Financial VAT may improve trade openness

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Abstract: This paper theoretically and empirically analyzes how the taxation of financial services under VAT ("financial VAT") influences trade openness. The empirical analysis uses data from the OECD and 36 European Union countries for the period 1960-2019. Dynamic panel data techniques are used, concretely the *GMM System,* and an unbalanced panel is handled. The results corroborate that financial VAT, and in particular the "option-to-tax" method applied by some countries in the European Union, are positively associated with a country's trade openness.

Key words: Financial VAT, Financial Services, Trade Openness, Panel Data.

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1. Introduction

Although in some countries financial services are subject to indirect taxes, in most countries these services are exempt from VAT. This exemption has several consequences for the economy. Those most studied are related to efficiency, as the exemption causes several distortions, mainly due to irrecoverable input VAT for entities: self-supply bias in the financial institutions, under-taxation of payment services, input inefficiencies in the business sector, and tax cascading.[1] As far as equity is concerned, and to the extent that most financial services are consumed by wealthier individuals, the exemption increases inequality in income distribution (Huizinga, 2002, López-Laborda and Peña, 2017a). Tax revenue is also affected by the exemption, with no consensus among scholars concerning the impact. The proceeds from a VAT on financial services in Europe have been estimated at 6 to 15 billion euros (Huizinga, 2002; European Commission, 2011; Lockwood, 2011).

One way the exemption affects efficiency is through its impact on trade openness, because financial services are under-taxed services for households, and as a kind of non-traded good, this under-taxation discourages the consumption of fully-taxed traded goods. Therefore, removing the VAT exemption for financial services and taxing them at a positive tax rate could reduce disincentives for traded services, and therefore, trade openness would increase. The aim of this paper is to empirically test whether applying indirect taxes to financial services, and in particular VAT ("financial VAT"), positively affects trade openness.

The literature has proposed several methods for taxing financial services, some of which are currently applied in international practice. Table 1 shows the main methods applied around the world.

[1] For a detailed review of the economic distortions of the exemption of financial services on VAT, see López-Laborda and Peña (2018). For a recent study on the implications of the exemption on real economy, see Baydur and Yilmaz (2021).

The "zero rate" method consists of setting VAT on financial services at 0%, allowing financial institutions to claim input VAT. The "exemption with partial input credits" method, also known as "partial income recovery", is a middle ground between exemption and zero-rating, where a percentage of the input VAT is allowed for crediting. In the "taxation of fees and commissions" method, there is a mandatory tax on all explicit fees and charges for financial services and a recoverable input VAT. The "option-to-tax" method gives financial entities the option of charging VAT on financial services, taxing both the interest margin and fees and commissions, or taxing fees and commissions only. The "net operating income" and "gross interest" methods take net operating income and gross lending interest, respectively, as the tax base for VAT. In the "addition" method, the tax is calculated by considering the sum of wages, rents, interests, and net profits as the tax base. In the "subtraction" method, the tax base is the difference between revenues and purchases, being both financial and non-financial. The "separate taxes" method consists of a new type of tax on financial services distinct from standard VAT; a specific example is the Financial Activities Tax (FAT), which also includes aspects of the addition method. These last five methods do not allow financial entities to credit their input VAT.[2]

[TABLE 1 ABOUT HERE]

The paper is divided into five sections. Section 2 reviews the literature and Section 3 develops the framework that theoretically establishes the influence of financial VAT on trade openness. Section 4 proposes the specification of the econometric model relating financial VAT to trade openness and describes the variables of the model. Section 5 estimates the model and discusses the results obtained. We manage an unbalanced data panel of 36 countries for the period 1960-2019. The selected countries are developed and developing

[2] For a more in-depth description and analysis of the different methods, see López-Laborda and Peña (2017b, 2018).

countries of the EU-28 and the OECD, except for Switzerland, Cyprus, Romania, and Malta. Due to the temporal dependence of the data on the dependent variable (degree of trade openness), a dynamic panel data is estimated, following the Generalized Method of Moments (GMM) in two steps. Our estimates suggest, first, that financial VAT, and in particular the "option-to-tax" method applied by some countries in the European Union, are positively and significantly associated with a country's trade openness; and second, that the "separate taxes" method does not seem to be related to trade openness.

2. Literature review

As Guttmann and Richards (2006) assert, the literature on the determinants of trade openness is scarce, despite such seminal works as Alesina and Wacziarg (1998). These authors include geographical variables, the tax-import ratio, the terms of trade, and public expenditure to explain trade openness. Since then, there have been new contributions to the topic. Specifically, there are advances in the study of geographical and commercial variables, such as Hau (1999), Alcalá and Ciccone (2004), Guttmann and Richards (2006), Ram (2009) and Marjit et al (2014). Other authors incorporate financial depth as a determinant, such as Svaleryda and Vlachos (2002) or Aizenman and Noy (2009), or inflation, with authors such as Kurihara (2013) who finds a positive and significant correlation between the two variables, and Lartey (2012), who finds that openness leads to an increase in the inflation sensitivity of non-tradable goods.

