VAT rate structures in theory and practice

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Abstract:

Most countries' value-added tax (VAT) systems apply reduced VAT rates to a selection of expenditure items in order to achieve distributional goals, and (to a lesser extent) social and cultural objectives. This paper reviews and assesses the arguments typically used for and against applying reduced VAT rates, with a particular focus on OECD countries where reduced rates feature prominently. It considers both the theoretical and empirical evidence, as well as practical considerations, and concludes that the case for reduced VAT rates is weak. In particular, the optimal indirect tax literature finds no redistributive role for reduced VAT rates when other more direct instruments are available. These theoretical findings are supported by the empirical literature that shows reduced VAT rates to be a poorly targeted means of supporting lower income households, particularly when compared to targeted cash transfer programs. Similarly, reduced VAT rates are unlikely to be a well-targeted way to encourage consumption of merit goods. Meanwhile, efficiency arguments, with the restricted exception of some substitutes for home production, favour the adoption of a single-rate VAT structure, which would also bring significant administrative benefits.

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Alastair Thomas[1]

1 Introduction

Most OECD countries have adopted multi-rate VAT structures. The predominant motivation for these multi-rate structures has been to achieve distributional goals – particularly in light of the perceived regressivity of the VAT. This has led to reduced rates being applied to consumption items that typically make up a greater proportion of the expenditure of poorer as compared to richer households. Meanwhile, the pursuit of social and cultural objectives, amongst others, have led to the application of reduced VAT rates on an even broader range of consumption in many OECD countries.

This paper examines the case for a multi-rate VAT structure. It first summarises the VAT rate structures currently in place in OECD countries, highlighting the widespread use of reduced VAT rates. It then reviews the optimal indirect taxation literature on the choice between uniform and multi-rate structures. Drawing on this literature, it then assesses the various arguments used in practice for and against the adoption of reduced VAT rates in OECD countries, before drawing policy conclusions.

2 VAT rate structures in OECD countries

As of 2022, 174 countries have adopted a VAT (OECD, 2022). This includes 37 of the 38 OECD member countries – the exception being the United States, which operates a range of state-level retail sales taxes instead. Although the general principles underlying each VAT system are the same, there are still significant differences in the systems implemented in different countries, and, in particular, in the rate structures adopted.[2]

Table 1 shows the variation in rate structures across OECD countries. Most "older" VAT systems tend to have multi-rate structures, with one or more reduced rates (including zero rates) applying to a significant number of goods and services. This is particularly the case in Europe where countries' VAT rate structures are guided by the EU VAT Directive, which generally allows for up to two reduced VAT rates in addition to the standard rate.[3] Meanwhile, the VAT systems in a small number of countries – such as Chile and New Zealand – apply a single rate to most, if not all, goods and services.

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[1] Senior Economist, The World Bank. This paper was, in part, prepared while the author was a PhD student under the supervision of the Chair in Public Finance at Victoria University of Wellington. Helpful comments were gratefully received from Bert Brys, John Creedy, Norman Gemmell and Kurt Van Dender. The findings, interpretations and conclusions are those of the author and do not necessarily reflect the views of the World Bank, its Board of Executive Directors, or the governments they represent.

[2] VAT systems also differ in terms of the extent of exemptions, the registration thresholds for businesses, the use of special taxation methods for specific supplies, and restrictions on the right to deduct VAT on specific inputs. OECD (2022) discusses these in more detail.

[3] The 2006 EU VAT Directive requires the standard rate to be at least 15%. Reduced rates must be at least 5% and can only be applied to the set of goods and services specified in Annex III of the Directive, though a number of derogations are provided that allow some countries to maintain reduced rates at a rate lower than 5% on some products.

Table 1. VAT rates in OECD countries as at 1 January 2022

	Standard rate	Reduced rates**
AUS	10.0	0.0
AUT*	20.0	10.0/13.0
BEL	21.0	0.0/6.0/12.0
CAN*	5.0	0.0
COL*	19.0	0.0/5.0
CHE	7.7	0.0/2.5/3.7
CHL	19.0	-
CRI	13.0	1.0/2.0/4.0
CZE	21.0	10.0/15.0
DEU	19.0	7.0
DNK	25.0	0.0
ESP*	21.0	4.0/10.0
EST	20.0	0.0/9.0
FIN	24.0	0.0/10.0/14.0
FRA*	20.0	2.1/5.5/10.0
GBR	20.0	0.0/5.0
GRC	24.0	6.0/13.0
HUN	27.0	5.0/18.0
IRL	23.0	0.0/4.8/9.0/13.5
ISL	24.0	0.0/11.0
ISR*	17.0	0.0
ITA	22.0	4.0/5.0/10.0
JPN	10.0	8.0
KOR	10.0	0.0
LTU	21.0	5.0/9.0
LUX	17.0	3.0/8.0/14.0
LVA	21.0	5.0/12.0
MEX*	16.0	0.0
NLD	21.0	9.0
NZL	15.0	0.0
NOR	25.0	0.0/12.0/15.0
POL	23.0	5.0/8.0
PRT*	23.0	6.0/13.0
SLV	22.0	5.0/9.5
SVK	20.0	10.0
SWE	25.0	0.0/6.0/12.0
TUR	18.0	1.0/8.0

Source: OECD (2022)

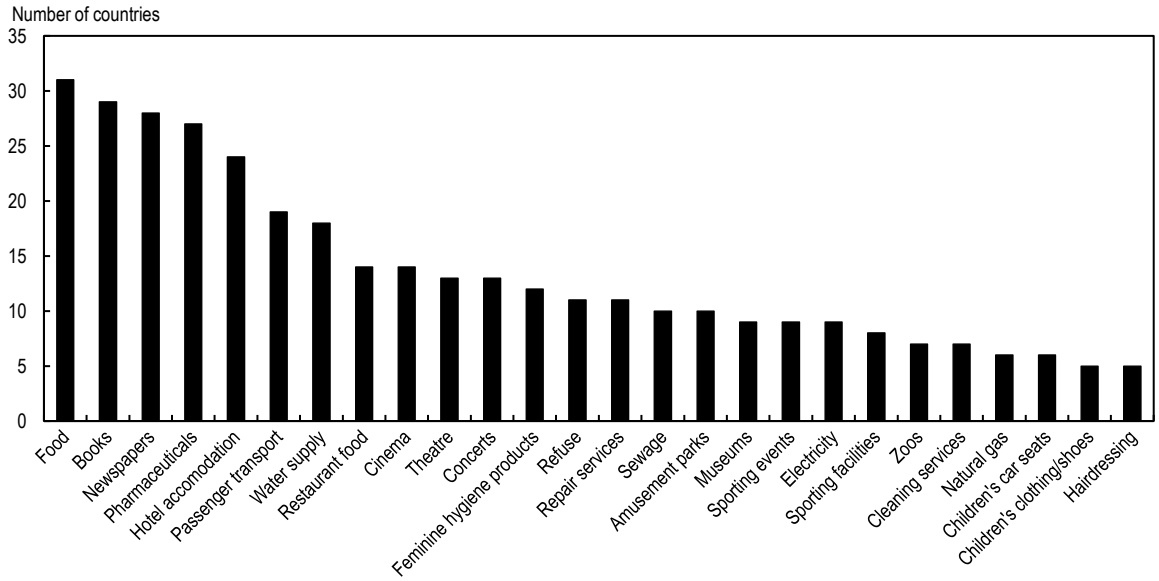
Table notes

*Austria: a standard rate of 19% applies in Jungholz and Mittelberg. Canada: provincial sales taxes also apply. Colombia: 0% rate applies to hygiene products in the department of Amazonas. France: rates of 0.9%, 2.1%, 10%, 13% and 20% apply in Corsica; rates of 1.05%, 1.75%, 2.1% and 8.5% apply to overseas departments excluding French Guyana and Mayotte. Israel: a rate of 0% applies when an Eilat resident dealer buys goods from Eilat non-residents. Mexico: 8% reduced rate applies in border regions. Portugal: rates of 5%, 10% and 18% apply in the Azores; rates of 5%, 10% and 22% apply in Madeira. Spain: rates of 0%, 2.75%, 3%, 7%, 9.5%, 13.5% and 20% apply in the Canary Islands; rates of 0.5%, 1%, 2%, 4%, 6%, 8%, 9% and 10% apply in Ceuta and Melilla. Temporary COVID-19-related rates are not specified in Table 1 (see OECD, 2022, for details).

