"Indirect taxation on VAT consumption. A possible study of alternative tax rate models in Portugal"

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BUSINESS PERSPECTIVES

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INDIRECT TAXATION ON VAT CONSUMPTION. A POSSIBLE STUDY OF ALTERNATIVE TAX RATE MODELS IN PORTUGAL

Abstract

The adoption of a single VAT rate system in the EU is a complex and controversial issue, since the current model includes several differentiated rates and is intended to reflect sectoral needs and ensure greater fairness in the taxation of consumption. This study aims to analyse which of the general consumption tax models (differentiated rates or a single rate) is more efficient in terms of revenue collection. The study uses official statistics available on the official website of the Tax and Customs Authority for the period 1996–2022. VAT revenue is measured by applying the formula of the EU's common VAT model with the necessary adaptations to the flat rate model. Quantitative methods are applied to verify which of the tax models is more efficient in terms of collection. For this purpose, two scenarios were defined (17% and 21%). The results suggest that the estimated revenues for the proposed flat rate models are higher than the amounts actually collected through the differentiated rates. They also suggest that the 21% flat rate is preferable to the 17% rate, although the latter has the capacity to maintain current revenue levels and increase the amount collected compared to the current system. The conclusions suggest that the single VAT rate model is technically more preferable and notably more efficient than the current common consumption tax model adopted by the European Union. The study concludes that the refusal to adopt the single-rate model is not due to technical reasons but to political ones.

Keywords	efficiency, incidence, policy, rate model, revenue, single tax, taxation, VAT
JEL Classification	E62, H21, H22, H25

INTRODUCTION

The discussion on the possibility of adopting a single-rate VAT tax system is currently a topic of great importance in institutions, academia, and society. Academics recognize the relevance of the issue, as there is a consensus on the need to simplify and increase the efficiency of the tax system, making it simpler and more transparent for taxpayers, more equitable and fairer in the taxation of goods and services, more attractive, predictable, and less bureaucratic for investors, resulting in greater efficiency in revenue collection.

This study aims to deepen the debate on the feasibility and possible effects on tax revenue of the VAT flat rate model, providing a new perspective on the general consumption tax. The problem formulation stems from the need to analyze the feasibility and practical challenges of implementing a single VAT rate compared to the current model. A possible reform of the tax implies analyzing factors such as the tax calculation methodology, the selection of rates, and the types of exemptions.

The calculation formula needs to be redefined so that it can capture the emerging characteristics of the single general consumption tax. By

presenting an alternative consumption tax model, the study aims to suggest a possible system capable of making countries more competitive at the international level, avoiding the phenomenon of the "fiscal war", and creating a more favorable environment for economic operations. The aim is to present, with due caution, an alternative approach to the current consumption tax model.

This study investigates the possibility of adopting a flat-rate VAT system in Portugal, the possible effects on consumption tax revenues, and the efficiency of revenue collection.

1. LITERATURE REVIEW

There are few studies on the possibility of applying a single VAT rate. The literature is limited and sometimes based on opinions published in opinion articles (Soares, 2021). However, despite the difficulty, it is possible to highlight some studies on the subject.

One of the first studies on the possible adoption of a single consumption tax model in Portugal was carried out by the VAT Commission in 1984. The VAT Commission proposed, analyzed, and tested, in the Portuguese economic context, the possibility of adopting a system of three general consumption tax rates. To this end, three scenarios were proposed: a single rate (scenario A); three differentiated rates (scenario B); and a zero rate plus two differentiated rates (scenario C). The Commission concluded that the adoption of a single rate would lead to an increase in revenue of 8.8%, while the adoption of a three-rate model would imply an increase of 6.8%, and the zero plus two rate scenarios would lead to an increase in revenue of 8.2%. In real terms, the revenue increases would be 5.1% (single rate), 3.2% (three rates), and 3.6% (zero rate plus two rates). As far as collection is concerned, they concluded that the single rate has the capacity to maintain the revenue collected, while the three rates and the zero rate with two rates decrease revenue by 2.0% and 0.6%, respectively.

Despite the VAT Commission's preference for adopting a single-rate VAT model, in 1986, with the accession of the former European Economic Community (European Union), the explanatory notes to the VAT Code state that it was not possible to adopt the single-rate solution. From the point of view of the VAT Centre (1986), adopting the model was clearly preferable from a technical point of view. For the VAT Centre (1986), the adoption of the model avoids the existence of problems in the collection of the tax, greater equity in the application of the tax in the taxation of goods and services, and the transition from a set of tax-exempt goods to an equitable taxation model. However, for the VAT Centre, the VAT reform was too bold a change in taxation.

Regarding the tax base of the proposed model, the VAT Centre (1986) argued that broadening the tax base eased the pressure on differentiated rates; however, the political option was to tax the protection of consumption of basic necessities (which constituted a significant part of household expenditure).

In fact, in Portugal, the choice of the differentiated rate model was the result of exclusively political principles. For Becker (1974), Griffiths, and Leach (2018), the adoption of a single VAT tax model leads to the adoption of a high tax rate, high visibility for the consumer, and, above all, notable unpopularity among voters and political actors.

According to Gale (1999), Gravelle (2003), and Basham and Mitchell (2008), VAT single rate models allow for gains in efficiency and simplicity. However, the authors argue that the gains are uncertain and depend on the depth, extent, and quality of the reforms made to the consumption tax. Although they agree that the model can lead to a more equitable system for taxing goods and services.

Although authors such as Albino (1999), Mankiw, Weinzierl, Yagan (2009), Teller (2011), Adhikari, Alm (2017), and Wynands (2018) mention that the adoption of the single rate model may raise uncertainties regarding the gains in simplicity, they all agree that the proposed model simplifies the application of the tax, although it does not eliminate the fiscal complexity arising from the numerous tax assessments. For the authors, even with

the application of a single VAT rate, taxpayers will continue to pay all kinds of taxes on consumption, such as excise duties.

With regard to tax collection, Correia (2007) concludes that the adoption of a flat-rate VAT system has a positive effect on efficiency in revenue collection and that, although the lower classes have a greater propensity to consume and allocate a greater share of their income to consumption, the results suggest that it is not entirely true that they are the most affected by the adoption of a flat-rate model and that there are revenue losses from replacing the system.