Finally, some papers study the influence of consumption or the size of the public sector on trade openness (Garen and Trask, 2005; Benarroch and Pandey, 2008, 2012; Benarroch and Pandey, 2012; and Jetter and Parmeter, 2015). Other papers also study the cointegration of the dependent variable with other variables, such as energy consumption (Nasreen and

Anwar, 2014), or look for determinants of other variables that are distinct but related to trade openness, such as international competition (Chang et al., 2009).

The literature on the impact of financial VAT on trade openness is even scarcer.[3] Huizinga (2002) theoretically studies the effect of VAT reform on VAT revenue and economic welfare, using a partial equilibrium model which simulates with household data. The paper finds a competitive disadvantage in VAT reform, which can also provoke indirect fiscal competition among countries. By exploring data on banking VAT declarations, Moncelli and Pazienza (2007) find that VAT exemption on financial services generates a "hidden tax burden" on the sector, probably related to tax cascading. Using an input-output analysis, the European Commission (2011) simulates the abolition of the financial services exemption, finding a reduction in the output prices of financial services, but also in the output prices of tradable goods. The simulations also show that this last price decrease is passed on to export prices, leading to a reduction in the terms of trade, thereby improving price competitiveness and fostering greater trade openness.

Our aim in this paper is to contribute to this small body of literature by providing an econometric approach to the topic of the impact of financial VAT on trade openness.

3. Conceptual framework

In this section, we propose a theoretical framework for analyzing the effects of financial VAT on trade openness, based on Feldstein and Krugman (1990), and assuming full pass-through of VAT to prices (Benedek et al, 2020). We consider a country that produces and consumes an exported good $\boldsymbol{X}$, an imported good $\boldsymbol{M}$, and a non-traded good $\boldsymbol{N}$. The country

[3] Indeed, as far as we know, the impact of financial VAT on any variable has not yet been studied with real data and econometric techniques, except for the impact of this tax on the size of the financial sector (López-Laborda and Peña, 2017c) and on income distribution (López-Laborda and Peña, 2017a).

is assumed to be small on world goods markets, so that it can trade $\boldsymbol{X}$ for $\boldsymbol{M}$ at a fixed relative price. The degree of trade openness of the country is defined as the sum of exports and imports over total GDP.

The country applies typical VAT, with tax refunds on exports and taxation on imports, so that imports and exports are both reduced in the same proportion by the application of VAT, which allows us to aggregate $\boldsymbol{X}$ and $\boldsymbol{M}$ into a composite traded good $\boldsymbol{T}$. The non-traded good is exempted from VAT. As we will see below, the exemption, which does not allow input VAT to be credited, results in an under-taxation of the non-traded sector compared to the traded sector, which encourages an increase in non-tradable consumption and production while reducing the size of the trading sector, and therefore a decrease in trade openness would be expected.

We can consider financial services to be more like a non-traded than a traded service, as those services are currently more often provided in physical branch offices than on the Internet. As shown by Freund and Weinhold (2002), while the Internet has improved trading with many services, this result is stronger when excluding some services as financial intermediation. Nonetheless, this effect could currently be lessening, since the development of regulation in the main trading conduits is reducing the trading costs of financial services (Miroudot, Sauvage, and Shepherd, 2013). While some authors, such as Krugman (1991, p. 65), consider that "[s]ome services, however, especially in the financial sector, can be traded", the literature has traditionally considered them non-traded services (Benigno and Fornaro, 2014). Indeed, the domestic consumption of financial services reached 76.7% of the final demand for these services in 2015 in Spain, while exports only reached 23.3%.[4] The export

[4] Data from the Input-Output Table for basic prices from the Spanish National Institute for Statistics (INE, 2015). Accessed on 23 April 2020.

share of financial services is significantly lower than that of traditionally traded products: textile products reach a share of 46.7% and motor vehicles, 65.3%.

Next, we analyze the expected differences in trade between the following five scenarios concerning financial VAT, representing the alternative methods applied in international practice as shown in Table 1: exemption, zero-rate, separate taxes, option to tax, and the taxation of financial services under VAT with a positive tax rate.