**Includes zero rates on domestic supplies. Excludes zero rates on exports and other supplies subject to similar treatment such as international transport or supplies to embassies, international organisations and diplomatic missions.

The types of goods and services subject to these reduced rates also varies. Nevertheless, there are some common trends. For example, as illustrated in Figure 1, the vast majority (31 out of 37 OECD countries that have a VAT) apply a reduced rate to either basic food products or, more often, to a very broad range of food and non-alcoholic beverages purchased for home consumption ("food" hereafter).[4] The general rationale for providing a reduced rate on food is distributional – i.e. to provide support to poorer households. Following a similar rationale, many countries also provide a reduced rate for pharmaceutical products and water supply. Meanwhile, a smaller number of countries apply reduced rates to refuse and sewage services, energy products, and to children's clothing or shoes. An increasing number of countries now also apply reduced rates to feminine hygiene products. Due to its significant budget share, the reduced rate on food is by far the most significant reduced VAT rate applied in OECD countries.[5]

Figure 1. Common reduced VAT rates in OECD countries as at 1 January 2022



Source: Author's calculations based on OECD (2022) and European Commission (2021).

Most countries also use reduced VAT rates to encourage the consumption of certain goods and services with perceived social or cultural benefits. The most common examples are books and newspapers, which are subject to reduced VAT rates in 29 and 28 (out of 37) countries, respectively. As Figure 1 shows, countries often also provide reduced rates for cinema, theatre and concerts, and to a lesser extent for amusement parks, museums, sporting events, sporting facilities and zoos.

Some countries also introduce reduced rates on services that are close substitutes with home supply in order to encourage (market) employment, such as repair, domestic cleaning and hairdressing services. Many countries also provide reduced rates with a less clear policy rationale. The most common of these are for hotel (and/or other) accommodation, restaurant food, and passenger transport. Reduced rates for hotels and restaurant food may, for example, be introduced to encourage the employment of low-skilled

[4] Unless otherwise specified, expenditure on food and non-alcoholic beverages is separated into two categories in this paper: food and non-alcoholic beverages purchased for home consumption, including takeaway food ("food"); and food and non-alcoholic beverages consumed in restaurants, canteens and cafeterias ("restaurant food").

[5] Food made up 18.5% of total household expenditure, on average, in 23 OECD countries examined by Thomas (2020) using household budget survey microdata. In contrast, the next most common expenditure categories – newspapers and books – together made up only around 1% of total household expenditure, on average, in the same 23 countries.

workers, or for a perceived social benefit. Reduced rates for (domestic) passenger transport may be motivated by environmental concerns, but they may also be justified on employment or distributional grounds (on the basis that they lower the cost of commuting to work).[6] The existence of these reduced rates may also partially result from interest group pressure rather than from a clear policy rationale.

Though not the focus of this paper, it is also common for countries to exempt certain expenditures from VAT (i.e. zero rating with no ability to deduct input tax). Again, it is European countries that tend to have the greatest number of exemptions, whereas Chile, Japan and New Zealand tend to have the fewest.[7] Most countries exempt certain sectors considered essential for social reasons – particularly education, healthcare and charities. In some cases, practical reasons have led countries to use exemptions – for example, in every OECD country, most or all financial services are exempted due to the difficulty in determining the appropriate margin on which to apply VAT. Other sectors, such as postal services and gambling have often been exempted for a variety of historical reasons.[8]

The application of VAT registration thresholds also reduces the size of the VAT base. These are generally aimed at removing small businesses from the tax net where the associated compliance and administrative costs would be disproportionate relative to the amount of VAT revenue generated. The level of these thresholds varies significantly across OECD countries.[9]

3 Optimal indirect tax theory

Before assessing the various arguments used for and against the adoption of these reduced VAT rates, this section first reviews the optimal indirect taxation literature on the choice between uniform and differentiated rate structures. The appropriate rate structure for indirect taxation has been the subject of much theoretical work. While early papers by Ramsey (1927) and Corlett and Hague (1953) focused purely on efficiency, the modern optimal indirect taxation literature – beginning with Diamond and Mirrlees (1971) – has attempted to balance equity and efficiency objectives within a single framework.

In a world with a single representative consumer, Ramsey (1927) examines how to raise a given amount of tax revenue from indirect taxation at the lowest distortionary cost. His model excludes the use of any other tax.[10] If cross-price effects are zero, then the famous "inverse elasticity" rule results – where more

[6] International air travel is universally zero-rated due to the practical difficulty in assigning taxation rights to a service that may occur across multiple countries. Some countries also apply zero rates to other forms of international passenger travel.

[7] Unlike a zero rate, some VAT will still generally be payable on exempted goods and services. This is because the inability to deduct input tax will increase the cost, and hence the price, of the final good or service (unless the cost is fully borne by a party within the supply chain).

[8] Exemptions are also often applied to cultural services, legal aid, precious metals, public transport and water supply. There is only limited consistency in the types of goods and services that countries apply exemptions to as opposed to applying reduced rates. For example, cultural services, public transport and water supply are exempt in some countries but subject to a reduced rate in others. This can even be the case for the most commonly applied exemptions – for example, Australia zero-rates rather than exempts education and healthcare. In contrast, Korea provides no reduced rates and instead uses exemptions to address the distributional, cultural and social goals that many countries attempt to address through reduced VAT rates.

[9] Full details on VAT design features in each OECD country, including reduced rates, exemptions and registration thresholds, are provided in the OECD's biennial *Consumption Tax Trends* publication (see OECD, 2022, for the latest edition).

[10] Atkinson and Stiglitz (1980) extend the Ramsey model to show that if a lump sum tax is possible and the government only cares about efficiency then there should be no indirect tax at all. This is because the lump sum tax would be a more efficient means of raising the required revenue than the distortionary indirect tax.

inelastic goods should be taxed more heavily, and vice versa. If there are cross-price effects then the less prescriptive result is found that taxes should be levied to produce equal proportional reductions in the consumption of each good.[11]

Corlett and Hague (1953) also consider a single representative consumer model, but with three goods: leisure and two taxed goods. They examine whether a shift away from uniform taxation would be efficiency improving. They find that efficiency can be improved by taxing more heavily the good that is more complementary with leisure. The rationale here is that, by taxing complements with leisure more heavily than other goods, this will discourage leisure and so reduce the underlying distortion to the labour supply decision. In contrast, if all goods are equally complementary with leisure then uniformity will be optimal.[12]

Diamond and Mirrlees (1971) and Diamond (1975) extend the Ramsey model to a many person setting in order to take account of distributional considerations.[13] They maximise social welfare functions that apply different weightings to the utility of different individuals. Both studies find that the Ramsey proportional reduction rule must be altered to depend on who consumes the goods. If the weights of the social welfare function are based on income, then the optimal set of tax rates should result in a smaller proportional reduction in demand for goods consumed in greater proportions by the poor.[14]

While the above models exclude the possibility of an income tax, the seminal paper by Atkinson and Stiglitz (1976) brings together the optimal income tax and indirect tax literature to examine the simultaneous optimisation of both income and consumption taxes. Following Mirrlees (1971), the government's problem is shaped as one of optimisation subject to information constraints. Individuals are assumed to have identical preferences, but to differ in ability level. As ability is not directly observable, income – and potentially consumption – must be taxed instead. The model assumes there is no savings and the only source of income is labour – so the income tax is effectively a wage tax.[15] Within this framework, they show that if an optimal non-linear income tax is available and preferences between consumption and leisure are "weakly separable" (or, in other words, all goods are equally complementary with leisure), then a uniform indirect tax will be optimal.[16] Equivalently, as in their model a uniform indirect tax can be subsumed within an income tax, no indirect taxation is necessary at all.

