-2004. We also used a sample of the total value of interest of the entity "CaixaBank" using quarterly data from the first quarter of 2011 to the second quarter of 2014. We found that the mean fraction for the period is 1.0159. These data are obtained from http://www.caixabank.com/informacionparaaccionistaseinversores/informacioneconomicofinanciera/informefinancieroanualysemestral/2013_es.html

(9) $$FVAT_j(FM) \approx \tau FM_j .$$

The VAT collected for net explicit fees and commissions by entity *j* during quarter *t* is

(10) $$FVAT_{j,t}(EFC) = \tau EFC_{j,t} .$$

The financial VAT collection of entity *j* is obtained by adding the VAT collected on the financial margin as calculated by the mobile-ratio plus the VAT collected on explicit fees and commissions, minus investment and input cost credits. In annual terms:

(11) $$FVAT_j = FVAT_j(FM) + FVAT_j(EFC) - FVAT_j(IC) - FVAT_j(I) .$$

The total financial VAT revenue of the economy in that year is thus

(12) $$FVAT = \sum_{j=1}^{m} FVAT_j \approx \tau FVA ,$$

where *FVA* is the financial value added of the economy.

It is well known that financial institutions provide financial services by acting as intermediaries. However, non-financial businesses also provide financial services in the form of loans, credit operations, and other products. While trading without intermediaries also generates financial value added, previous methods used to apply VAT to financial services tended to ignore this fact to avoid complexity and allocation problems. In contrast, the mobile-ratio method can be applied to financial services provided by all kind of businesses[13] (financial institutions and non-financial businesses) in order to achieve neutrality (Poddar, 2007) and to avoid erosion of the VAT base or the use of alternatives to financial institutions (e.g., the provision of financial services without intermediaries via the Internet, financial markets, etc.). Alternatives to financial institutions are used because in some cases

[13] The term "entity" refers to all financial and non-financial entities or businesses.

transaction costs are lower than the sum of the financial explicit and implicit margins plus the VAT charged to consumers.

These types of alternative services generally involve a sole provider and a single customer of the financial service. This is in contrast to financial services provided by financial intermediaries, which involve a sole provider (the financial institution) and two customers (the borrower and the depositor). In those cases, the mobile-ratio only applies to the interest receipts obtained by the provider of the financial service. The lender will apply the following ratio to loan interest

$$\rho = \frac{FM}{TVI} = \frac{IR - \varepsilon}{IR}, \tag{13}$$

where ε is the "pure" interest.

The last theoretical issue to resolve concerns the taxation of cross-border transactions. According to the destination principle, financial services provided to foreign businesses or households should be taxed in their residence country, by means of a reverse-charge approach. Customers would be the taxpayers of the financial VAT in their residence country, the tax being determined by multiplying the mobile-ratio of the provider of the service, the value of the transaction, and the VAT rate of the customers' country of residence. A notional ratio (e.g., the global ratio of the country from the previous quarter) would be used if the country of residence of the financial service provider did not apply the mobile-ratio method.

B. Numerical examples

In this section, we present two numerical examples in order to illustrate the workings and characteristics of the mobile-ratio method: a simple fictional example and a "real world" example.

The following simple fictional example illustrates the mechanism of the mobile-ratio method. The main transactions in this example are summarized in Table 2. We assume a 100 percent pass-through of the VAT into higher prices for consumers. We assume a household deposit of €10,000 in a bank, which simultaneously provides a loan of €10,000 to a firm. The financial institution pays interest of €100 to the depositor and receives interest of €200 from the borrower. The financial institution applies the general VAT rate (0.21) and a mobile-ratio of 0.3333(=(200-100)/(200+100)) for each interest amount.[14] The household obtains €100 in interest, but pays VAT of €7, the product of the interest, the mobile-ratio, and the standard VAT rate. The net interest is the difference between the deposit interest and the VAT paid, €93. The firm pays a net interest of €200, and also pays €14 in VAT. Accordingly, the gross interest paid by the firm is €214, the sum of the two amounts.

It is true that the mobile-ratio method does not explicitly take into account pure interest, so it does not exactly allocate the value added between deposits and loans. But equation [6] is associated with an implicit pure interest rate[15] that is close to the interest rates on government bonds in countries such as Canada, Germany, France, Spain or the United Kingdom.[16] Therefore, the mobile-ratio method results in an acceptable approximation to the correct VAT.

The other three examples shown in Table 5 are similar, but with the following specifications. First, in the case of the life insurance, interest receipts are replaced with

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[14] Assuming that, for the sake of simplicity, these are the only transactions.