First, the inefficiency derived from the exemption is analyzed. Considering p_T are the prices of the traded goods in the country, p_N are the prices of the non-traded goods (financial services) in this country, t^G is the standard VAT rate, t^f is the tax rate or the VAT applied to financial services, and $0 < \gamma < 1$ is the percentage of traded goods that are used as input in non-traded goods, and assuming tax revenue is higher than irrecoverable VAT, we can represent the relative price of traded to non-traded goods as follows:

(1) $$\frac{\left(1+t^G\right)p_T}{p_N+\gamma t^G \cdot p_T} > \frac{p_T}{p_N} \Rightarrow T_e < T_*$$

This expression shows that the exemption (identified by sub-index *e*) reduces the size of the tradable sector, T_e, by increasing its price relative to non-traded goods, with respect to the general method of taxation in VAT, T_*. The next expression compares the exemption and "zero-rate" cases:

(2) $$\frac{\left(1+t^G\right)p_T}{p_N} > \frac{\left(1+t^G\right)p_T}{p_N+\gamma t^G \cdot p_T} \Rightarrow T_{zr} < T_e$$

If "zero-rate" is applied to financial services, non-traded goods are not taxed, but the input VAT is refunded. Therefore, the tax levy and the price of these services is lower than in a case where the non-traded sector cannot deduct input VAT, which is the case for the

exemption. Hence, the "zero-rate" method would further increase the price of traded goods relative to non-traded ones, discouraging traded goods, T_{zr}, more than the exemption method.

We now compare the exemption method and "separate taxation". The latter applies a positive tax rate to financial services, but as it is a different tax from VAT, the VAT chain is also broken as in the exemption method. The relative price of traded to non-traded goods is then as follows:

$$(3) \qquad \frac{\left(1+t^G\right)p_T}{\left(1+t^f\right)p_N+\gamma t^G\cdot p_T} < \frac{\left(1+t^G\right)p_T}{p_N+\gamma t^G\cdot p_T} \Rightarrow T_{st} > T_e$$

So, the tradable sector is encouraged with "separate taxes", T_{st}, compared to the exemption or "zero-rate" methods.

The fourth method we will discuss is financial VAT with a positive tax rate:

$$(4) \qquad \frac{\left(1+t^G\right)p_T}{\left(1+t^f\right)p_N} < \frac{\left(1+t^G\right)p_T}{p_N+\gamma t^G\cdot p_T} \Rightarrow T_{ft} > T_e$$

Assuming that the irrecoverable input VAT is lower than the collected financial VAT, we can see that the relative price is lower with the full financial VAT method than with the exemption method and therefore the tradable sector will be incentivized in the first case, T_{ft}, compared to the exemption method.

It is worth noting that, if $t^G = t^f$, then $\left(1+t^G\right)p_T / \left(1+t^f\right)p_N = p_T / p_N \Rightarrow T_{ft} = T_*$. In this case, the following expression will be fulfilled:

$$(5) \qquad T_{zr} < T_e < T_* = T_{ft} < T_{st}$$

Consequently, the method of separate taxation could encourage an inefficiently high tradable sector.

And finally, the "option-to-tax" method is considered. This method allows financial entities to opt between the exemption and the taxation of financial services in VAT with a positive tax rate and the deduction of input VAT:

$$(6) \qquad \frac{\left(1+t^{G}\right)p_{T}}{\left(1+\alpha t^{f}\right)p_{N}+\left(1-\alpha\right)\gamma t^{G}\cdot p_{T}} \leq \frac{\left(1+t^{G}\right)p_{T}}{p_{N}+\gamma t^{G}\cdot p_{T}} \Rightarrow T_{ot} \geq T_{e}$$

Where $0 \leq \alpha \leq 1$ is the proportion of financial entities from country A opting to tax. The aggregate results of this method are between those of full taxation (for $\alpha = 1$, the left-hand side in expression 6 equates that in expression 4) and those of the exemption method (for $\alpha = 0$, the left-hand side in expression 6 equates that in expression 1).

In short, if financial services are considered as non-traded services, the results summarized in (5) suggest that financial VAT can enhance the size of the tradable sector, at the expense of the non-tradable sector, and hence increase trade openness. According to our theoretical analysis, the most suitable methods seem to be full taxation and "option-to-tax".

4. Specifications

According to the theoretical results obtained in the previous section, our objective is to empirically test whether VAT on financial services positively affects the degree of trade openness of countries. We manage an unbalanced data panel of 36 countries for the period 1960-2019. The selected countries are developed and developing countries of the EU-28 and the OECD, with the exception of Switzerland, Cyprus, Romania and Malta.