Subsequent papers, such as Christiansen (1984) and Edwards et al. (1994), confirm the uniformity result where preferences are weakly separable. Where weak separability does not hold, they show that higher indirect taxes should be imposed on goods that are more complementary with leisure – consistent with

[11] As Heady (1993) notes, this technically only applies for small revenue requirements, and that additional assumptions of no income effects and linear demand curves are necessary for it to hold for large revenue requirements.

[12] Atkinson and Stiglitz (1972) highlight that Corlett and Hague's result is driven by the untaxed nature of leisure, not leisure itself. They note the general principle in such a three good model that if there is one untaxed good then we should tax the greater complement with it more heavily as this is a way of indirectly taxing the untaxed good. The uniformity result in the absence of complements with leisure is also found by Sandmo (1974).

[13] Diamond's (1975) model also includes the presence of a lump sum tax.

[14] Diamond and Mirrlees (1971) also develop the famous production efficiency result that, externalities aside, indirect taxes should not be levied on intermediate goods but only on final consumption. The intuition behind this result, as succinctly summarised by Crawford et al. (2010), is that "any distortion of production decisions reduces aggregate output, which cannot be wise so long as there is some useful purpose to which that output could be put." (p283).

[15] All references in this section to an income tax should be interpreted as a wage tax.

[16] Subsequent work by Kaplow (2006) and Laroque (2005) shows that this result still holds even if the income tax is not optimal.

the Corlett and Hague (1953) result.[17] Unlike Diamond and Mirrlees (1971) and Diamond (1975), the usefulness of indirect taxes is purely to improve efficiency as opposed to assist redistribution – which can now be more effectively addressed through the income tax.

The intuition behind this is drawn out by Edwards et al. (1994) using a model where individuals have just two ability levels.[18] They show that taxing complements with leisure makes it less attractive for higher ability individuals to "mimic" lower ability individuals (by working less), and this relaxes the incentive compatibility constraint that otherwise restricts the degree of redistribution that can be achieved through the income tax. This efficiency rationale for differential taxation is in striking contrast to the redistribution-based arguments typically used in practice to justify differential VAT rates. Meanwhile, if all goods are equally complementary with leisure, a mimicking high ability individual will consume the exact same bundle of goods as a lower ability individual with the same income, so consumption will not provide any additional information on ability and hence indirect taxes cannot be used to relax the incentive compatibility constraint.

The latter case emphasises the importance of the assumption of homogeneous tastes. In contrast, if individuals have heterogeneous tastes then a higher and lower ability individual earning the same income would no longer consume the exact same bundle of goods, and so consumption patterns may once again provide information about ability. Mirrlees (1976), Saez (2002) and Gauthier and Henriet (2018) consider models with heterogeneous tastes. They show that if tastes depend on ability, then a higher indirect tax should, in general, be imposed on a good if higher ability individuals have a relatively strong taste for that good.[19]

Another strand of literature has considered the impact of home production on optimal tax rates. Kleven et al. (2000) develop a single representative consumer model incorporating home production. This effectively produces a modified Corlett and Hague (1953) rule where the tax distortion favouring (untaxed) home production pushes down the optimal tax rate on consumer services that are substitutes for home production (e.g. house repairs, cleaning services). Where goods and services are equally complementary with leisure (so that uniform taxation would otherwise be optimal), they show that substitutes for home production should unequivocally face a relatively low tax rate. Piggott and Whalley (2001) develop a very similar model incorporating home production. They simulate their model based on Canadian data and find that Canada's 1990 VAT reform that brought consumer services into the indirect tax net was welfare reducing.[20]

Kleven (2004) and Boadway and Gahvari (2006) consider models where both goods and time must be allocated. Kleven (2004) finds that market goods that take more time to be consumed should be taxed more heavily than those that take less time, or those that save time. Boadway and Gahvari (2006) find that goods that are less pleasurable to consume should be taxed more heavily than those that are more pleasurable and that, for less pleasurable goods, those that take longer to be consumed should be taxed

[17] Atkinson and Stiglitz (1976) actually make the opposite conclusion to Corlett and Hague (1953) when consumption and labour are not weakly separable: that you should tax more heavily goods that are complements with labour – i.e. substitutes with leisure. Kaplow (2010) examines the discrepancy in detail and points to a revised interpretation of the Atkinson and Stiglitz model's setup where results become consistent with Corlett and Hague (1953).

[18] A similar analysis is undertaken by Nava et al. (1996).

[19] Cremer et al. (2001) also show a role for differential taxation if individuals have different initial endowments of goods.

[20] Cremer and Gahvari (2015) also show in an Atkinson and Stiglitz (1976) framework that weak separability in preferences between consumption and leisure is no longer sufficient for uniformity when there is household production. However, if preferences are weakly-separable in market goods versus leisure and household production, then uniformity becomes optimal.

more heavily. As Crawford et al. (2010) note, intuitively this is once again acting to reduce tax-induced disincentives to engage in market work, but additionally recognising that it is preferable to spend any given amount of time in a pleasurable activity as compared to an unpleasurable one. They give the example that DVDs (which are pleasurable but time consuming) should be taxed less heavily than ironing boards (as ironing is dull and time consuming).

A key question arising from the above literature is whether preferences between consumption and leisure are in fact weakly separable. Unfortunately, only a small number of empirical studies have examined this question. Browning and Meghir (1991) and Crawford et al. (2010) estimate demand systems for the United Kingdom and both reject weak separability – suggesting a role for differential taxation. Crawford et al. (2010), for example, find that most food products, fuels, tobacco, children's clothing and public transport are complements with leisure. Meanwhile, alcoholic drinks, food eaten out, motor fuels and leisure goods are complements with work.[21]

Pirttila and Suoniemi (2014), estimate a model using commodity demands and additional administrative data to explain hours worked for Finland. Their results also reject weak separability, although they find statistically significant relationships between consumption and hours worked for a smaller number of consumption categories than Crawford et al. (2010). Expenditure on housing and on books and magazines are found to be negatively related to hours worked, while office meals and car use are positively related to hours worked.[22] They also examine the use of public services and find that the use of childcare is positively related to hours of work.

While these results suggest an efficiency case for differential taxation, the practical implementation of such an optimal rate structure is challenging. Crawford et al. (2010), for example, emphasise that optimal tax rates will depend not just on the sign of demand responses but also on their magnitudes as well as on cross-price effects. They conclude that "the limitations and uncertainties of both the theory and empirical work are such that, at least as yet, they provide little firm basis for policy prescription" (p350). They further note that, given the small size of their complementarity estimates, the social gain from implementing differential rates is likely to be small, and these would need to be weighed against the administrative burden (see section 4.4) of implementing a highly differentiated rate structure.

The Mirrlees Review (Mirrlees et al., 2011) to which Crawford et al. (2010) contribute, consequently recommends the adoption of a uniform VAT rate structure for the United Kingdom, with the possible exception of childcare to which a zero rate could be applied.[23] More generally, Sørensen (2007, 2010) argues that a lack of elasticity information, combined with administrative and political economy

[21] Crawford et al. (2010) suggest the latter result may reflect the use of leisure goods as substitutes for time spent producing relaxation, as per the arguments in Kleven (2004) and Boadway and Gahvari (2006).

[22] Additionally, they find capital income to be significantly negatively related to hours of work. Gordon and Kopczuk (2014) make a similar finding based on United States data. Both papers argue therefore that capital income should be taxed. They also argue that current direct tax concessions (e.g. mortgage interest deductibility) for housing should be removed.

[23] Bastani et al. (2015) argue that Mirrlees et al. (2011) are effectively considering a situation where all goods are separable from leisure with the exception of one good needed for work. They develop a model to show that in such a case there remains an equity argument to apply differential tax rates to the goods that are separable from leisure. The rationale is that, because a family needs to pay for childcare in order to work, a high ability "mimicking" family (that works less hours than a non-mimicking family) actually has higher disposable income than a non-mimicking family earning the same gross income because they need to pay for less childcare. Their higher disposable income creates an equity-based rationale for taxing goods consumed proportionately more by higher income households. If childcare is publicly provided, this rationale disappears and uniform taxation is once again optimal.

considerations, suggests that "uniform taxation should be the main guideline for indirect taxation" (Sørensen, 2010; p241). Nevertheless, he also adds that, following the recent home production literature, there is a good case for applying relatively low indirect tax rates to substitutes for home production activities.