[15] The margin-based value added of the loan is $IR - \varepsilon$ and that of the deposit, $\varepsilon - IP$. In order for the mobile-ratio method to correctly allocate the value added between the loan and the deposit, the following conditions have to be met: $\rho \cdot IR = IR - \varepsilon$ and $\rho \cdot IP = \varepsilon - IP$, with ρ the mobile-ratio. Solving these equations for ρ and ε yields $\rho = \frac{IR - IP}{IR + IP}$ and $\varepsilon = \frac{2 \cdot IR \cdot IP}{IR + IP}$.

[16] For instance, for the period 1980-2003 in Spain, the average of the deposit interest rate is 8.21%, the average of the lending interest rate is 11.77%, the average of the short-term Treasury bill rate is 10.64%, and the average ε is equal to 9.59%; for the period 1980-1998 in United Kingdom, the same values are 8.37%, 10.09%, 10.22% and 9.08%, respectively. These data were obtained from the OECD and World Bank Databases.

premiums and interest payments are replaced with claims.[17] The derivative transaction reflects a future contract in which the seller incurs losses. First customer A sells a security for €10, which is bought by the bank after selling the same security to customer B for €20. The financial entity applies the general VAT rate (0.21) and a mobile-ratio of 0.3333(=(20+180-10-90)/ (20+180+10+90)) for each interest amount. Customer A pays €0.7 (=10*0.3333*21) of VAT and the VAT paid by customer B is €1.4 (=20*0.3333*21). Second, after some period of time, customer A purchases the same security for €180, which is sold by the financial institution after buying the same transaction from customer B for €90. The application of the mobile-ratio method is the same: customer A pays €6.3 (=90*0.3333*21) of VAT and the VAT paid by customer B is €12.6 (=180*0.3333*21). The final value added is equal to 100 (=20-10+180-90), and the total VAT paid is €21 (=0.7+1.4+6.3+12.6). The capital loss for customer A is 170(=180-10), and the capital gain for customer B is 70 (=90-20).

For the foreign currency transaction, we assume that the currency is bought for €100 by the bank from customer A and sold to customer B for €200, with €300 (=200+100) as the value of total interest. The mobile-ratio is 0.3333(=(200-100)/ (200+100)). The VAT rate is applied to the product of taxable interest and the mobile-ratio, and then customer A pays €7(=100*0.3333*0.21) of VAT, and customer B pays VAT of €14 (=200*0.3333*0.21). The total VAT revenue of this transaction is thus 21(=300*0.3333*0.21).

(Table 2)

[17] This is an extremely simplified example. Individuals will pay VAT on premiums by applying the mobile-ratio in force in each period. When they receive the benefit, they will also pay VAT on it, applying the corresponding mobile-ratio. In our view, this constitutes an acceptable approximation to the taxation of the value added of each insurance contract. A notional ratio might have to be applied in the early years of a company's activity to compensate for the imbalance between premiums and claims.

We now develop a real-world example using quarterly data from CaixaBank (a Spanish financial corporation). The current period in this first example is the second quarter of 2014.

The value added of CaixaBank in the first (*t-1*) and second (*t*) quarters of 2014 is calculated using the addition method, as shown in Table 3, and the subtraction method, as shown in Table 4, both following (1). The risk premium allocation is solved by obtaining the financial margin and applying the addition method, an accounts-based (not transaction-by-transaction) method. The financial margin can also be calculated using the subtraction method as the sum of the interest margin, the insurance margin, and the bid-ask spread, thus also solving the risk premium allocation problem.

(Table 3)

(Table 4)

Table 5 shows how the mobile-ratio method is used to calculate total VAT revenue, where $TA_{j,t}$ is the total assets (material and intangible) of CaixaBank in *t*. The financial VAT revenue is obtained by adding the VAT paid on the explicit fees and commissions to the VAT paid on the financial margin, minus the VAT credits for investment and input costs. The VAT collected for the financial margin is calculated using the product of the standard VAT rate, the total value of interest of the entity CaixaBank in the second quarter of 2014, and the mobile-ratio. The mobile-ratio is obtained by dividing the financial margin by the total value of interest for CaixaBank in the first quarter of 2014.

(Table 5)

C. Discussion

In Table 6 we assess the mobile-ratio approach and the current approaches to applying VAT to financial services reviewed in section II.B, in terms of seven desirable

properties. A "✓" indicates that the approach, in our view, has the desirable property, which represents an advantage of the method. Each "✖" indicates that the method does not have the desirable property, which is a disadvantage of the method, while "**?**" indicates that the approach does not, or does not always, have the desirable property.