Like Chang et al. (2009) and Marjit et al. (2014), we will estimate a model that applies the *System GMM* method for dynamic panel data (Arellano and Bover, 1995, and Blundell and Bond, 1998). The specification is as follows:

(7) $$openness_{it} = \gamma * openness_{it-1} + \beta_T T + \beta \mathbf{x}_{it} + a + c_t + \varepsilon_{it}$$

Where $openness_{it}$ is the logarithm of the degree of trade openness of goods of the country *i* in year *t*, calculated as the sum of exports and imports of goods, divided by the value of GDP, in US dollars and current prices. The variable $openness_{it-1}$ is the first lag of the endogenous variable and γ is its coefficient. $\boldsymbol{T}$ is the vector of interest variables (if financial services are subject to VAT, and, if so, the method and the tax rate applied), $\mathbf{x}_{it}$ are the control variables, β are the coefficients, a is the constant, c_t is the trend, and ε_{it} is the disturbance term.

Two complementary specifications are formulated, which differ in the variables of interest they incorporate. The first specification uses *fvat *fr* and *separate*fr* as interest variables. The first variable is the interaction of *fvat*, a binary variable taking the value 1 if financial services are subject to VAT according to Table 1 (excluding FAT and separate taxes), and 0 otherwise; with *fr*, the financial services tax rate applied, as a percent. The second variable is the interaction of *fr* with *separate*, a binary variable taking the value 1 if financial services are subject to a separate tax, and 0 otherwise. As seen in Section 3, a country with financial VAT would have a higher trade openness than with the exemption, because it would avoid discouraging traded goods compared to non-traded goods such as financial services. In addition, the expected effect will be greater as the financial VAT rate approaches the standard VAT rate.

In the second specification, we focus on determining the effect on the trade openness of the financial VAT method most used by the countries in the sample, which is the "option-to-tax" method established by the European Union (EU). Article 137(1)(a) of the VAT Directive currently in force allows EU Member States to introduce an option-to-tax financial services. In the EU, the exemption is generally applied, but since 1978 several countries, such

as Austria, Belgium, Estonia, France, Germany and Lithuania, have successively introduced the option-to-tax system. The "option-to-tax" method allows financial entities to opt to levy VAT on financial services. If an entity decides not to levy VAT, the exemption is applied. If it opts to tax, then financial services are subject to VAT using the VAT method chosen by the country where the financial services provider is established. In this way, each financial entity chooses the most profitable option depending on the volume of input VAT that the company incurs. This method is designed for financial entities that provide services to businesses and apply for a large amount of deductible input VAT (López-Laborda and Peña, 2017b).

This specification uses *O2T*fr, alter*fr* and *separate*fr* as variables of interest. The first is the interaction of the financial tax rate, *fr*, and *O2T*, a dummy variable that reflects whether a country applies (value 1) or not (value 0) the "option-to-tax" method. The second variable of interest is the interaction of *fr* with *alter*, a dummy that reflects whether a country applies (value 1) or not (value 0) financial VAT with a method other than the "option-to-tax".[5] The third variable of interest has already been defined above.

The following variables are used as controls in both specifications, according to the literature on trade openness (see Table 2). The variables related with the demand side are *gdppc*, *investment* and *electricity*. The *gdppc* variable is the logarithm of GDP per capita, lagged one period to avoid simultaneity and endogeneity problems. Per capita capital, incorporated through the *investment* variable, is measured by gross investment, expressed in thousands of millions of dollars and considering investment as the purchase of fixed assets plus net changes in stock. Electricity production, net of energy losses arising during transformation,

[5] If any data is zero in both *fVAT* and *separate* variables, it means that either the country exempted financial services from VAT that year, or the country was not taxing VAT at that time (e.g. US). In the case of France, where financial VAT and a separate tax were in force simultaneously for a while, we have considered it as financial VAT during that period.

distribution and consumption, lagged one year, is measured in kW hour per capita by the *electricity* variable.

The following variables reflect public affairs. The size of the public sector is incorporated through the *psize* variable, measured by public expenditure as a share of GDP, where public expenditure is considered as government payments for operational activities for the provision of goods and services, including workers' remuneration (as wages and salaries), interests and subsidies, donations, social benefits and other costs like income and dividends, according to the World Bank. A country's public surplus is controlled by the *surplus* variable, which is the percentage of surplus over the total GDP. Finally, the *experience* variable reflects the total years since the entry into force of VAT in a country.

Institutional variables are also included in the specifications. Political stability is considered with *stability*, a variable that captures the probability expectations of a destabilization of the government. The *secondary* variable measures the gross secondary school enrolment rate, which is the total number of secondary school students divided by the total number of persons of secondary school age. *Language* is an indicator of institutional development, and measures the presence of at least a significant minority of the population whose mother tongue is one of Europe's five main languages (English, French, German, Spanish and Russian). Infrastructures are considered through the *mobiles* variable, which measures mobile phone lines per 100 people.