In summary, consideration of the above literature provides support for a uniform VAT rate in two ways. First, and most clearly, the optimal indirect tax literature provides the strong message that rate differentiation should not be used to achieve distributional goals when other more direct instruments are available. Second, while the optimal indirect tax literature does provide a potential efficiency rationale for differentiated rates, such an approach is not practically implementable due to the extremely high data requirements. Therefore, from an efficiency perspective, we fall back on a single rate structure to avoid distorting consumption decisions (while also reaping the administrative benefits of a single-rate structure, as discussed subsequently in this paper). The one potential exception on efficiency grounds is regarding substitutes for home production activities – although, as discussed below, this also has practical limitations.

4 The case for reduced VAT rates

With the above lessons from the optimal indirect tax literature in mind, this section now briefly assesses the main arguments that have been used in practice both for and against the adoption of reduced VAT rates. As already noted, the primary rationale for the adoption of reduced VAT rates has been to achieve distributional goals. That said, merit good and efficiency-based arguments are also used to justify the introduction of reduced rates. Meanwhile, a number of practical arguments favour simplification and the use of a single-rate VAT structure.

4.1 Redistribution

The discussion above has shown that the theoretical case for using reduced VAT rates to achieve distributional goals is very weak, particularly when other more direct instruments are available. In spite of this, redistribution has been the predominant motivation for reduced VAT rates in OECD countries. On this basis, reduced rates are frequently applied to consumption items that tend to make up a greater proportion of the expenditure of poorer as compared to richer households. As shown in Section 2, these include food, water supply, pharmaceuticals, refuse, sewage, energy and children's clothing.

Distributional arguments are generally premised on the view that the VAT is regressive, and hence measures are necessary to reduce the negative distributional consequences of the VAT. This is problematic for several reasons: first, it is by no means clear that the VAT is indeed regressive; second, it is unlikely that reduced VAT rates will be a well targeted instrument to support the poor; and third, as the theoretical literature emphasises, other more direct instruments – if available – are likely to be better targeted. In this regard, it is important to remember that it is the progressivity of the overall tax-benefit system (together with expenditure programs) that matters, not one particular component. As such, distributional concerns regarding the VAT do not need to be addressed directly through the VAT system itself.

The distributional impact of a VAT system, including who benefits from reduced VAT rates, will in practice depend on both the design of the VAT system and the consumption patterns of households (including their responses to price changes). As such, whether the VAT is regressive, whether reduced VAT rates are well targeted at poorer households, and whether alternative instruments can better target poorer households are all empirical questions that can be tested. A number of empirical studies have examined these questions, and are summarised briefly below. These studies typically draw on household

expenditure survey microdata[24], as this enables the fine distinctions present in many countries between expenditure categories subject to different VAT rates to be accurately modelled.

4.1.1 Regressivity of the VAT

Several studies (e.g., Leahy et al., 2011; Ruiz and Trannoy, 2008; O'Donoghue et al., 2004) examine the overall distributional impact of the VAT by measuring VAT burdens as a percentage of income across the income distribution for a single year. Following this approach, these studies find the VAT to be a highly regressive tax. However, as has been highlighted by various authors (e.g., IFS, 2011a; Creedy, 1998; Metcalf, 1994), a major problem with this approach is that it does not account for savings behaviour. More specifically, it ignores the fact that income saved in the current year will incur VAT when it is eventually consumed (because this VAT cannot be captured by an analysis based on data from a single year).[25] Because savings rates tend to increase with income, this biases income-based VAT burden results downwards at higher income levels – driving the finding that the VAT is regressive.

In contrast, studies that measure VAT burdens as a proportion of expenditure (across either the income or expenditure distribution) tend to find that VAT systems are relatively proportional, or even slightly progressive (see, e.g., Thomas, 2022a; Bird and Smart, 2016; IFS, 2011a; Metcalf, 1994). The largest cross-country study favouring the expenditure-based approach is Thomas (2022a), who finds the VAT to be either roughly proportional or slightly progressive in 23 of 27 OECD countries examined. However, results for four countries show that broad-based VAT systems with very few reduced VAT rates or exemptions can produce a small degree of regressivity.

Most recently, Bachas et al. (2023) have considered the impact of informality in developing countries on the distribution of VAT burdens. They estimate informality Engel curves (relating the informal budget share to log total expenditure) for 32 low and middle-income countries. They find that informality decreases as household expenditure increases, and conclude that this will create a degree of progressivity in the VAT in developing countries. Similarly, Jenkins et al. (2006) find that informality creates progressivity in the VAT in the Dominican Republic.

4.1.2 The ability of reduced VAT rates to target poorer households

A number of empirical studies examine who benefits from reduced rates, finding the VAT to be a poorly targeted tool for supporting poorer households. For example, two large scale studies consider who benefits from reduced VAT rates in nine European (IFS, 2011a) and 20 OECD countries (OECD/KIPF, 2014). Both studies find that reduced VAT rates as a whole have a progressive impact, but that richer households benefit more in aggregate terms than poorer households. IFS (2011a) emphasize a key reason for the overall progressive results is the application of reduced rates to the majority of food in all nine countries. OECD/KIPF (2014) finds significant variation in the distributional impact of reduced rates across expenditure types. Reduced rates typically introduced to achieve distributional goals – such as on food, water supply and energy products – are found to have a small progressive effect, but to be poorly targeted. Reduced rates typically introduced to address social, cultural and other non-distributional goals – such as reduced rates on books, restaurant food and hotel accommodation – are often found to be so poorly targeted that they have a regressive effect.[26]

[24] Warren (2008) provides a summary of different approaches that can be taken to modelling the distributional effects of consumption taxes more broadly.

[25] Similarly, current expenditure, and the VAT incurred on it, may have been funded from income earned in a previous year. See Thomas (2022a) for a more detailed discussion.

[26] A range of other single-country microsimulation studies find similar results either for reduced VAT rates as a whole or for selected reduced rates such as on food (e.g., Davis and Kay, 1985, for the United Kingdom; Leahy et al., 2011,

Meanwhile, Warwick et al. (2022) examine the overall distributional impact of reduced VAT rates in six developing countries (Ethiopia, Ghana, Senegal, Sri Lanka, Uzbekistan and Zambia). Additionally, they utilize input-output tables to estimate tax expenditures resulting from VAT exemptions. They find both progressive and regressive results, depending on the country, but that reduced rates and exemptions give significant benefit to richer households and are therefore an expensive way of attempting to support poorer households.[27] The impact of informality in developing countries illustrated by Bachas et al. (2023) may further weaken the ability of reduced VAT rates to target poor households. In particular, Bachas et al. (2023) find (very small) positive slopes on formal food Engel curves in some low-income countries – implying that formal budget shares on food increase with income, and hence that even a reduced rate on food could be slightly regressive in some low-income countries.[28, 29]

A standard assumption in the above studies is that the VAT is fully passed on to consumers in prices (and so the savings from a reduced VAT rate are also passed on to the consumer). However, the theoretical and empirical literature suggests that this may not necessarily be the case, casting further doubt on the ability of reduced VAT rates to provide support to poorer households.[30] For example, a detailed review by IHS (2011) finds a wide range of empirical results in the literature, covering full, less than full, and more than full pass-through. They conclude that full pass-through is more likely to be found in more competitive markets and for broader VAT reforms. More recently, Benzarti et al. (2020) find evidence for European countries of stronger pass-through of VAT increases than VAT decreases. Benedek et al. (2019) find roughly full pass-through of standard VAT rate changes, but only around 30 per cent pass-through for changes in reduced VAT rates. Unlike Benzarti et al. (2020), they find no significant evidence of asymmetric responses to price changes in European countries. Meanwhile, Gaarder (2018) finds that the introduction of a reduced VAT rate on food in Norway resulted in full pass-through to prices.