The approaches with the fewest desirable properties are the account-based methods, the full invoicing and the zero-rating approaches, while those with the most desirable properties are the cash flow method with its variants, TCA and modified reverse-charging, and separate tax rates (the hybrid method). The mobile-ratio approach is the only method with all the desirable properties listed in Table 6.

We next compare the three most desirable methods: the TCA, the hybrid, and the mobile-ratio. These three methods satisfy the first six criteria. The complete elimination of business over-taxation, tax cascading, and integration incentives (property 1) is achieved due to the full crediting of input VAT and the taxation of both the financial margin and explicit fees and commissions (exactly in the case of TCA and approximately in the cases of the hybrid and mobile-ratio methods). This discourages the substitution of fees for margins, and eliminates the incentive to self-supply and import bias. Tax revenue is not reduced unless financial services move to the informal sector or abroad. Taxing financial services at a VAT rate higher than zero for businesses and consumers eliminates under-taxation of consumers (property 2) and ensures positive and efficient VAT collection (property 5). Taxing businesses and consumers also eliminates the differences between taxable and exempt services (property 3). Complete deduction of the input VAT is allowed (property 4). The distribution of the value added among transactions allows applying a transaction-by-transaction-based method (property 6). Therefore, these three approaches are fully compatible with the credit-invoice method, and also eliminate the liquidity problems associated with taxing capital. The main differences between these three methods relate to simplicity and

feasibility (property 7). The mobile-ratio method is characterized by simpler administration and compliance than the cash-flow and hybrid methods.

The various methods tax financial services in different ways: TCA and modified-reverse charging apply a transaction-specific rate, the mobile-ratio method charges a firm-specific rate, and the hybrid system and separate tax rates tax each type of transaction with a separate rate.

(Table 6)

The consumption of financial services is simpler to calculate with the mobile-ratio method than compared with the hybrid method; simple addition and subtraction methods are used to calculate the financial value added for each entity and this financial value added is easily allocated to each transaction using the mobile-ratio, without having to calculate the value added for each type of transaction over the total amount for each type of transaction, an operation that could prove complex and costly (Gendron, 2008). The mobile-ratio method taxes different products in the same way, while still taking into account the differences between markets, profits, and financial margins for different firms. Our proposed mobile-ratio method achieves neutrality without the added complexity of having to distinguish between financial and non-financial businesses (as described in section II.B). Therefore, the mobile-ratio method reduces erosion of the tax base.

Views of the effectiveness of the cash flow method with TCA vary in the literature. According to Huizinga (2002) and Zee (2006), the EU experience during the period 1996-1998 with 10 banks using this method was discouraging, as it was very difficult to implement. As stated in a report for the European Commission by Ernst and Young, the cash flow method with TCA proved feasible if it was ‘truncated’ (Ernst and Young, 1998), i.e., if

only financial institutions were required to calculate the tax. However, the reason why this method failed remains unclear.

The mobile-ratio method removes the main disadvantages of the cash-flow method with TCA in terms of compliance and administrative costs. First, the mobile-ratio method applies to financial transactions by non-financial businesses, which eliminates the need to distinguish between financial and non-financial entities. Second, the method avoids the use of TCAs and explicit indexing rates, eliminating the associated complexities. The mobile-ratio method allows an instantaneous tax collection due to the collection of VAT on each interest transaction, without waiting for offsetting transactions. Moreover, banks receive VAT credits for bad loans when TCA is applied, which generates revenue losses for the government and reduces the cost of making bad loans. The mobile-ratio method does not include the credit risk premium in the tax base, avoiding these problems.

The mobile-ratio method is superior to the modified reverse-charge approach in the following respects. First, the mobile-ratio method requires no matching of deposits with loans and does not impose a transaction-specific rate that requires updating of the rate for each transaction. Second, with the mobile-ratio method there is roughly no over-taxation of lenders or under-taxation of depositors. This method also does not require explicit allocation of the VAT between lenders and depositors, due to the implicit indexing rate. Finally, the mobile-ratio method can be applied to many kinds of financial services, while the modified reverse-charge is only charged to deposits and loans provided by banks.

D. Concluding remarks

The mobile-ratio method is the first approach to applying VAT to financial services that taxes all financial services, including those provided by non-financial businesses. Furthermore, it does so using a simple approach that allows entities to collect near-exact

VAT revenue with low administrative and compliance costs. The proposed method is also more neutral than the exemption approach, achieving a desirable balance in the trade-off between neutrality and simplicity. Our method will be of interest to policy-makers, lawmakers, and tax administrators that wish to increase VAT collection and improve VAT efficiency and neutrality using a simple and precise approach.