The models also include some geographical variables. The *local* variable takes the value 0 if the country is an island, and otherwise, is equal to the result of dividing one by the number of countries that have a common border.[6] The population is incorporated by the *population* variable, which is the de facto population estimated at the middle of the year. The *density*

[6] Other location variables have been used, such as the mean distance to France, USA and Japan, but we obtained worse results in the estimates of the models.

variable reflects the de facto population divided by the surface area of the country. We also control by the *area* variable, which is the size of a country measured by its area.

Finally, financial and trading variables are also incorporated. The size of the financial sector is included through the *fsize* variable, which is the percentage of national private credit provided by the financial sector over total GDP, lagged one year. *Inflation* is the rate of growth of the price of goods and services index. Financial openness is measured by *fopenness*, which is the sum of the capital and current accounts of the balance of payments, with a lag of one year. The terms of trade adjustment, *TOT*, is the level of import minus export of goods and services.

All variables have been obtained from the World Bank database (World Bank, 2021), with the exceptions of *language*, *local*, *experience*, *fr*, *fvat*, *O2T*, *alter* and *separate*, all created by the authors. The expected signs for the coefficients of each variable are shown in Table 2. Table 3 contains the main descriptive statistics of the variables used in the estimates.

[TABLE 2 ABOUT HERE]

[TABLE 3 ABOUT HERE]

5. Estimates and results

To avoid problems of multicollinearity, the correlation matrix is analyzed and the VIF test is applied, and consequently the variables *fsize*, *electricity*, *area*, *population, language* and *experience* are excluded from the estimates. Next, due to the long period considered, unit root tests are applied to the dependent variable, in particular Im–Pesaran–Shin and Phillips–Perron. These tests indicate the existence of a problem of unit root. Therefore, a time trend has been incorporated into the model (Phillips and Perron, 1988) and logarithms have been applied to the dependent variable. The *GMM System* is applied to the two specifications formulated in Section 4, and the empirical strategy followed in both models is also the same. First, each model is estimated taking all non-correlated variables into account. Once this is done, the

Sargan test (over-identification of the instruments) and Arellano and Bond test (non-autocorrelation of residues) are applied. The Sargan test assumes the validity of the applied instruments as null hypothesis. In this first step, no good econometric properties are obtained in any case, so better models are needed.

Second, we sequentially eliminate the non-significant variables from previous models until we obtain estimates in which the validity of the instruments and non-autocorrelation of the residues are corroborated. In these resulting models, the residuals are obtained by a WC-estimator derived by Windmeijer (2005), which is a robust and bias-corrected estimator for two-step VCEs (variance-covariance matrix estimators). This gives final Models I and II shown in Table 4.[7]

[TABLE 4 ABOUT HERE]

A positive and statistically significant relation with trade openness is obtained for the coefficients of financial VAT (*fvat*fr*, Model I) and of taxation through the "option-to-tax" method (*O2T*fr*, Model II), as predicted by our theoretical framework. As Table 4 shows, a one-percentage point increase in a country's financial VAT rate is associated with a 2.1% increase in short-term trade openness. Similarly, a one-percentage point increase in the financial rate through the application of the "option-to-tax" method is associated with a 2.3% increase in short-term trade openness. However, the taxation of the financial services by means of an out-of-VAT tax, which does not allow the full credit of input VAT, as well as financial VAT types other than the "option-to-tax" method, do not seem to have any significant relation with trade openness, as shown by the low significance of the coefficient associated with these variables.

[7] Similar results have been obtained by estimating the same specifications using GMM in differences.

As for the control variables, the coefficient of the lagged dependent variable is positive and significant, consistent with Marjit et al. (2014), and the model has good econometric properties, which confirms the hypothesis developed at the beginning of section 4, so the dynamic character of the model is confirmed.[8] The time trend coefficient is also significant, avoiding potential unit root problems.

With regard to variables of demand, the coefficient of the logarithm of GDP per capita has a negative sign, as in Guttman and Richards (2004), in contrast with other authors such as Chang et al (2009) and Ram (2009), who obtain positive coefficients. Guttman and Richards (2004) suggest that if trade variables are incorporated, as is our case with the variable *TOT*, the trade openness relationship with income is negative. They explain that, according to the literature, non-traded prices are lower in developing countries, so based on the assumption that all countries produce the same proportion of traded and non-traded goods, the value of the non-traded goods would be lower in developing than developed countries. Hence, incorporating trading variables, or geographical variables as proxies for them, the GDP would be negatively related with trade openness. The coefficient of the variable *investment* is significant and with the predicted positive sign, but only in Model I.

With respect to variables related to the public sector, a positive and significant sign is obtained for the coefficient of the variable relating to the size of the government, *psize*, as in Alesina and Wacziarg (1998), and for the coefficient of the variable *surplus*, the same sign as in Aizenman and Noy (2009).