The doctrine does not agree on the model, but the authors agree that the proposed system is simpler (easier to understand), less onerous (application of obligations), more neutral (uniform application of the VAT rate to all goods and services), and, above all, more efficient in collecting revenue (Clemens et al., 2003). It is in this sense that Cintra (2003), Ivanova et al. (2005), Paulus and Peichl (2008), Mihaescu and Voinea (2009), and Mohs (2019) argue that the single rate model can guarantee greater efficiency in the collection of VAT revenue and reduced tax evasion.

In addition to the efficiency of revenue collection, the costs of managing the tax must be considered. Braz and Cunha (2009), in their study on the advantages and disadvantages of the single VAT rate, conclude that the differentiated rate structure leads to high tax management costs, which limits efficiency gains. It is because of this inefficiency that Bickley (2003) and Rot and Heuty (2012) advocate the adoption of a single rate model in order to make VAT more neutral and reduce administration costs. For the authors, differentiated rates encourage the creation of distortions in the consumption structure, and they conclude that differentiated rates alter prices and distort consumer choices, reducing social welfare (since there are fewer public financial resources available to implement public policies).

In terms of tax management costs, Bahl and Wallace (2007) and Soares (2014) conclude that the flat VAT rate, in addition to achieving revenue gains, reduces the costs of administering the tax

(quantifying, charging, and collecting) and increases compliance with tax obligations, eliminating the need to carry out audits of the tax deductions and exemptions granted.

From the state's point of view, Bickley (2003) concludes that the system of differentiated rates requires the presence of large numbers of tax inspectors, which increases the costs of managing the tax and the efficiency of collection, to determine whether the tax base has been classified according to the rate and that one of the most common forms of tax evasion, applied by companies, consists of falsely classifying goods and services at lower tax rates. From a practical point of view, the author concludes that differentiated rate models are complex and that the single rate system is much simpler (Bickley, 2003).

Regarding the system of differentiated rates, Laura-Liana and Carmen (2009) point out that due to its complexity, the model corresponds to a true hidden tax, i.e., the costs of calculating tax revenue obtained from differentiated rates are increasing, while single-rate taxes are simpler and more transparent. On the other hand, they also point out that the single-rate model increases national wealth because all revenue-generating assets increase in value due to the increase in the flow of exchanges between agents (Laura-Liana & Carmen, 2009).

According to the doctrine, the proposed model can produce the revenue needed to finance public needs (Shrivastava & Gupta, 2004) and avoid the emergence of injustices in the distribution of the tax burden on products and services (Siqueira, 2001). In the authors' view, differentiated rates are incapable of satisfying the growing needs of public spending and avoiding injustices in the distribution of the tax burden on taxpayers.

The injustices in general taxation on consumption, including in Portugal, in addition to the application of a system of differentiated rates, stem from the existence of special regimes. It is because of the existence of special VAT regimes that Carvalho et al. (2018) argue that taxation on consumption should be unique and there should be no special regimes or differentiated rates. For the authors, the main objective of consumption taxa-

tion is to raise public revenue and not to realize social, regional, or sectoral policies, and the argument that low-income citizens benefit most from tax exemption is false (Carvalho et al., 2018). The best and most efficient choice, according to the authors, is to tax all consumption equally and repeal or reduce the allocation of revenue to social policies (Carvalho et al., 2018).

Although the model is technically feasible and economically more advantageous, like Tomaz (2012), we are surprised by the almost unanimous rejection of the model and find it strange that in the European Union, which is in favor of the single VAT rate system, Denmark is the only country to have adopted the model. For Tomaz (2012), Catarino and Soares (2019), and Burman and Slemrod (2020), the justification for this situation stems from the fact that the model is a politically sensitive issue, which is why the technical rationality and advantages of the solution have not been realized.

Like Cintra (2009), most authors argue that all existing systems of differentiated rates should be changed to a single rate system, except for excise duties.

In the overall application of the model under analysis, authors such as Grecu (2004), James (2015), Alavuotunki et al. (2016), Catarino et al. (2017), Popescu et al. (2019), Vasques (2023), and Mgammal et al. (2023) argue that the single VAT rate model increases public revenue (as a result of a more dynamic economy and reduced tax evasion), reduces the time and cost of tax obligations (measuring and obtaining tax is simpler and more efficient), calls into question the status quo of the differentiated rate system (preference for maintaining the system), reduces tax evasion (taxpayers are willing to pay the tax burden when the tax is reduced), achieves gains in simplicity, efficiency and neutrality (as advocated by tax theory) and makes the tax system more attractive for investment (where investors move freely across country borders).

This study aims to analyze the possible adoption of a single VAT rate in Portugal, taking into account the doctrine produced and statistical data on the evolution of general consumption tax revenue.

2. METHODS

The study is based on a case study and applied statistical data on value-added tax made available by the Tax and Customs Authority for the period 1996–2022.

It is important to emphasize that there are no official statistical data that refer to the total amounts of revenue collected by rate (reduced, intermediate, and normal), and the available values by economic year correspond to the accumulated values. Consequently, the approximate consumption breakdowns of 29% (reduced), 11% (intermediate), and 60% (normal), identified by Portuguese tax experts, were used.

Based on the percentage breakdowns identified, the possible revenue values for each of the differentiated rates were estimated. The revenue values for the two proposed scenarios were then estimated. For this purpose, the estimates were obtained using the following expression:

$$Vat\ Revenue_{Single\ Rate} = \frac{c \cdot b_r}{a_r} + \frac{c \cdot b_i}{a_i} + \frac{c \cdot b_n}{a_n}, \quad (1)$$

where c – proposed single rate of value added tax; b_r – total revenue from the reduced rate; b_i – total revenue from the intermediate rate; b_n – total revenue from the normal rate; a_r – reduced differentiated rate of value added tax; a_i – intermediate differentiated rate of value added tax; a_n – normal differentiated rate of value added tax.

The main objective of the study is to contribute to the debate on the single VAT rate by carrying out a set of analyses and statistical tests for the scenarios under analysis.