4.1.3 Reduced VAT rates vs cash transfers

The above studies, while showing that reduced VAT rates often have a progressive effect, also show them to be badly targeted at the poor. Nevertheless, a case only exists for removing existing reduced rates if a better alternative policy instrument exists with which to achieve distributional goals. In theory, cash transfer programs (whether implemented through the tax or benefit system) should be able to better target support to poorer households than reduced VAT rates. Not only can they target support based on income, but also on family characteristics, such as number and age of children, to further target support

for Ireland; Caspersen and Metcalf, 1994, for the United States; Creedy, 2001, for Australia; Ball et al., 2016, for New Zealand; Cseres-Gergely et al., 2017, for Hungary; and Gaarder, 2018, for Norway). See Thomas (2020) for a detailed review of this literature.

[27] Warwick et al. (2022) assume a constant degree of informality across households in their base scenario. In sensitivity analysis for Senegal, they vary the degree of informality across households and products, based on place of purchase data (as used by Bachas et al., 2023). This has only a small impact on their results, and their conclusions remain the same, in part because their data suggests only limited variation in informality across the income distribution in Senegal (88% informality in the bottom decile vs 83% informality in the top decile).

[28] The slopes of formal food Engel curves tend to become negative for upper middle-income countries in their sample. As would be expected, the slopes of total (i.e. formal plus informal) food Engel curves are found to be negative in all countries covered.

[29] Furthermore, if a zero rate was applied to formal food consumption, a situation could arise where low-income informal consumers effectively pay a positive rate of VAT on their food purchases, but high-income formal consumers pays no VAT due to the zero rate. The positive VAT on informal consumption would arise where informal suppliers of food purchase inputs from formal VAT registered businesses. These VAT registered businesses would charge VAT on their output, but this would not be able to be reclaimed by the informal supplier, who may therefore pass this VAT cost on to their (informal) consumer in the price of the food.

[30] This point is emphasized by de la Feria and Walpole (2020).

at households most in need. This expectation is supported by several recent studies that show cash transfers to be superior to reduced VAT rates at providing support to poorer households. These include several studies that estimate demand systems to incorporate behavioral responses into the simulation results, as well as simpler non-behavioral studies.

For example, Cseres-Gergely et al. (2017) estimate a Quadratic Almost Ideal Demand System (QUAIDS) for Hungary to simulate the introduction of a range of potential policy measures to help poorer households, finding that an income transfer to the unemployed would be better targeted at the poor than reduced VAT rates on food. Thomas (2022b) uses a QUAIDS model for New Zealand to simulate a revenue neutral reform replacing existing targeted family tax credits with reduced VAT rates on food, beverages, and a range of recreational and cultural expenditure. He finds that these reduced VAT rates would be far less effective at supporting poorer households than the existing targeted family tax credits.

Van Oordt (2018) uses a QUAIDS model for South Africa to simulate removing reduced VAT rates and using the revenue to extend existing cash transfers. He finds that low- and middle-income households would benefit from the reform, while high-income households would lose. However, he highlights some concerns regarding the ability to effectively implement cash transfers in a developing country context. In this regard, Gcabo et al. (2019), in their non-behavioral analysis, find that better targeting would be achieved with the introduction of new cash transfers rather than the extension of existing cash transfers in South Africa.

Warwick et al. (2022) find that the existing cash transfer programs in their six developing countries are better targeted at poor households than reduced VAT rates and exemptions. That said, the targeting of these programs remains imperfect, and would require significant improvements in both generosity and coverage in order to compensate for base-broadening VAT reforms. Strikingly, their non-behavioural simulation results show that even adopting a universal benefit would better target poor households than the reduced VAT rates (and exemptions) in place in these countries.[31]

In addition to redistribution (which addresses vertical equity concerns), there are also horizontal equity implications to the adoption of reduced VAT rates. As noted by IFS (2011b), multi-rate VAT systems will effectively reward some households for their preferences and penalise others. This will breach horizontal equity as, for example, two otherwise identical households with different consumption preferences for reduced vs standard-rated goods and services, will face different VAT burdens. In contrast, a single-rate VAT system would result in the same tax burden for both households, irrespective of their consumption preferences.[32]

Finally, the application of reduced VAT rates for distributional purposes may conflict with other policy objectives. In particular, applying reduced VAT rates on fossil fuel energy use (e.g. heating fuels) will conflict with environmental goals to efficiently price carbon emissions (and internalize other negative externalities, e.g., local air pollution). A preferable approach is to fully internalize the negative

[31] Non-behavioral studies for the United Kingdom by Davis and Kay (1985), Crawford et al. (2010) and Mirrlees et al. (2011) find reform packages involving the replacement of reduced VAT rates with changes to direct taxes and transfer payments can improve distributional outcomes. Similarly, Brashares et al. (1988) find that income-tested credits or reimbursements would benefit poor households far more than zero-rating necessities in a VAT in the United States. Again, see Thomas (2020) for a more detailed review of this literature.

[32] IFS (2011b) also discuss the specific egalitarianism argument of Tobin (1970). This argument supposes that society has preferences regarding inequality in the consumption of specific products – such as necessities – as opposed to over total consumption. However, as they note, this argument assumes that households would buy too little of the product if they were provided with the money to buy them (e.g. through a tax credit or benefit). As such, it is more in the nature of a merit good or internality argument, rather than an equity-based argument.

externalities in the price through excise and/or carbon taxes, apply the standard VAT rate on top, and then provide compensation to poorer households through targeted cash transfer programs.[33] More generally, with any good producing negative externalities (e.g. tobacco, alcohol), the standard VAT rate should be imposed on top of the corrective excise tax used to internalize the externality.

4.2 Merit goods/externalities

Another common argument for the introduction of reduced VAT rates is to encourage consumption of 'merit goods' that generate positive externalities. That is, if consumption of a good or service has benefits to society that the consumer does not take into account in their consumption decision, then there is *prima facie* a market-failure based case for government intervention to encourage consumption up to the socially optimal level. (Equally, there is a case to discourage consumption of goods and services with negative external effects as noted above).[34]

On this basis, as noted in Section 2, many OECD countries have introduced reduced VAT rates on a range of goods and services with perceived cultural or social merit to encourage their consumption. These include: books, newspapers, cinema, theatre, concerts, museums, zoos, amusement parks, and sporting events and facilities. Reduced rates are also applied on environmental externality grounds in some countries to solar panels, insulation, and other environmentally beneficial goods and services. Reduced rates applied to passenger transport may in some cases also be based on environmental externality grounds. Total expenditure on such goods and services typically makes up a far smaller proportion of total household expenditure than on those introduced for distributional reasons, due, in particular, to the large budget share of food.

While the basic rationale to internalize a positive externality is valid, a key question arises, as it did with redistribution, regarding whether a reduced VAT rate is the most effective way of achieving the desired policy goal.[35] Various authors have suggested this is unlikely to be the case (see, for example, IFS, 2011b; IHS et al., 2015; Abramovsky et al., 2017). IFS (2011b), for example, argue that "[i]f the social problem one wishes to address is affected by business use of a product, or is associated with the consumption of only particular kinds of consumers (e.g. the poor or children), or is unrelated to the price of the product, then applying reduced rates may not be an appropriate policy response" (p554).

The first of these points relates to the ability of businesses to claim input tax credits, meaning that a reduced VAT rate will not lower the price a business pays for a product. As such, where business consumption of a product (e.g. passenger transport, insulation or solar panels) produces positive externalities, then reduced rates – which only incentivise final consumers – will not be well targeted. Second, as reduced VAT rates apply equally to all consumers, they will not be well targeted if under-

[33] The same rationale also applies regarding temporary measures introduced in response to the recent surge in food and energy prices, with targeted cash transfers (whether implemented via the tax or benefit system) being preferable to reduced VAT rates or other price-based support measures (see, e.g., Amaglobeli et al., 2022; Van Dender et al., 2022).