Among the institutional variables, only *secondary* has a significant estimated coefficient, albeit with a negative sign contrary to the one expected.[9] Finally, two financial and trading variables

[8] Specifications with other lag length have been estimated and the results are kept.

[9] For a brief discussion of other measures of human capital which are debated in the literature, see Barro (2001). We have tried other variables, such as the literacy rate, but the resulting models do not have good econometric properties.

also show significant coefficients. The sign is positive for the variable inflation, as in Lartey (2012) and Kurihara (2013), but in contrast to the negative or zero effect obtained by Aizenman and Noy (2009). The coefficient of the variable *TOT* has a negative sign because, as Camagni (2002) states, the terms of trade have a negative correlation with competitiveness. Nonetheless, the coefficient of the terms of trade variable does not appear to be economically significant, due to its low magnitude.

In our models, no significance is obtained for the coefficients of the geographical and institutional variables.

The estimated coefficients show the short-term effects of exogenous variables on the endogenous variable. Long-term effects are calculated by dividing these coefficients by one minus the coefficient of the lag of the endogenous variable. The semi-elasticities of the short- and long-term effects of the significant variables of Models I and II are summarized in Table 5. This table shows that the long-term effects are higher than the short-term effects in absolute terms for all variables.

As for our variables of interest, a one-point increase in a country's financial VAT rate is related to a 5.2% increase in long-term trade openness, and a one-point increase in the financial rate using the option-to-tax method is related to a 6.3% increase in long-term trade openness. We can therefore assert that financial VAT, and specifically the "option-to-tax" method, seems to contribute to increasing the efficiency of the economy, making a country more competitive through its trade openness, in the short and especially the long term.

[TABLE 5 ABOUT HERE]

To test the robustness of our results, we have re-estimated specification (7), but now constructing a new dependent variable, representing the log of aggregate trade openness, calculated as the sum of exports and imports of goods and services, divided by the value of GDP, instead of the trade openness of goods only, as we have considered so far. Table 6

shows the results of new estimates, which substantially coincide with those reflected in Table 4.

[TABLE 6 ABOUT HERE]

6. Concluding remarks

We have theoretically and empirically analyzed the effects on trade openness of applying VAT on financial services. Theoretically, we expect financial VAT to reduce the price of traded goods relative to the price of non-traded goods, allowing an increase in the tradable sector. The results obtained in our empirical exercises suggest, first, that financial VAT, and in particular the "option-to-tax" method applied by some countries in the European Union, are positively and significantly associated with a country's trade openness; and second, that the "separate taxes" method does not seem to be related to trade openness.

Therefore, eliminating the exemption and establishing financial VAT would benefit the economy. The problem is how to apply the levy method. Many methods have been designed, but they are either too simple and do not allow full taxation of the financial services, such as zero-rate, or they produce distortions, such as the addition method, or they are theoretically accurate but difficult to apply, such as the cash flow method with TCA ("tax calculation account"). For a discussion of the methods, see López-Laborda and Peña (2017b).

At the mid-point of this trade-off between simplicity and accuracy, in López-Laborda and Peña (2018) we developed a sufficiently precise but feasible method for taxing financial services under VAT. This is the "mobile-ratio" method, which taxes the financial margin of each company using a mobile-ratio approach. The tax base is constructed by applying the same ratio to each interest transaction carried out by the company in a given period: e.g., each loan or deposit interest. The ratio consists of the margin generated by financial services provided by the company (i.e., the difference between interest receipts and interest payments) during the latest period for which the information is available, divided by the total value of

the interests of the company (i.e., interest receipts plus interest payments) in that same period. The VAT rate is then applied to the tax base. Under this method, VAT rate is also directly applied to net explicit fees and commissions. Thus, all the financial value added provided by a company is taxed. Furthermore, the mobile-ratio method is applied to financial services provided by financial and non-financial entities in order to reach neutrality.

After withdrawing its 2007 proposal in 2016, the European Commission has recently launched a new legislative initiative to modernize the taxation of insurance and financial services (European Commission, 2020). The Commission considers that the current legislation is complex and difficult to implement in practice and that it has not adapted to developments in the financial industry. This has led to conflicts and legal uncertainty. Moreover, the existing rules are not applied uniformly by all Member States, which leads to distortions within the European Union and in third countries' trade. The Commission puts forward two possible alternatives to the exemption: full taxation of insurance and financial services (at standard or reduced rates), and taxation of fee-based services only.

In short, at present there seems to be, on one hand, some willingness to remove the VAT exemption for financial services, given the damage it causes to the economy; and on the other, some theoretically acceptable alternatives to introducing a financial VAT. If these two circumstances converge in the adoption of measures to levy VAT on financial services, our paper suggests that this could lead to an increase in trade openness, among other positive consequences for the economy.