3. RESULTS

Considering the methodology and official statistical data obtained from the Portuguese Tax and Customs Authority website, the consumption tax revenue figures were estimated for each of the proposed single rates, and the efficiency levels in collecting the tax and its weight in relation to the Portuguese gross domestic product were analyzed.

Table 1 shows that the results suggest that the revenue collection efficiency levels of the single VAT rate system of 17% and 21% are higher than the current system of differentiated rates.

In relation to 1996, it can be estimated that €5,641.99 million in VAT revenue was collected through the current system of differentiated rates. The amount actually collected corresponds to 3.756% of Portugal's total gross domestic product. When the 17% single rate system is applied, the results suggest a potential revenue of €9,827.25 million, which translates into 6.542% of Portugal's GDP. If the option had been to adopt a single rate system of 21%, the estimated data suggests potential VAT revenue of €12,139.55 million, corresponding to a total of 8.082% of Portugal's GDP. In comparative terms, the 17% VAT single rate system is more efficient at collecting the tax than the differentiated rate system by €4,185.35 million, while the 21% single rate is more efficient by €6,497.65 million. When both VAT single rate proposals are compared, it can be concluded that the 21% rate is more efficient than the 17% rate by €2,312.30 million.

In 1997, it can be seen from Table 1 that the current consumption tax system collected a total effective amount of €6,403.57 million, which corresponds to 4.083% of gross domestic product. If the single rate system of 17% had been adopted, the Portuguese economy would have been able to produce €11,153.95 million in VAT revenue, translating into a total percentage of Portuguese GDP of 7.112%. For the period in question, it can be seen that the proposed model is more efficient than the current system by €4,750.38 million. In the case of adopting a single rate of 21%, the estimated results point to a potential value of €13,778.41 million, which translates to 8.786% of Portugal's total GDP. In terms of efficiency, it can be seen that the proposed single rate of 21%, compared to the current VAT system, is more efficient by €7,374.84 million. When the results are compared between the two proposals, they suggest that the 21% rate is more efficient at collecting tax than the 17% rate, by 2,624.46 million euros.

In 1998, €7,072.46 million was collected, which corresponds to 4.303% of GDP. Assuming the adoption of a single VAT rate model at 17%, the re-

sults suggest a potential revenue of €12,319.04 million, equivalent to 7.495% of total GDP. In terms of tax collection efficiency, the proposed system is more efficient than the current Portuguese system by €5,246.58 million. In the case of adopting a 21% rate, the results indicate an amount collected of €15,217.64 million, which corresponds to 9.259% of Portugal's GDP. In terms of the model's efficiency, it is more efficient than the differentiated rate system by €8,145.18 million. Compared to the 17% single-rate system, it is also more efficient by €2,898.60 million.

Table 1 shows that €7,906.11 million of VAT were actually collected in 1999, a figure that corresponds to 4,629% of Portugal's GDP. In terms of the system being analyzed, the 17% rate shows potential revenue for that year of €13,771.13 million. The potential revenue from the 17% single rate model translates into 8.063% of Portugal's GDP. For the 21% single rate, the methodology suggests potential revenue of €17,011.40 million, which is equivalent to 9.961% of GDP. As for the efficiency of single rates, compared to the current system of differentiated rates, it can be concluded that the 17% single-rate is more efficient by €5,865.02 million and the 21% rate by €9,105.28 million. As for single rates, the 21% rate is more efficient in collecting revenue of €3,240.27 million compared to the 17% rate.

According to official statistics, in 2000, the Portuguese tax authorities collected €8,672.77 million in VAT, or 4.892% of GDP. In the event of the 17% single-rate model being adopted, the results suggest a potential revenue of €8,672.77 million, a figure corresponding to 8.520% of Portugal's GDP. The results also show that the 17% single rate is more efficient, compared to the differentiated rate model, by €6,433.75 million. In relation to the 21% rate, the results suggest a potential revenue of €18,661.00 million, which translates into a weight in GDP of 10.525%. The 21% single rate is more efficient than the current model by €9,988.23 million, and then the 17% rate by €3,554.48 million.

Regarding tax revenue in 2001, it can be seen that €8,966.00 million were collected in VAT, which translates into 4.960% of the total GDP for the period. In the hypothetical application of the pro-

posed model, at a single rate of 17%, the methodology points to potential revenue of €15,617.28 million, which translates into 8.640% of Portugal's GDP. The results show that the proposed model is more efficient than the current model by €6,651.28 million. If a rate of 21% is adopted, the model points to potential revenue of €19,291.93 million, or 10.673% of Portugal's GDP. In terms of efficiency in collecting VAT revenue, the 23% single-rate model is more efficient than the differentiated rates by €10,325.93 million and then the 17% rate by €3,674.65 million.

In 2002, €9,956.60 million of VAT was collected, which corresponds to 5.466% of GDP. According to Table 1, if a single rate of 17% were to be adopted, the results point to potential revenue of €16,713.90 million, or 9.176% of GDP. The data suggests that the model, compared to the current system, is more efficient by €6,757.30 million. If a single rate of 21% were adopted, the results suggest an estimated collection of €20,646.58 million, or 11.335% of GDP. The 21% single rate is more efficient than the 17% rate by €3,932.68 million, and then the differentiated rates by €10,689.98 million.

In the 2003 economic period, according to official statistics, €10,562.00 million in VAT was collected, which translates into 5.853% of GDP. If the single rate of 17% is applied, the results suggest that the Portuguese state could have collected potential VAT revenue of €17,730.17 million, i.e., 9.826% of GDP. The proposed system is more efficient by €7,168.17 million. On the other hand, adopting a single VAT rate of 21% suggests a potential revenue of €21,901.97 million, which represents 12.138% of GDP. In terms of revenue efficiency, the 21% rate is more efficient than the differentiated rates (€11,339.97 million) and the single rate of 17% (€4,171.80 million).

Compared to 2004, the Portuguese state managed to collect €10,340.70 million in VAT, which translates into a total value of 5.630% of GDP. Under the 17% rate model, the estimated results show potential revenue of €17,358.68 million (9.451% of GDP), while under the single 21% rate, the results suggest potential revenue of €21,443.07 million (11.674% of GDP). In terms of efficiency, the 17% rate is more efficient than the differentiated rates model by €7,017.98 million, while the 23%

rate is more efficient than the current model by €11,102.37 million, and then the single 17% rate by €4,084.40 million.