[34] Similar arguments may be made regarding "internalities" where consumption may provide additional benefits to the consumer that they do not fully take into account due, for example, to a lack of knowledge. Negative internality arguments are often used in relation to proposals for health-related excise taxes (see, for example, Marron, 2015). Negative externalities are, of course, a common justification for health-related excise taxes on alcohol and tobacco.

[35] Another question that may be asked is whether or not the tax-favored activity really is socially desirable or not. However, as IFS (2011b) note, what is socially desirable is a largely subjective question, and may depend significantly on the culture and history of the particular country. Estimation of the size of the positive externality is also a substantial challenge (as it is for negative externalities). Further difficulty then arises in accurately estimating the behavioral response to a price change, in order to determine the necessary size of the tax concession to fully internalize the externality.

consumption is specific to a subset of the population – for example, under-consumption of books by young people or poor people.

Perhaps most significantly, reduced VAT rates provide a larger subsidy for more expensive purchases. This implies that, for a reduced rate to be well targeted, the positive externality should be correlated with the price of the product subject to the reduced rate. However, in many cases this will not be true. For example, reading an inexpensive paperback book will not provide less social benefit than reading an expensive hard-back version of the book. Similarly, taking a taxi is unlikely to provide a greater reduction in environmental cost than taking a bus for the same journey (assuming an internal combustion engine in both cases). IFS (2011b) suggest better targeted mechanisms are likely to be available in many cases. For example, income-based or age-based subsidies are likely to better target concerns about under-consumption of certain products by young or poor people. Subsidies can also be made available to businesses.

Applying a reduced VAT rate for social or cultural purposes may also have broader distributional effects. For example, certain cultural activities may be consumed disproportionately by better-off households, who would then benefit disproportionately from a reduced rate on these activities (OECD/KIPF, 2014).

Recently, 'circular economy'-based arguments have also been put forward suggesting the use of differentiated VAT rates to encourage greater use of recyclable and re-usable goods. (See, for example, European Circular Economy Stakeholder Platform, 2021).[36] While circular economy arguments go beyond the externality-based rationale discussed above, if pursued as a policy goal, the same question remains as to whether the VAT is the most effective way of achieving such a goal. In this regard, the ability of businesses to claim input tax credits, and the provision of a larger subsidy for more expensive purchases (rather than larger resource quantity), again suggest that alternative options may be more effective at achieving those objectives, and with less negative distributional impact.

4.3 Efficiency

As Mirrlees et al. (2011) note, there is an initial presumption on efficiency grounds in favour of uniformity of indirect taxes to avoid distorting consumption decisions. The optimal tax literature discussed above then points to a theoretical case for differentiated rates on efficiency grounds, but not one in practice due to the lack of reliable information. As such, efficiency arguments point broadly towards a single-rate VAT structure.

Nevertheless, following Kleven et al. (2000) and subsequent literature, there is a restricted case for applying reduced VAT rates to substitutes for home production activities. This provides support for the reduced rates in place in a number of countries for services such as domestic cleaning, repair services and hairdressing. That said, an assessment by the European Commission (2003) of reduced rates introduced in nine member countries on such labour-intensive services concluded that the reduced rates did not appear to have a positive impact on employment (or on the informal economy). More generally, they concluded that "[c]ompared with other measures, particularly those that directly target labour costs, the budgetary cost of any job creation effects through VAT reductions is always high."

Another argument used to justify applying reduced VAT rates to labour-intensive sectors – such as restaurants and hotels – is to reduce structural unemployment of low-skilled workers (Copenhagen Economics, 2007; IFS, 2011b, IHS et al., 2015). Applying a reduced VAT rate to such sectors that primarily hire low-skilled workers is intended to boost demand for low-skilled workers, and thereby reduce

[36] Existing reduced rates in several OECD countries for repair services could be justified on this basis, although they appear to have typically been introduced on efficiency grounds as a substitute for home production (IFS, 2011b).

structural unemployment that may have arisen due to factors such as restrictive labour market regulations, high minimum wages, and high non-wage labour costs.[37]

Little empirical evidence is available on the effectiveness of such measures. However, a study by Copenhagen Economics (2007) suggests that reduced VAT rates are unlikely to be an effective mechanism to increase low-skilled employment. Using a general equilibrium model for the European economy as a whole, they find that reduced VAT rates can lower structural unemployment in sectors such as hotels and restaurants, without significantly reducing employment in other sectors. However, they find that this provides only a very limited boost to overall employment of low-skilled workers, as such sectors only employ a small fraction of all low-skilled workers. Furthermore, they find that applying the standard VAT rate to all sectors currently benefiting from reduced rates would be likely to create a similar boost in demand for low-skilled workers, but without distorting consumption decisions. They note that direct subsidies may be a better-targeted and more transparent approach, with lower compliance costs. IFS (2011b), meanwhile, argue that alternative mechanisms such as active labour market policies, employment regulation reform, and education investment would be likely to be better targeted ways of addressing structural unemployment of low-skilled workers.

Finally, applying a reduced VAT rate to increase employment is also likely to have broader distributional effects. In particular, restaurant food and hotel accommodation are likely to be consumed disproportionately by better-off households, who would then benefit disproportionately from a reduced rate on these activities (OECD/KIPF, 2014).

4.4 Practical implementation issues

Finally, the application of a multi-rate VAT system increases the complexity of the system, thereby increasing administrative and compliance costs, creating opportunities for tax avoidance and evasion, as well as increasing susceptibility to lobbying.

A large number of studies point to the increased compliance and administration costs associated with multi-rate VAT structures (e.g., Ebrill et al., 2001; Copenhagen Economics, 2007; IFS, 2011b; IHS et al., 2015; Abramovsky et al., 2017). In particular, the use of multiple rates requires accounting, invoicing and tax reporting systems to separately record purchases and sales involving different VAT rates. In contrast, a single VAT rate enables simpler reporting systems with less possibility of error. Ebrill et al. (2001) argue further that simple records, invoices and tax forms will in turn support the effective operation of self-assessment systems as well as more effective taxpayer education and staff training. A single rate will also aid audit activity, as verification is not required of the breakdown of purchases and sales between different rates. A single rate will also reduce scope for disputes over classifications (and limit fraud by reducing possibilities for deliberate misclassification). A single rate will also reduce the number of refunds that tax administrations must process.

While there is significant empirical evidence on the overall compliance and administrative costs of the VAT, there is unfortunately only limited evidence specifically on the impact of rate structure. An early study by Sandford et al. (1981) found that the average compliance costs of firms in the United Kingdom with output subject to multiple rates were more than twice those of firms with output only subject to a

[37] Copenhagen Economics (2007) and IHS et al. (2015) emphasise that this argument also requires disproportionate structural unemployment of low-skilled workers as compared to higher skilled workers. If not, any demand-induced reduction in structural unemployment of low-skilled workers would be countered by a demand-induced increase in structural unemployment of higher skilled workers. They also note that a reduced VAT rate would be unlikely to reduce structural unemployment if it was applied to tradeable goods and services, as part of the impact would be to increase imports.

single rate. Copenhagen Economics (2007), meanwhile, point to practical evidence from Sweden showing roughly 20 percent of all VAT disputes to be linked to arguments about whether a particular product should be subjected to a low or high VAT rate. Abramovsky et al. (2017) provide examples of court cases from the United Kingdom involving disputes over classifications. These include cases considering whether Pringles should be classified as potato crisps (standard-rated) or savoury snacks (zero-rated), and whether Jaffa Cakes are chocolate-covered biscuits (standard-rated) or chocolate cakes (zero-rated). Meanwhile, for a sample of OECD countries, Agha and Haughton (1996), find that VAT compliance decreases significantly the greater the number of VAT rates – suggesting these problems manifest in lower compliance.

Finally, the application of reduced VAT rates to some products, increases vulnerability to lobby group pressure to apply reduced rates to additional products. IFS (2011b) argue this is particularly likely for substitutes for goods already subject to reduced rates, or if the rationale for the existing concessions can be argued as also applicable to other goods. Mirrlees et al. (2011), for example, suggest that lobby group pressure has influenced decisions in the United Kingdom to extend VAT concessions. Drawing on the New Zealand experience, Benge et al. (2013) argue that it is "much easier to deny special treatment in all cases rather than allow certain special cases but not others", and that "once certain special cases are allowed, decisions on whether or not to allow others are much more likely to be driven by lobbying and political realities than unbiased econometric analysis" (p496).