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Table 1

Methods of taxing financial services applied in international practice

Method	Countries where applied	Method	Countries where applied
Zero-rating	*Quebec (up to 2013), New Zealand (since 2005; Merrill, 2011)*	Subtraction method	*Italy (since 1998; Keen, Krelove and Norregard, 2010), proposed in Japan to be established in 1950, but rejected (De la Feria and Krever, 2013), also proposed in Canada in 1987(Schenk, 2009), and in the Philippines (Xu and Krever, 2016) proposed on 2000, but abandoned before implementing*
Exemption with input credits	*Australia (since 2000; De la Feria and Walpole, 2009), Singapore (since 1994; Jenkins and Khadka, 1998), Malaysia (since 2015; IMF, 2015)*	Net operating income	*Mexico (since 1992; Schatan, 2003)*
Option to tax	*Option to tax only fees: Belgium (since 1978), Lithuania (since 1 May 2004), France (since 1979)* *Option to tax fees and margin: Austria (since 1997 with retroactive effect), Estonia* [1] *(since 2002), Germany (since 1968)* *Source: Ernst and Young (2009)*	Addition method	*Quebec, Michigan (since 1953; De la Feria and Krever, 2013), France (since 1979; Pons, 2006), Israel (since 1976; Gillis, 1987), Denmark (since 1988; Nielsen and Hjerrild, 2013)*
Taxation of gross interest	*Argentina (since 1992; Zee, 2004). Proxy taxes: China (since 1994; Owens, 2014), on VAT since 1 May 2016; KPMG, 2016), the Philippines (since 1946;* ZGLO, 2006*), Taiwan (since April 1986; ROC, 2016), Thailand and Korea*	Financial Activities Tax	*Iceland (since 2012; Keen, Krelove and Norregard, 2016)*
Taxing fee-based services	*Australia, Singapore, South Africa (since 1996; Merrill, 2011), Malaysia, the Philippines (since 1988), India (since 1994; Deloitte, 2013), China (since 1994; Owens, 2014), Korea (since 1982; MSF, 2012), Belgium (1971–1977; Ernst and Young, 2009), Slovenia (since March 2013, PKF, 2014), Andorra (since 2013), Ghana (since 2013; PWC, 2015), Mexico (since 1980; Schatan, 2003), Thailand (since 1992; BOI, 2016), Taiwan*	Separate taxes	*Quebec, Israel (since 1981; Gillis, 1987), France (since 1968; Pons 2006), Denmark, Italy, Andorra (from June 2002 to 2013, as a sales equalization tax, ABA 2010), China (from 1994 (Owens, 2014) up to 1 May 2016 (KPMG, 2016)), India (since 1994 (Deloitte, 2013), proposed under GST in 2016, but postponed until 2017), the Philippines (since 1946; except for the year 2003 when it was taxed under VAT, ZGLO, 2006), Taiwan (since 1 April 1986; ROC, 2016), Thailand and Korea*

[1] None of the financial institutions of this country have opted to tax (Borselli, 2009).

Source: By the authors.

Table 2

Example: financial VAT paid using the mobile-ratio method

	Transaction	Deposit-Loan	Life insurance	Derivative (future)	Foreign currency transaction
	Capital inflows	10,000			
	Capital outflows	10,000			
1	**Interest receipts**	200	200	20+180	200
2	**Interest payments**	100	100	10+90	100
3=1+2	**Total of interests**	300	300	300	300
4	**Mobile-Ratio**	0.3333	0.3333	0.3333	0.3333
5=3*4	**Taxable interest**	100	100	100	100
6	**VAT rate**	0.21	0.21	0.21	0.21
7=5*6	**VAT paid**	21	21	21	21

Table 3

Calculation of the value added of CaixaBank using the addition method

(Millions of euros)

Addition method			
Expression	Account	t-1	t
"Operating Margin" [1] $OM_{j,t} = P_{j,t} + i_{j,t}K_{j,t}$	Net results [2]	152	153
	Financial capital gains	150	74
	Deposit guarantee fund	83	83
	Taxes	-26	24
	Provisions	703	713
$WS_{j,t}$	Wages and salaries	638	653
$A_{j,t}$	Amortization	93	91
$I_{j,t}$	Investment	69	98
$VA_{j,t}$	**Value added (addition)**	1424	1545
τ	Standard VAT rate	21%	21%
$VAT_{j,t}$	Ideal financial VAT revenue of CaixaBank	299.04	324.45

[1] The "Operating Margin" (*OM*) is calculated as the sum of the operating income that appears in the profit and loss statement of CaixaBank plus the Deposit Guarantee Fund account, minus financial capital gains. Following Equation 1, *OM* is equal to profits, *P*, plus the cost of capital, *iK*.