In 2005, an effective amount of €11,671.60 million in VAT was collected for the public coffers, which translates into 6.305% of GDP. Using the methodology adopted for a single-rate system of 17%, the data suggests a potential revenue of €18,996.08 million, giving a total GDP value of 10.262%. The system is more efficient, compared to the current consumption tax system, by €7,324.48 million. In the case of opting for the 21% rate, the methodology points to an estimated €23,465.75 million in revenue (12.677% of GDP). The second proposal is more efficient, compared to the current model, in collecting revenue by €11,794.15 million and €4,469.67 million, respectively, when compared to the 17% proposal.

According to the data, €12,401.10 million was collected in 2006, which translates into 6.592% of GDP. In the proposed model, the methodology adopted suggests potential revenue of €20,183.38 million (10.729% of GDP). In the case of adopting a rate of 21%, the results suggest a collection of €24,932.41 million (13.254% of GDP). In 2006, in comparative terms, the single rate of 17% was more efficient than the differentiated rates by €7,782.28 million and the 21% rate by €12.531.31 million. As for the proposals, the 21% rate is more efficient than the 17% rate by €4,749.03 million.

In 2007, €13,196.40 million was actually collected in VAT revenue, totaling 6.843% of GDP. For the same period, if the single rate of 17% had been adopted, the potential revenue would have been €21,477.77 million, i.e., 11.138% of GDP. Compared to the differentiated rate system, the proposed model is more efficient by €8,281.37 million. If the 21% rate had been chosen, the data suggests potential revenue of €26,531.36 million, which translates into 13.759% of GDP. In fact, the 21% rate is more efficient than the differentiated rates by €13,334.96 million, and then the single rate of 17% by €5,053.59 million.

As Table 1 shows, in 2008, around €13,427.50 million was collected in VAT revenue, which represents 6.941% of national GDP. If a rate of 17€ were to be applied, the results suggest potential reve-

nue of €22,179.99 million, equivalent to 11.466% of GDP. In this situation, the proposed model is more efficient at collecting revenue than the current system of differentiated rates, which corresponds to a potential loss of tax revenue. If a rate of 21% had been chosen, the methodology points to an estimated revenue of €27,398.81 million, which represents 14.163% of Portugal's GDP. In this case, the 21% rate is more efficient than the differentiated rates by €13,971.31 million, and then the 17% rate by €5,218.82 million.

In 2009, the public coffers collected €10,883.40 million in VAT, which translates into 5.807% of Portugal's GDP. If a single rate of 17% were adopted, the results suggest potential revenue of €17,977.56 million (9.593% of GDP). The model is more efficient in collecting tax than the differentiated rate system by around €7,094.16 million. In the case of a 21% rate, the potential revenue is €22,207.58 million, which corresponds to 11.850% of GDP. In the case of implementing the 21% rate, the model is more efficient in collecting tax by €11,324.18 million compared to the current system and €4,230.01 million compared to the 17% rate.

As far as 2010 is concerned, Table 1 shows that €12,145.90 million were collected, which is equivalent to 6.370% of GDP. In the case of adopting a 17% rate, the results suggest a potential revenue of €17,626.46 million in VAT (9.245% of GDP), i.e., greater efficiency, compared to the differentiated rates of €5,480.56 million. If the option were the 21% rate, the results indicate potential revenue of €21,773.86 million (11.420% of GDP). The results also indicate a greater efficiency of €9,627.96 million compared to the current model and €4,147.40 million compared to the 17% rate.

In 2011, a total of €13,051.60 million (6.963% of gross domestic product) was collected. If a 17% rate had been applied, the data indicates a potential revenue of €18,389.59 million (9.811% of GDP), which shows a greater efficiency of €5,337.99 million compared to the differentiated rates. In the case of the single rate of 21%, the results suggest a potential revenue value of €22,716.55 million (12.120% of Portugal's GDP). In this situation, the model is more efficient in collecting tax by €9,664.95 million compared to the differentiated rate system and €4,326.96 million compared to the 17% rate.

According to Table 1, in 2012, €12,800.10 million were collected, i.e., 7.118% of GDP. If a 17% rate had been adopted, the data suggests a potential revenue of €18,035.23 million, which corresponds to 10.029% of GDP. The results show greater efficiency than the current system of differentiated rates of €5,235.13 million. As for the single rate of 21%, the results point to potential revenue of €22,278.81 million (12.389%). The proposal is more efficient than the differentiated rates by €9,478.71 million and €4,243.58 million for the 17% rate.

In 2013, the data shows an amount collected of €13,249.10 million (7.436% of GDP). If the 17% rate had been adopted, the results suggest an estimated revenue of €18,667.86 million, a figure that corresponds to 10.478% of GDP, making the model more efficient in collecting the tax by €5,418.76 million. In the case of adopting a single rate of 21%, the results suggest revenue of €23,060.30 million, which is equivalent to 12.943% of GDP. The 21% rate, according to the methodology adopted, is more efficient than the differentiated rates by €9,811.20 million and then the single rate of 17% by €4,392.44 million.

As far as 2014 is concerned, €13,812.33 million were collected, a figure that corresponds to 7.691% of GDP. For the first proposal, 17%, the results suggest a potential revenue of €19,461.45 million, equivalent to 10.837% of gross domestic product. The level of efficiency in collecting the tax, compared to the model in force in Portugal, is €5,649.12 million higher. As for the second rate, 21%, the results point to potential revenue of €24,040.61 million, which translates into 13.387% of GDP. Regarding the efficiency of the rates in terms of tax collection, the 21% rate is the most efficient, i.e., it can collect €10,228.28 million more than the differentiated rates and €4,579.16 million more than the 17% rate.

In 2015, €14,844.27 million of VAT was collected (8.121% of GDP). Regarding the 17% rate, the results point to a potential revenue of €20,915.45 million in VAT (11.442% of GDP), meaning that the proposal is more efficient than the differentiated rates by €6,071.17 million. In relation to the 21% rate, the data suggests potential revenue of €25,836.73 million (14.134% of GDP). The 21% proposal, according to the data, is more efficient than

the differentiated rates by €10,992.46 million and then the single rate of 17% by €4,921.28 million.