5 Conclusion

This paper has highlighted the widespread use of reduced VAT rates in OECD countries, with these typically being aimed at achieving distributional goals, and (to a lesser extent) social, cultural and other objectives. However, analysis of both the theoretical and empirical evidence, as well as practical considerations, suggests that the case for applying reduced VAT rates is weak. In particular, the optimal indirect tax literature finds no redistributive role for reduced VAT rates when other more direct instruments are available. These theoretical findings are supported by the empirical literature that shows reduced VAT rates to be a poorly targeted means of supporting lower income households, and the greater – though still imperfect – targeting ability of cash transfer programs. Similarly, reduced VAT rates are unlikely to be a well-targeted way to encourage consumption of merit goods. Meanwhile, efficiency arguments, with the restricted exception of some substitutes for home production, favour the adoption of a single-rate VAT structure, which would also bring significant administrative benefits.

While focusing predominantly on OECD countries, the paper's findings have significant implications for tax reform in both developed and developing economies. In particular, where countries have the administrative capacity to effectively implement targeted cash transfer programs, they should use these programs to support poorer households instead of using reduced VAT rates. In more limited capacity environments, a simpler universal cash transfer could even be adopted – as this would still better target support to poorer households than reduced VAT rates. Only where there is no administrative capacity to effectively implement a cash transfer program should reduced VAT rates be considered as a tool to target support to poorer households. Even then, the potential impact of informality on the ability to target poorer households should be considered.

Countries should also consider removing reduced VAT rates aimed at non-distributional goals where a more effective instrument is available to achieve the particular policy goal. At a minimum, the merits of these reduced VAT rates should be reassessed in light of their negative distributional impact.

From a political economy perspective, countries that face political difficulty removing reduced VAT rates should, in the short-term, consider removing at least those that have regressive effects. In the long-term,

they should still consider removing all reduced rates and adopting more targeted policy solutions with less negative distributional consequences. Not only would a move to a single-rate VAT system improve distributional outcomes, it would simplify the VAT system – thereby reducing administrative and compliance costs, and reducing opportunities for abuse. The clear "packaging" of the increases in targeted support together with the removal of reduced VAT rates in any public communication is likely to increase public support for the reform.

Finally, countries that currently do not employ reduced rates in their VAT system should be very cautious regarding any proposals to introduce reduced rates. This is particularly important in light of the potential political economy difficulties of removing them once they are in place.

References

Abramovsky, L., D. Phillips and R. Warwick (2017), "Redistribution, Efficiency and the Design of VAT: A Review of the Theory and Literature", *IFS Briefing Note*, No. BN212.

Agha, A. and J. Haughton (1996), "Designing VAT Systems: Some Efficiency Considerations", *Review of Economics and Statistics*, 78(2), 303–08.

Amaglobeli, D., E. Hanedar, G. Hong and C. Thévenot (2022), "Fiscal Policy for Mitigating the Social Impact of High Energy and Food Prices", IMF Notes, 2022/001.

Atkinson, A. and J. Stiglitz (1972), "The Structure of Indirect Taxation and Economic Efficiency", *Journal of Public Economics*, 1, 97–119.

Atkinson, A. and J. Stiglitz (1976), "The Design of Tax Structure: Direct versus Indirect Taxation", *Journal of Public Economics*, 6, 55–75.

Atkinson, A. and J. Stiglitz (1980), *Lectures on Public Economics*, New York: McGraw-Hill.

Bachas, P., L. Gadenne and A. Jensen (2023), "Informality, consumption taxes and redistribution", *Review of Economic Studies* (forthcoming).

Ball, C., J. Creedy and M. Ryan (2016), "Food Expenditure and GST in New Zealand", *New Zealand Economic Papers*, 50(2), 115–128.

Bastani, S., S. Blomquist and J. Pirttila (2015), "How Should Commodities Be Taxed? A Counter-Argument to the Recommendation in the Mirrlees Review", *Oxford Economic Papers*, 67(2), 455–478.

Benedek, D., R. De Mooij, M. Keen and P. Wingender (2019), "Varieties of VAT pass through", *International Tax and Public Finance*, 27, 890–930.

Benge, M., M. Pallot and H. Slack (2013), "Possible Lessons for the United States from New Zealand's GST", *National Tax Journal*, 66(2), 479–498.

Benzarti, Y., Carloni, D., Harju, J. and T. Kosonen (2020), "What goes up may not come down: asymmetric incidence of value-added taxes", *Journal of Political Economy*, 128, 4438–74.

Bird, R. and M. Smart (2016), "Taxing Consumption in Canada: Rates, Revenues, and Redistribution", *Canadian Tax Journal*, 64(2), 417–42.

Boadway, R. and F. Gahvari (2006), "Optimal Taxation with Consumption Time as a Leisure or Labor Substitute", *Journal of Public Economics*, 90, 1851–1878.

Brashares, E., J. Speyrer and G. Carlson (1988), "Distributional Aspects of a Federal Value-Added Tax", *National Tax Journal*, 41(2), 155-74.

Browning, M. and C. Meghir (1991), "The Effects of Male and Female Labor Supply on Commodity Demands", *Econometrica*, 51, 925–951.

Caspersen, E., and G. Metcalf (1994), "Is a Value Added Tax Regressive? Annual versus Lifetime Incidence Measures", *National Tax Journal*, 47, 731–746.

Christiansen, V. (1984), "Which Commodity Taxes Should Supplement the Income Tax?", *Journal of Public Economics*, 24, 195–220.

Copenhagen Economics (2007), "Study on Reduced VAT Applied to Goods and Services in the Member States of the European Union", Report prepared for the European Commission, 6503 DG TAXUD.

Corlett, W. and D. Hague (1953), "Complementarity and the Excess Burden of Taxation", *Review of Economic Studies*, 21, 21–30.

Crawford, I., M. Keen and S. Smith (2010), "Value-Added Tax and Excises", in J. Mirrlees et al. (eds.), *Dimensions of Tax Design: The Mirrlees Review*, Oxford University Press, Oxford.

Creedy, J. (2001), "Indirect Tax Reform and the Role of Exemptions", *Fiscal Studies*, 22(4), 457–86.

Creedy, J. (1998), "Are Consumption Taxes Regressive?", *Australian Economic Review*, 31(2), 107–116.

Cremer, H. and F. Gahvari (2015), "Atkinson and Stiglitz Theorem in the Presence of a Household Production Sector" *Economics Letters*, 126, 91–95.

Cremer, H., P. Pestieau and J-C. Rochet (2001), "Direct versus Indirect Taxation: The Design of the Tax Structure Revisited", *International Economic Review*, 42, 781–799.

Cseres-Gergely, Z., G. Molnar and T. Szabo (2017), "Expenditure Responses, Policy Interventions and Heterogeneous Welfare Effects in Hungary During the 2000s", Discussion paper 2017/4, Institute of Economics, Centre for Economic and Regional Studies, Hungarian Academy of Sciences.

Davis E. and J. Kay (1985), "Extending the VAT Base: Problems and Possibilities", *Fiscal Studies*, 6, 1–16.

de la Feria, R. and M. Walpole (2020), "The Impact of Public Perceptions on General Consumption Taxes", *British Tax Review*, 67(5), 637-669.

Diamond, P. (1975), "A Many-Person Ramsey Tax Rule", *Journal of Public Economics*, 4, 335–342.

Diamond, P. and J. Mirrlees (1971), "Optimal Taxation and Public Production I: Production Efficiency, II Tax Rules", *American Economic Review*, 61, 8–27 and 261–78.

Ebrill, L., M. Keen, J-P. Bodin and V. Summers (2001), *The Modern VAT*, International Monetary Fund, Washington DC.