[2] The cost of capital and part of the profits are included in the net results.

Table 4

Calculation of the value added of CaixaBank using the subtraction method

(Millions of euros)

Subtraction method			
Expression	Account	t-1	t
$BM_{j,t}$	Interest margin [1]	993	1,022
$IM_{j,t}$	Insurance margin [1]	32	34
$BAS_{j,t}$	Bid-ask spread [1]	223	311
$FM_{j,t}$	**Financial margin**	1,248	1,367
$EFC_{j,t}$	Net explicit fees and commissions	454	476
$I_{j,t}$	Investment	69	98
$IC_{j,t}$	Input costs	209	200
$VA_{j,t}$	**Value added (Subtraction)**	1,424	1,545

[1] The interest margin is equal to the difference between accounts "Financial Revenues" and "Financial Expenditures". The insurance margin is equal to the "Revenues and Expenditures from Insurance Activities" account. The bid-ask spread is equal to the sum of the "Other Operating Charges and Products" account plus the "Results from financial transactions and exchange differences" account.

Table 5

Calculation of aggregated VAT revenue using the mobile-ratio approach

(Millions of euros)

$IR_{j,t}$ [1]	2,272
$IP_{j,t}$ [1]	1,104
$IR_{j,t-1}$ [1]	2,278.5
$IP_{j,t-1}$ [1]	1,030.5
$TVI_{j,t} = IR_{j,t} + IP_{j,t}$ [1]	3,376
$FM_{j,t-1} = IR_{j,t-1} - IP_{j,t-1}$	1,248
$TVI_{j,t-1} = IR_{j,t-1} + IP_{j,t-1}$ [1]	3,309
$\rho_{j,t} = \frac{FM_{j,t-1}}{TVI_{j,t-1}}$	37.715%
τ	21%
$FVAT_{j,t}(FM) = \tau \times \rho_{j,t} \times TVI_{j,t}$	267.39
$EFC_{j,t}$	476
$FVAT_{j,t}(EFC) = \tau \times EFC_{j,t}$	99.96
$TA_{j,t}$	9,498
$TA_{j,t-1}$	9,309
$I_{j,t} = \Delta TA_{j,t} - A_{j,t} = TA_{j,t} - TA_{j,t-1} - A_{j,t}$	98
$FVAT_{j,t}(I)$	20.58
$IC_{j,t}$	200
$FVAT_{j,t}(IC)$	42
$FVAT_{j,t} = FVAT_{j,t}(FM) + FVAT_{j,t}(EFC) - FVAT_{j,t}(IC) - FVAT_{j,t}(I)$	304.77

[1] Due to a lack of information, we calculate the total value of interest as the sum of banking interest payments and receipts. The actual banking interest receipts of Caixabank are €2,199 million in period t and €2,151 million in period t-1, and the actual banking interest payments are €1,177 million in period t and €1,158 million in period t-1. Knowing the proxy of the total value of interest, and the financial margin for each period, we solve the following equation system for t and t-1 to obtain a proxy for IR and IP: FM= IR-IP and TVI= IR+IP. The real total value of interest for each period is necessarily higher.

Table 6

Assessment of financial VAT methods

Properties (see notes)	*Exemption*	*Zero rating*	*Partial input recovery*	*Full invoicing*	*Taxation of explicit fees and commissions*	*Taxing the gross interest*	*Account-based methods*	*Separate tax rates, hybrid method*	*Cash flow /TCA, Modified-reverse charging*	*Mobile-ratio*
1	✖	✓	**?**	✖	✖	✖	✖	✓	✓	✓
2	✖	✖	✖	✖	**?**	**?**	✓	✓	✓	✓
3	✖	✖	✖	✓	✖	✖	✓	✓	✓	✓
4	✖	✓	**?**	✓	**?**	**?**	✖	✓	✓	✓
5	✖	✖	**?**	**?**	✓	**?**	✓	✓	✓	✓
6	✓	✓	✓	✓	✓	✓	✖	✓	✓	✓
7	✓	✓	✓	✖	✓	✓	✓	**?**	**?**	✓

Notes: 1: Elimination of business distortions: over-taxation, tax cascading, integration incentives and others; 2: Elimination of consumer under taxation; 3: Elimination of the difference between taxable and exempt services; 4: Full crediting of input VAT; 5: Positive and efficient VAT collection; 6: Transaction-by-transaction basis; 7: Simplicity, feasibility.