Data availability statement: The data that support the findings of this study are available from the corresponding author upon request.

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Table 1. Methods of taxing financial services applied around the world

Method	Countries where applied	Method	Countries where applied
Zero-rating	*Quebec (up to 2013), New Zealand (since 2005; Merrill 2011),*	Net operating income	*Mexico (since 1992; Schatan 2003)*
Exemption with partial input credits	*Australia (since 2000; De la Feria and Walpole 2009), Singapore (since 1994; Jenkins and Khadka 1998), Malaysia (since 2015; IMF 2015)*	Subtraction method	*Italy (since 1998; Keen et al. 2010), proposed in Japan to be established in 1950, but rejected (De la Feria and Krever 2012), also proposed in Canada on 1987(Schenk 2009), and in the Philippines (Xu and Krever 2016) proposed on 2000, but abandoned before implementing*
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), Gahana (since 2015; 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, Iceland and Korea*
Option to tax	*Option to tax only fees* (partial taxation)*: Belgium (since 1978), Lithuania (since 1 May 2004), France (since 1979)* *Option to tax fees and margin* (full taxation)*: Austria (since 1997 with retroactive effect), Estonia (since 2002), Germany (since 1968)* *Source: Ernst and Young (2009)*	Addition method	*Quebec, Michigan (since 1953; De la Feria and Krever 2012), France (since 1979; Pons 2006), Israel (since 1976; Gillis 1987), Denmark (since 1988; Møller and Hjerrild 2013)*
Taxation of gross interest	*Argentina (since 1992; Zee 2004). Proxy taxes (Burns 2007): 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 et al. 2016), Norway (since 2017)*

Source: López-Laborda and Peña (2017b).

Table 2. Independent variables and expected signs

Variable	Exp. sign	Literature	Variable	Exp. sign	Literature
*fvat*fr*	(+)	Feldstein and Krugman (1990)	*secondary*	(+)	Chang et al. (2009).
*O2T*fr*	(+)	By the authors	*language*	(+)	Alcalá and Ciccone (2004)
*alter*fr*	(+)	By the authors	*mobiles*	(+)	Chang et al. (2009)
*separate*fr*	(+)	By the authors	*local*	(+/-)	(+): Chang et al. (2009), (-): Guttmann and Richards (2006)
gdppc	(-)	Guttman and Richards (2004)	*pop*	(+/-)	(+): Ram (2009), (-): Alesina and Wacziarg (1998), Alcalá and Ciccone (2004), Guttman and Richards (2004).
investment	(+)	Marjit et al. (2014)	*density*	(+/-)	Ram (2009): theoretically (-), empirically (+)
electricity	(+)	Nasreen and Anwar (2014)	*area*	(-)	Alesina and Wacziarg (1998), and Guttman and Richards (2004).
psize	(+)	Alesina and Wacziarg (1998), Rodrik (1998), Garen and Trask (2005) and Ram (2009)	*fsize*	(+)	Chang et al. (2009)
surplus	(+)	Aizenman and Noy (2009)	*inflation*	(+/0/ -)	(+): Lartey (2012) and Kurihara (2013), (0/ -): Chang et al. (2009). Aizenman and Noy (2009)
experience	(+)	Alesina and Wacziarg (1998)	*fopen*	(+)	Aizenman and Noy (2009)
stability	(+/-)	(+): Hau (1999), (-): Aizenman and Noy (2009), Marjit et al. (2014).	*TOT*	(-)	Camagni (2002)

Table 3. Descriptive statistics

Variable	No observations	Mean	Standard Deviation	Minimum	Maximum	Skewness	Kurtosis
openness (ln)	1784	3.826	0.606	1.729	5.204	-0.27	3.433
totopenness (ln)	1703	4.123	0.611	1.745	6.012	-0.174	3.432
fvat (0-1)	2160	0.129	0.335	0	1	2.217	5.919
O2T(0-1)	2160	0.089	0.284	0	1	2.893	9.374
alter (0-1)	2160	0.040	0.196	0	1	4.692	23.032
separate (0-1)	2160	0.064	0.245	0	1	3.551	13.608
fr (%)	2160	2.814	6.566	0	25	2.096	5.769
gdppc (ln)	1834	9.144	1.305	4.541	11.685	-0.556	2.735
investment ($)	1703	1.64E+11	4.2E+11	1.42E+08	4.5E+12	5.776	43.956
psize (%)	1363	33.150	9.846	10.089	78.862	0.007	3.243
surplus (%)	1351	-1.806	4.020	-32.043	19.670	-0.124	8.485
stability	756	0.702	0.647	-2.009	1.760	-1.434	5.193
secondary (%)	1482	96.252	20.300	21.726	163.935	-0.086	5.018
mobiles (%)	1188	65.534	52.712	0.001	172.122	-0.020	1.446
local (0-1)	2160	0.356	0.314	0	1	1.202	3.197
density(km^2 pc)	2120	116.192	117.633	1.338	530.187	1.507	4.734
inflation (%)	1908	12.761	59.729	-4.478	1281.443	14.277	244.616
fopen ($)	1381	-5.75E+09	7.33E+10	-8.26E+11	3.20E+11	-4.625	46.19
TOT ($)	1639	3.91E+11	5.87E+12	-7.04E+13	5.43E+13	-0.725	62.365