Edwards, J., M. Keen and M. Tuomala (1994), "Income Tax, Commodity Taxes and Public Good Provision: A Brief Guide", *FinanzArchiv*, 51(4), 472–487.

European Circular Economy Stakeholder Platform (2021), "Circular Taxation Reflection Paper", Available at: https://circulareconomy.europa.eu/platform/sites/default/files/leadership_group_on_economic_incentives_-_circular_taxation_reflection_paper_2021.pdf

European Commission (2021), "VAT Rates Applied in the Member States of the European Union", DG TAXUD, Available at: https://taxation-customs.ec.europa.eu/system/files/2021-06/vat_rates_en.pdf

European Commission (2003), "Evaluation Report on the Experimental Application of a Reduced Rate of VAT to Certain Labour-Intensive Services", COM(2003)309 final.

Gaarder, I. (2018), "Incidence and Distributional Effects of Value Added Taxes", *Economic Journal*, 129, 853–876.

Gauthier, S. and F. Henriet (2018), "Commodity Taxes and Taste Heterogeneity", *European Economic Review*, 101, 284–296.

Gcabo, R., B. Moche, W. Steyn, B. Moahlodi, J. Pirttilä, M. Noble, G. Wright, H. Barnes and F. Masekesa (2019), "Modelling Value-Added Tax (VAT) in South Africa", *WIDER Working Paper*s, No. 2019/13, United Nations University.

Gordon, R. and W. Kopczuk (2014), "The Choice of the Personal Income Tax Base", *Journal of Public Economics*, 118, 97–110.

Heady, C. (1993), "Optimal Taxation as a Guide to Tax Policy: A Survey", *Fiscal Studies*, 14(1), 15–41.

IFS (2011a), "Quantitative Analysis of VAT Rate Structures" in IFS et al., *A retrospective evaluation of elements of the EU VAT system*, Report prepared for the European Commission, TAXUD/2010/DE/328.

IFS (2011b), "Assessing Existing Rate Structures" in IFS et al., *A retrospective evaluation of elements of the EU VAT system*, Report prepared for the European Commission, TAXUD/2010/DE/328.

IHS, CPB, CAPP, CASE and IFS (2015), *A Study on the Economic Effects of the Current VAT Rates Structure*, Report prepared for the European Commission, TAXUD/2012/DE/323. (Completed 2013; publicly released 2015).

IHS (2011), "The Effect of VAT on Price-Setting Behaviour" in IFS et al., *A retrospective evaluation of elements of the EU VAT system*, Report prepared for the European Commission, TAXUD/2010/DE/328.

Jenkins, G., H. Jenkins and C. Kuo (2006), "Is the Value Added Tax Naturally Progressive?", *Queen's Economics Department Working Papers*, No. 1059.

Kaplow, L. (2006), "On the Undesirability of Commodity Taxation Even When Income Taxation is Not Optimal", *Journal of Public Economics*, 90, 1235–50.

Kaplow, L. (2010), "Taxing Leisure Complements", *Economic Inquiry*, 48(4), 1065–1071.

Kleven, H. (2004), "Optimum Taxation and the Allocation of Time", *Journal of Public Economics*, 88, 545–557.

Kleven, H., W. Richter and P-B. Sørensen (2000), "Optimal Taxation with Household Production", *Oxford Economic Papers*, 52, 584–594.

Laroque, G. (2005), 'Indirect Taxation is Superfluous under Separability and Taste Homogeneity: A Simple Proof', *Economics Letters*, 87, 141–4.

Leahy, E., S. Lyons and R. Tol (2011), "The Distributional Effects of Value Added Tax in Ireland", *The Economic and Social Review*, 42(2), 213–235.

Marron, D. (2015), "Should We Tax Internalities Like Externalities?", *Urban-Brookings Tax Policy Centre Working Paper*, November 2015.

Metcalf, G. (1994), "Life Cycle versus Annual Perspectives on the Incidence of a Value Added Tax", *Tax Policy and the Economy*, 8, 45–64.

Mirrlees, J. (1971), "An Exploration in the Theory of Optimum Income Taxation", *Review of Economic Studies*, 38, 175–208.

Mirrlees, J. (1976), "Optimal Tax Theory: A Synthesis", *Journal of Public Economics*, 6(4), 327–58.

Mirrlees, J., S. Adam, T. Besley, R. Blundell, S. Bond, R. Chote, M. Gammie, P. Johnson, G. Myles and J. Poterba (2011), *Tax by Design: The Mirrlees Review*, Oxford University Press, Oxford.

Nava, M., F. Schroyen and M. Marchand (1996), "Optimal Fiscal and Public Expenditure Policy in a Two-Class Economy", *Journal of Public Economics*, 61(1), 119–137.

O'Donoghue, C., M. Baldini and D. Mantovani (2004), "Modelling the Redistributive Impact of Indirect Taxes in Europe: An Application of EUROMOD", *EUROMOD working papers*, No. EM7/01.

OECD (2022), *Consumption Tax Trends*, OECD Publishing, Paris.

OECD/KIPF (2014), *The Distributional Effects of Consumption Taxes in OECD Countries*, OECD Tax Policy Studies, No. 23, OECD Publishing, Paris.

Piggott, J. and J. Whalley (2001), "VAT Base Broadening, Self Supply, and the Informal Sector", *American Economic Review*, 91, 1084–94.

Pirttila, J. and I. Suoniemi (2014), "Public Provision, Commodity Demand, and Hours of Work: An Empirical Analysis", *Scandinavian Journal of Economics*, 116(4), 1044–1067.

Ramsey, F. (1927), "A Contribution to the Theory of Taxation", *Economic Journal*, 37, 47–61.

Ruiz, N. and A. Trannoy (2008), "Le caractère régressif des taxes indirectes : les enseignements d'un modèle de microsimulation", *Economie et Statistique*, 413, 21–46.

Saez, E. (2002), "The Desirability of Commodity Taxation Under Non-Linear Income Taxation and Heterogeneous Tastes", *Journal of Public Economics*, 83, 217–230.

Sandford, C., M. Godwin, P. Hardwick and M. Butterworth (1981), *Costs and Benefits of VAT*, Heinemann Educational books, London.

Sandmo, A. (1974), "A Note on the Structure of Optimal Taxation", *American Economic Review*, 64, 701–706.

Sørensen, P-B. (2007), "The Theory of Optimal Taxation: What is the Policy Relevance?", *International Tax and Public Finance*, 14, 383–406.

Sørensen, P-B. (2010), "The Theory of Optimal Taxation: New Developments and Policy Relevance", *Nationaløkonomisk Tidsskrift*, 148, 212–244.

Thomas, A. (2022a) "Reassessing the Regressivity of the VAT", *Fiscal Studies*, 43(1), 23–38.

Thomas, A. (2022b) "Who Would Win from a Multi-rate GST in New Zealand: Evidence from a QUAIDS Model", *New Zealand Economic Papers*, 56(2), 141–168.

Thomas, A. (2020) "The Distributional Effects of Value-added Taxes in OECD Countries", PhD thesis, Victoria University of Wellington.

Tobin, J. (1970), "On Limiting the Domain of Inequality", *Journal of Law and Economics*, 13(2), 263–277.

Van Dender, K., A. Elgouacem, G. Garsous, H. Belgroun, M. Mateo and A. Cano Prentice (2022), "Why governments should target support amidst high energy prices". Available at: https://www.oecd.org/ukraine-hub/policy-responses/why-governments-should-target-support-amidst-high-energy-prices-40f44f78/

Van Oordt, M. (2018), "Zero-Rating versus Cash Transfers Under the VAT", *Fiscal Studies*, 39(3), 489–515.

Warren, N. (2008), "A Review of Studies on the Distributional Impact of Consumption Taxes in OECD Countries", *OECD Social, Employment and Migration Working Papers*, No. 64.

Warwick, R., T. Harris, D. Phillips, M. Goldman, J. Jellema, G. Inchauste, K. Goraus-Tanska (2022), "The Redistributive Power of Cash Transfers vs VAT exemptions: A Multi-country Study", *World Development*, 151, 105742.

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