In 2016, €15,082.49 million was collected in general consumption tax, which represents 8.088% of GDP. At the 17% rate, the results indicate a value of €21,251.09 million in VAT, which corresponds to 11.395% of GDP. The model is more efficient than the differentiated rate model by €6,168.60 million. For a VAT rate of 21%, the results point to revenue of €26,251.34 million, which represents 14.077% of GDP. In terms of VAT collection efficiency, the proposal is more efficient than the differentiated rates by €11.168.86 million and then the 17% rate by €5,000.26 million.

Taking Table 1 into account, in 2017, €16,001.44 million were collected (8.290% of GDP). For a single rate of 17%, the results suggest a potential revenue of €22,545.89 million, which translates into a weight of 11.680% of GDP. The figures represent an efficiency, compared to the current model, of €6,544.45 million. In relation to the 21% rate, the results indicate potential revenue of €27,850.00 million, which corresponds to 14.428% of the domestic product. The 21% rate is more efficient than the differentiated rates by €11,849.36 million, and then the 17% rate by around €5,304.91 million.

In 2018, the tax administration collected a total revenue of €16,670.34 million, which represents 8.397% of GDP. If the option had been to adopt a single rate of 17%, the data suggests a potential revenue of €23,488.36 million (11.831% of GDP), which shows an efficiency, compared to the current model, in tax collection of €6,818.02 million. In relation to the proposal to adopt a single rate of 21%, the results suggest a revenue of €29,015.04 million (14.615% of GDP). The second proposal, according to the methodology, is more efficient than the differentiated rates by €12,344.70 million and then the tax rate of 17% by €5,526.67 million.

In 2019, around €17,862.50 million was collected, which corresponds to 8.762% of GDP. By adopting a 17% rate, the results show potential revenue of €25,168.10 million, which corresponds to 12.346% of GDP. The proposal is €7,305.60 million more efficient than the current model. If a single rate of 21% is applied, the results suggest potential revenue of €31,090.01 million, which corresponds to

15.251% of GDP. The 21% rate is more efficient than the differentiated rates by €13,227.51 million, and then the 17% rate by €5,921.91 million.

For 2020, around €16,367.20 million (8.756% of GDP) were collected in general consumption tax. If a rate of 17% is applied, the results point to potential revenue of €23,061.24 million (12.337% of GDP). The proposal is more efficient than the differentiated rate system by €6,694.04 million. With regard to the 21% rate, the results suggest potential revenue of €28,487.41 million, which translates into 15.239% of GDP. In terms of tax collection efficiency, the 21% single rate is more efficient than the differentiated rates by €12,120.21 million, and then the 17% rate by €5,426.17 million.

In 2021, Portugal actually collected €19,108.00 million, which represents 9.689% of GDP. In the case of a 17% rate, the results point to a potential tax of €26,923.00 million, which is equivalent to 13.651% of Portugal's GDP. For a single rate of 21%, the results suggest revenue of €33,257.83 million (16.863% of GDP). When it comes to the efficiency of VAT collection, the first proposal is more efficient than the differentiated rates by €7,815.00 million, while the single rate of 21% is more efficient by €14,149.83 million. In comparative terms, the 21% rate is more efficient in terms of collection than the 17% single-rate by €6,334.82 million.

Finally, in 2022, €13,537.80 million were collected, reflecting a total of 10.724% of Portugal's GDP. For the 17% single-rate model, the results suggest potential revenue of €31,791.07 million (15.109% of GDP). The proposal is more efficient than the current system by €9,228.07 million. On the other hand, if a rate of 21% is applied, the results point to an estimated revenue of €39,271.32 million, which translates into 18.665% of Portugal's GDP. The single rate of 21% is more efficient than the differentiated rates by around €16,708.32 million, and then the 17% rate by €7,480.25 million.

Table 1 shows that the accumulated value of VAT between 1996 and 2022 for the current system of differentiated rates was €340,660.38 million. For the single rates of 17% and 21%, the accumulated value is €517,737.49 million and €639,558.07 million, respectively, which represents a difference between the differentiated rates and the single-rate

Table 1. VAT revenue with differentiated rates and estimated VAT revenues with single rates of 17% and 21%