Table 4. Estimates results

Dependent variable: *openness*	**Model I**			**Model II**		
Explanatory variables	Coeff.	Std. e.	p-value	Coeff.	Std. e.	p-value
openness t-1	0.594	0.094	0.000	0.632	0.064	0.000
trend	0.009	0.003	0.001	0.009	0.004	0.019
*fvat*fr*	0.021	0.011	0.050			
*O2T*fr*				0.023	0.013	0.087
*alter*fr*				-0.010	0.023	0.672
*separate*fr*	0.007	0.013	0.616	0.008	0.015	0.597
gdppc	-0.094	0.043	0.029	-0.121	0.046	0.009
investment	0.000	0.000	0.035	0.000	0.000	0.376
psize	0.021	0.007	0.002	0.014	0.006	0.013
surplus	0.019	0.007	0.010	0.013	0.006	0.020
stability	0.065	0.046	0.153	0.033	0.046	0.473
secondary	-0.003	0.002	0.029	-0.003	0.002	0.053
local	-0.478	0.605	0.429	-0.290	0.573	0.612
density	0.000	0.001	0.892	0.000	0.001	0.637
inflation	0.008	0.004	0.050	0.010	0.005	0.028
TOT	-2.53E-15	1.14E-15	0.027	-4.08E-15	1.46E-15	0.005
constant	1.871	0.471	0.000	2.186	0.495	0.000
Sargan (p-value)	0.632			0.527		
Arellano-Bond (p-value 1st, 2nd Order)	0	0.689		0	0.589	
No Observations	592			592		
No Instruments	35			35		
R^2 (a)	0.379			0.383		

* 10%, **5% and *** 1% signification level; Std. e.: standard errors; (a): R^2 of the equivalent static model with fix effects.

Table 5. Short- and long-term effects

Model	Model I		Model II	
Variable	**Short run effect**	**Long run effect**	**Short run effect**	**Long run effect**
*fvat*fr*	0.021	0.052		
*O2T*fr*			0.023	0.063
gdppc	-0.094	-0.231	-0.121	-0.329
investment	1.31E-13	3.23E-13		
psize	0.021	0.052	0.014	0.038
surplus	0.019	0.047	0.013	0.035
secondary	-0.003	-0.009	-0.003	-0.008
inflation	0.008	0.020	0.010	0.027
TOT	-2.53E-15	-6.23875E-15	-4.08E-15	-1.11E-14

Table 6. Robustness check

Dependent variable: *totopenness*	**Model I**			**Model II**		
Explanatory variables	Coeff.	Std. e.	p-value	Coeff.	Std. e.	p-value
totopenness t-1	0.737	0.099	0.000	0.722	0.105	0.000
trend	0.006	0.003	0.043	0.006	0.003	0.022
*fvat*fr*	0.015	0.006	0.024			
*O2T*fr*				0.016	0.008	0.047
*alter*fr*				-0.004	0.017	0.802
*separate*fr*	0.007	0.009	0.476	0.004	0.009	0.640
gdppc	-0.021	0.045	0.639	-0.022	0.033	0.513
investment	0.000	0.000	0.585	0.000	0.000	0.373
psize	0.012	0.005	0.018	0.009	0.004	0.036
surplus	0.013	0.006	0.041	0.010	0.005	0.040
stability	0.072	0.034	0.035	0.052	0.034	0.128
secondary	-0.003	0.001	0.026	-0.002	0.001	0.030
local	-0.333	0.421	0.429	-0.337	0.525	0.521
density	0.000	0.001	0.950	-0.001	0.001	0.565
inflation	0.005	0.004	0.163	0.007	0.003	0.021
TOT	-2.30E-15	1.39E-15	0.097	-3.02E-15	9.65E-16	0.002
constant	1.006	0.449	0.025	1.178	0.413	0.004
Sargan (p-value)		0.701			0.692	
Arellano-Bond (p-value 1st, 2nd Order)	0	0.165		0	0.163	
No Observations		593			593	
No Instruments		35			35	
R^2 (a)		0.559			0.564	

* 10%, **5% and *** 1% signification level; Std. e.: standard errors; (a): R^2 of the equivalent static model with fix effects.