| Year	GDP (M€)	Evolution of VAT rates			Evolution of estimated consumption					Effective revenue with differentiated rates						Estimated revenue with a single rate of 17%		Estimated revenue with a single rate of 21%	
		Reduced Rate	Intermediate Rate	Normal Rate	Reduced Rate (M€)	Intermediate Rate (M€)	Normal Rate (M€)	Total Revenue (M€)	% of GDP	Reduced Rate (29%) (M€)	Intermediate Rate (11%) (M€)	Normal Rate (60%) (M€)	VAT Revenue (M€)	% of GDP	Average Rate (%)	VAT Revenue (M€)	% of GDP	VAT Revenue (M€)	% of GDP
1996	150,213.00	5.00%	12.00%	17.00%	32,723.04	5,171.74	19,912.60	57,807.38	38.484%	1,636.15	620.61	3,385.14	5,641.90	3.756%	9.760%	9,827.25	6.542%	12,139.55	8.082%
1997	156,823.60	5.00%	12.00%	17.00%	37,140.69	5,869.94	22,600.83	65,611.45	41.838%	1,857.03	704.39	3,842.14	6,403.57	4.083%	9.760%	11,153.95	7.112%	13,778.41	8.786%
1998	164,363.70	5.00%	12.00%	17.00%	41,020.24	6,483.08	24,961.61	72,464.93	44.088%	2,051.01	777.97	4,243.47	7,072.46	4.303%	9.760%	12,319.04	7.495%	15,217.64	9.259%
1999	170,784.60	5.00%	12.00%	17.00%	45,855.45	7,247.27	27,903.93	81,006.65	47.432%	2,292.77	869.67	4,743.67	7,906.11	4.629%	9.760%	13,771.13	8.063%	17,011.40	9.961%
2000	177,302.10	5.00%	12.00%	17.00%	50,302.07	7,950.04	30,609.78	88,861.89	50.119%	2,515.10	954.00	5,203.66	8,672.77	4.892%	9.760%	15,106.52	8.520%	18,661.00	10.525%
2001	180,748.30	5.00%	12.00%	17.00%	52,002.80	8,218.83	31,644.71	91866.34	50.826%	2,600.14	986.26	5,379.60	8,966.00	4.960%	9.760%	15,617.28	8.640%	19,291.93	10.673%
2002	182,141.70	5.00%	12.00%	19.00%	57,748.28	9,126.88	31,441.89	98,317.06	53.978%	2,887.41	1,095.23	5,973.96	9,956.60	5.466%	10.127%	16,713.90	9.176%	20,646.58	11.335%
2003	180,446.80	5.00%	12.00%	19.00%	61,259.60	9,681.83	33,353.68	104,295.12	57.798%	3,062.98	1,161.82	6,337.20	10,562.00	5.853%	10.127%	17,730.17	9.826%	21,901.97	12.138%
2004	183,674.50	5.00%	12.00%	21.00%	59,976.06	9,478.98	32,654.84	102,109.88	55.593%	2,998.80	1,137.48	6,204.42	10,340.70	5.630%	10.127%	17,358.68	9.451%	214,43.07	11.674%
2005	185,110.60	5.00%	12.00%	21.00%	67,695.28	10,698.97	33,347.43	111,741.68	60.365%	3,384.76	1,283.88	7,002.96	11,671.60	6.305%	10.445%	18,996.08	10.262%	23,465.75	12.677%
2006	188,118.70	5.00%	12.00%	21.00%	71,926.38	11,367.68	35,431.71	118,725.77	63.112%	3,596.32	1,364.12	7,440.66	12,401.10	6.592%	10.445%	20,183.38	10.729%	24,932.41	13.254%
2007	192,834.10	5.00%	12.00%	21.00%	76,539.12	12,096.70	37,704.00	126,339.82	65.517%	3,826.96	1,451.60	7,917.84	13,196.40	6.843%	10.445%	21,477.77	11.138%	26,531.36	13.759%
2008	193,449.70	5.00%	12.00%	20.00%	77,879.50	12,308.54	40,282.50	130,470.54	67.444%	3,893.98	1,477.03	8,056.50	13,427.50	6.941%	10.292%	22,179.99	11.466%	27,398.81	14.163%
2009	187,410.00	5.00%	12.00%	21.00%	63,123.72	9,976.45	32,650.20	105,750.37	56.427%	3,156.19	1,197.17	6,530.04	10,883.40	5.807%	10.292%	17,977.56	9.593%	22,207.58	11.850%
2010	190,666.50	6.00%	13.00%	21.00%	58,705.18	10,277.30	34,702.57	103,685.05	54.380%	3,522.31	1,336.05	7,287.54	12,145.90	6.370%	11.714%	17,626.46	9.245%	21,773.86	11.420%
2011	187,432.50	6.00%	13.00%	21.00%	63,082.73	11,043.66	34,047.65	108,174.05	57.714%	3,784.96	1,435.68	7,830.96	13,051.60	6.963%	12.065%	18,389.59	9.811%	22,716.55	12.120%
2012	179,827.80	6.00%	13.00%	23.00%	61,867.15	10,830.85	33,391.57	106,089.57	58.995%	3,712.03	1,408.01	7,680.06	12,800.10	7.118%	12.065%	18,035.23	10.029%	22,278.81	12.389%
2013	178,168.60	6.00%	13.00%	23.00%	64,037.32	11,210.78	34,562.87	109,810.96	61.633%	3,842.24	1,457.40	7,949.46	13,249.10	7.436%	12.065%	18,667.86	10.478%	23,060.30	12.943%
2014	179,580.10	6.00%	13.00%	23.00%	66,759.58	11,687.35	36,032.16	114,479.10	63.748%	4,005.58	1,519.36	8,287.40	13,812.33	7.691%	12.065%	19,461.45	10.837%	24,040.61	13.387%
2015	182,798.20	6.00%	13.00%	23.00%	71,747.31	12,560.54	38,724.19	123,032.04	67.305%	4,304.84	1,632.87	8,906.56	14,844.27	8.121%	12.065%	20,915.45	11.442%	25,836.73	14.134%
2016	186,489.80	6.00%	13.00%	23.00%	72,898.68	12,762.10	39,345.61	125,006.40	67.031%	4,373.92	1,659.07	9,049.49	15,082.49	8.088%	12.065%	21,251.09	11.395%	26,251.34	14.077%
2017	193,028.80	6.00%	13.00%	23.00%	77,340.30	13,539.68	41,742.89	132,622.86	68.706%	4,640.42	1,760.16	9,600.86	16,001.44	8.290%	12.065%	22,545.89	11.680%	27,850.80	14.428%
2018	198,528.80	6.00%	13.00%	23.00%	80,573.32	14,105.67	43,487.85	138,166.84	69.595%	4,834.40	1,833.74	10,002.21	16,670.34	8.397%	12.065%	23,488.36	11.831%	29,015.04	14.615%
2019	203,854.90	6.00%	13.00%	23.00%	86,335.42	15,114.42	46,597.83	148,047.67	72.624%	5,180.13	1,964.88	10,717.50	17,862.50	8.762%	12.065%	25,168.10	12.346%	31,090.01	15.251%
2020	186,933.90	6.00%	13.00%	23.00%	79,108.13	13,849.17	42,697.04	135,654.35	72.568%	4,746.49	1,800.39	9,820.32	16,367.20	8.756%	12.065%	23,061.24	12.337%	28,487.41	15.239%
2021	197,220.40	6.00%	13.00%	23.00%	92,355.33	16,168.31	49,846.96	158,370.60	80.301%	5,541.32	2,101.88	11,464.80	19,108.00	9.689%	12.065%	26,923.00	13.651%	33,257.83	16.863%
2022	210,406.00	6.00%	13.00%	23.00%	109,054.50	19,091.77	58,860.00	187,006.27	88.879%	6,543.27	2,481.93	13,537.80	22,563.00	10.724%	12.065%	31,791.07	15.109%	39,271.32	18.665%
Accumulated value													340,660.38	–	–	517,737.49	–	639,558.07	–
Difference in revenue: estimated at a single rate of 17% and effective at differentiated rates																177,077.11	+51,98%		
Difference in revenue: estimated at a single rate of 21% and effective at differentiated rates																298,897.70	+87,74%		
Difference in revenue: estimated at a single rate of 21% and estimated at a single rate of 17%																121,820.59	+23,53%		
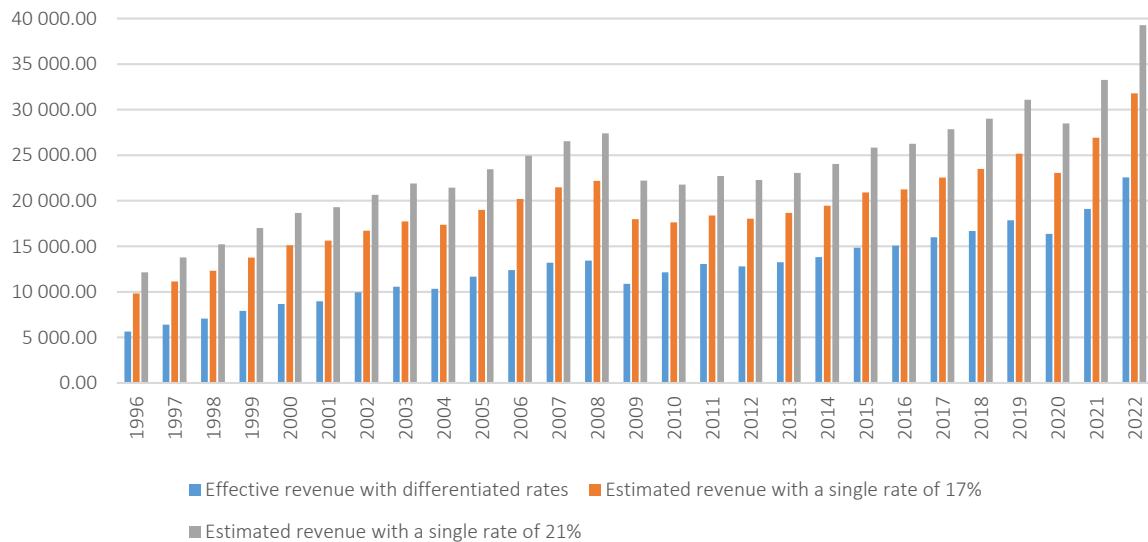
Figure 1. VAT revenue with differentiated rates and estimated VAT revenues
with a single rate of 17% and 21% (in M€)

model of 17% of €177,077.11 million (+51.98%) and between the current model and the single rate of 21% of €298,897.70 million (+87.74%).

Between the proposed single VAT rates, there is a difference in potential revenue of €121,820.59 million, i.e., the single VAT rate of 21% can produce 23.53% more revenue than the single rate of 17%.

As can be seen from Figure 1, for all years, the 21% single VAT rate model is the one that proves to be the most efficient and has the highest levels of general consumption tax revenue (green), followed by the 17% single rate (red). The least efficient and most revenue-raising system is the current system of differentiated rates (blue).

In terms of tax efficiency, it is important to analyze the results of both systems, and for this purpose, Laffer curves have been drawn for the revenues of the differentiated rates and for the respective single VAT rates.

Figure 2 corresponds to the Laffer curve for the VAT revenues of the current differentiated rate model and for the single VAT rate models of 17% and 21%.

In the differentiated rates model, plotted based on actual VAT revenues, the Laffer curve shows, for the years 1996 to 2022, the peak of maximum tax collection efficiency in 2022, with a revenue of €22,563.00

million. That is, the year 2022 was the one in which the current general consumption tax system was able to produce a higher level of tax revenue. On the other hand, Figure 2 shows that the year 1996 was the worst year for VAT revenue collection with a total amount collected of €5,641.90 million and that the years 2004, 2009, 2012, and 2020 are points of fiscal inefficiency as they are periods when the VAT rate produced less total revenue. In addition, the years 2004, 2009, and 2012 are also years when VAT rates were increased from 19% to 21%, from 20% to 21%, and from 21% to 23%, respectively. This means that increases in tax rates can produce revenue losses for the public coffers. According to the principles of the Laffer curve, the existence of points of declining revenue indicates that the point of maximum tax efficiency of revenue collection has not yet been reached and that increases in VAT rates are in fact unfavorable for public revenues.

Regarding the estimated revenues for the 17% and 21% single rate systems, the Laffer curves suggest that the peak of maximum efficiency of tax collection is in the year 2022, with potential revenues of €31,791.07 million (17%) and €39,271.32 million (21%). Figure 2 indicates that the worst year for VAT revenue collection was the year 1996, for both proposed rates, with €9,827.25 million (17%) and €12,139.55 million (21%). The lowest efficiency points were observed in the years 2004, 2009, 2012, and 2020, where revenues fell compared to the previous year.
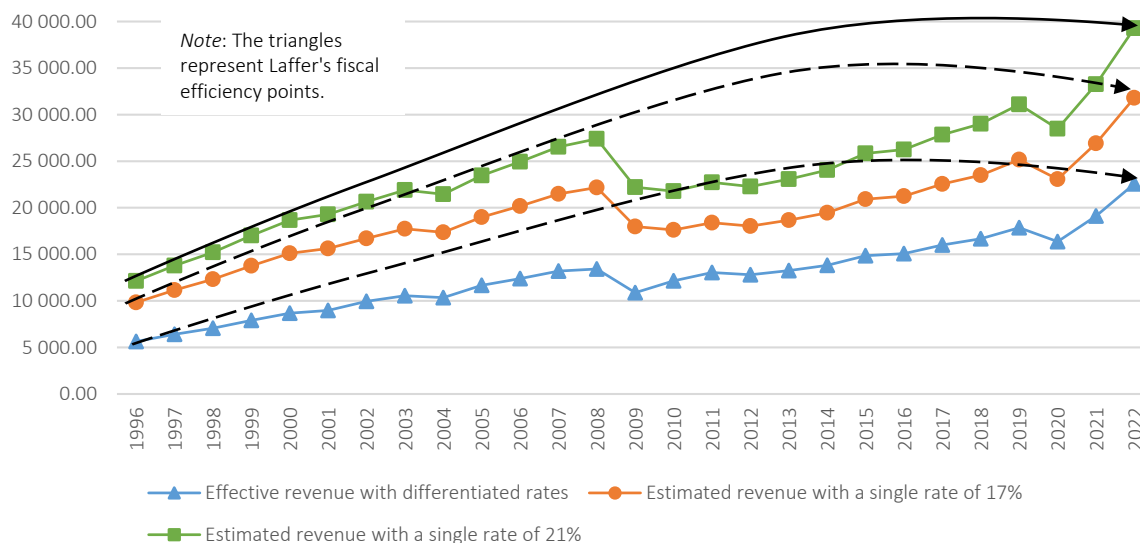
Figure 2. Laffer curve for VAT revenue with differentiated rates
and for estimated VAT revenues with single rates of 17% and 21% (in M€)

4. DISCUSSION

The results of the study suggest, like the work of Becker, Griffiths and Leach, that the adoption of a single VAT rate model leads to the adoption of a higher rate for the reduced and intermediate differentiated rates, which could make the implementation of the model unpopular among consumers with lower economic resources. In this line, Palma (2011) argues that the adoption of a single-rate VAT system has pernicious effects on the tax and that it will weigh more heavily on the lower income classes and misrepresent the characteristics of the tax (Palma, 2012). However, the authors argue that social issues should be resolved through income taxes, which have more personalized characteristics.

The study also confirms the conclusions of the studies carried out by the Comissão do IVA in 1984, i.e., the results suggest, through estimated revenue, that the adoption of the proposed system makes it possible to increase VAT revenue. In this sense, the simplification of the VAT system's incidence regime makes it possible, as Nabais (2010) argues, to obtain greater revenue gains.

The conclusions are also in line with those presented by Gale, Bickley, Clemens, Emes, Scott, Basham, and Mitchell, since flat-rate models allow for efficiency gains in revenue collection as a result of simplifying the system. However, for Gale, the levels of gains are uncertain and depend on

the extent and quality of the reforms carried out. However, not all authors agree with this view; for example, Cintra (1991) argues that companies would no longer have to dedicate 30% of their administrative staff to tax requirements, reducing the costs of the self-assessment mechanism, and although there are still some authors who are against the search for solutions that aim to improve the tax system (Cintra, 1994).

In the conclusions of Albino's studies, he also has his doubts about the level of gains from adopting the proposed model but recognizes that its adoption simplifies the application of the tax. The results of this study suggest that, in addition to simplifying the application of the system, and contrary to the conclusions of Albino and the authors Mankiw, Weinzierl, Yagan, Teller, Adhikari, Alm, and Wynands, the model can increase the amount of VAT revenue collected compared to the amount of revenue collected through the current general consumption tax system.

The results are also in line with the conclusions of Cintra and other authors such as Ivanova, Keen, Klemm, Paulus, Peichl, Mihaescu, Voinea, and Mohs, attest to the fact that the single VAT rate model can guarantee greater VAT revenue collection. Consequently, they validate the conclusions of Shrivastava, Gupta, Baldini, and Rizzo (2021), that the model can produce the necessary revenue to finance public needs. However, despite the model's

ability to raise a higher level of revenue, it is unable to meet the growing needs of public spending.

Like the other authors cited, the results of the study also attest to the conclusions of Grecu, Vasques, Bahl, and Wallace, as well as James, Alavuotunki, Haapanen, Pirttilä, Popescu, Militaru, Stanila, Vasilesu, Cristescu, Mgammal, Al-Matari, and Alruwaili, in which the VAT single rate model increases state revenue and makes measuring and obtaining the tax simpler and more efficient. Since the model is more efficient, it eliminates the need to carry out audits of the tax deductions and exemptions granted and increases compliance with tax obligations.

If we start from the conclusions of Laura-Liana, Carmen, and Siqueira, in which a simpler tax system makes the economy economically richer due to the increase in exchange flows between agents, then the results also indicate that the single rate model is a key element in increasing the gains in national wealth.

However, the possibility of adopting the model needs to be further investigated, especially at the level of border municipalities. A future research question is to analyze how the revenues of border municipalities are affected by the adoption of the VAT flat rate system, especially in those where economic agents compete directly with other agents from other territorial areas.

CONCLUSION

The study analyzes the level of efficiency of general consumption tax revenue collection between the differentiated rates and the single rate models. The research is based on the observable model adopted by the European Union and implemented by Portugal (differentiated rates) and the theoretical model, an alternative general consumption tax model (single rate).

From the research it can be concluded that: (1) although studies argue that adopting a single VAT rate model is more efficient in terms of revenue collection, in reality no reform has been implemented to improve efficiency; (2) although most EU countries have adopted the multiple VAT rate model, theorists are in favor of applying a single rate for reasons of increasing revenue and simplifying the tax and its collection; (3) the political rejection of the single VAT rate model produces revenue losses, since the simulations of the proposed single rates lead to the conclusion that they make it possible to increase revenue collection (efficiency gains); (4) the single rate model is capable of maintaining revenue levels, an essential factor for the consolidation of public accounts, so the option of a 21% rate seems more appropriate; (5) the results suggest that the 21% single rate model can produce more revenue, around 87.74% more than that obtained with the differentiated VAT rates adopted in Portugal; (6) the results suggest that the single rate model of 17% is enough to ensure that the level of revenue is maintained, but also to increase revenue by around 51.84% compared to the differentiated rate model adopted; and (7) the results suggest that the adoption of the single VAT rate model seems to be a possible solution to partially meet public financing needs, with the obstacles to its adoption appearing to be social and, above all, political.

AUTHOR CONTRIBUTIONS

Formal analysis: Ricardo de Moraes e Soares, Pedro Pinheiro, Paula Heliodoro.
Investigation: Ricardo de Moraes e Soares.
Methodology: Ricardo de Moraes e Soares.
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Software: Ricardo de Moraes e Soares.
Supervision: Ricardo de Moraes e Soares.
Visualization: Ricardo de Moraes e Soares, Paula Heliodoro.
Writing – original draft: Ricardo de Moraes e Soares.
Writing – review & editing: Ricardo de Moraes e Soares, Pedro Pinheiro, Paula Heliodoro.

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