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SHOULD ISRAEL ADOPT DIFFERENTIAL VAT? EXAMINING THE EXPECTED IMPLICATIONS IN VIEW OF THEORY AND INTERNATIONAL EXPERIENCE

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Abstract

In the aftermath of Israel's social protests in the summer of 2011, there was a demand to expand the list of goods to which Value Added Tax is applied at a different rate (hereinafter: differential VAT) in order to mitigate inequality, much as is done in many European Union countries. This paper examines whether introducing differential VAT is in fact the best way to reduce inequality.

The theoretical and empirical economic literature indicates that introducing differential VAT is less effective in reducing inequality than other methods such as progressive income tax, social benefits, and subsidies.[1]

The same conclusion is obtained in a simulation that we performed in regard to the Israeli economy, concerning the effect of repealing the zero-rate VAT that applies to fruit and vegetables and replacing it with social benefits or a negative income tax. This, it is found, will not only mitigate inequality but also enhance economic efficiency by eliminating the distortion in relative prices that the zero-rate VAT creates.

The use of differential VAT to modify business entities' behavior—a worthy step to take when a production factor has an externality—should also be ruled out because businesses are entitled to a full refund of the VAT they pay.

In addition to its role in narrowing inequality in terms of the purchasing power of income by lowering the prices of goods that are most consumed by the low-income population, differential taxation of goods has also been examined in the literature as a way of contending with utility inequality, which is also affected by leisure. When only income is taxed, individuals with high earning ability lower their tax burden by working fewer hours. Therefore, insofar as a correlation exists between earning ability and the

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[1] See, for example, Gupta et al. (2014).

extent of consumption of certain goods, differential taxation of those goods is a worthy measure for considerations of utility equality.
Using the Israel Household Expenditure Survey for 2010, we estimated the correlation between wage per hour (a proxy for individuals' earning ability) and household expenditure on a range of goods.
The estimation shows that zero-rate VAT on fruit and vegetables actually exacerbates inequality when taking into account the inequality in leisure as well, because expenditure on these commodities is positively correlated with earning ability. As for other food products, it is found, as expected, that expenditure correlates negatively with earning ability but not significantly. Therefore, one cannot conclude that a reduced VAT rate should be applied to these products. Conversely, a significant positive correlation is found between residential rent expenditure and earning ability, suggesting that leasing of dwellings should be taxed more heavily.

1. INTRODUCTION

Value Added Tax (VAT) is an indirect tax effectively applied to consumption in a domestic market. In many cases, it raises prices of goods to the end consumer. A standard rate of VAT on all goods is very convenient for calculation and collection purposes. The costs in terms of taxpayer compliance and government administration are relatively low and tax-planning possibilities are limited. A standard VAT rate has the additional advantage of relatively little impairment to economic efficiency because it does not distort the final price ratio of various products and factor inputs. Many countries, however, have chosen to stray from the basic VAT paradigm by applying *differential VAT*, i.e., different rates on different products, including a zero rate or an exemption (which, in practice, actually imposes partial VAT on the final product by not allowing firms to offset their input VAT). An important reason for setting differential VAT is the wish to mitigate economic inequality by making the consumption basket of low-income households less costly. There are additional reasons, such as encouraging people to consume certain products by lowering the rate of VAT that applies to them.

Due to the escalating public debate about the cost of living and inequality in Israel since the social protests in the summer of 2011, several ways of coping with these matters have been proposed, including the introduction of differential VAT. Thus far, VAT in Israel has been applied at a standard rate on most goods. It accounts for an important share of state tax revenues: 33.5 percent in 2009 (State Revenue Administration, 2011)—exceeding the 19 percent nonweighted average among OECD countries in 2008 (OECD, 2011). Notably, since VAT was introduced in Israel in 1976, its rate has more than doubled, from 8 percent that year to 18 percent in 1991 and 16–18 percent since then—a trajectory that many countries have matched over time.

Israel's standard-rate VAT has several exceptions that may be characterized by cross-sections: type of product (fruit and vegetables—zero); type of incorporation (not-for-profit organizations—reduced rate on activity); place of sale (Eilat—sales, although not of all goods, are exempt from VAT); and type of customer (exports—zero).[2] An OECD study (ibid. and see below, Section C Part 1) shows that as of 2009, VAT collected in Israel was 68 percent of the total that could be collected if all goods were taxed at the full rate (or 86 percent according to the consumption that constitutes the tax base[3]). This collection rate, one of the highest among OECD countries, may attest to the small number of goods and services that are subject to reduced-rate VAT in Israel. The question up for public debate is whether the list of goods to which reduced-rate VAT applies should be expanded (and/or revised) in order to redistribute national income in favor of the disadvantaged.

In the next section, we present the theoretical background and the methodology for the analysis of tax policy generally and of indirect taxes and VAT in particular. Section C provides an overview of differential VAT in other countries. Section D presents the results of studies that discuss the extent of pass-through of a VAT cut to the end consumer—a matter of central importance in understanding the expected effect of a VAT reduction on economic units and, in turn, on inequality. In Section E, we quantitatively demonstrate the effect of zero-rate VAT on fruit and vegetables on economic inequality in Israel and compare it with the inequality that would be obtained in Israel if alternative and fiscally neutral policy tools are used. In Section F, an alternative to the standard definition of inequality is proposed, which, beyond the conventional measurement of income inequality, includes leisure inequality. In accordance with this definition, a model is presented that examines the goods that should be subject to differential VAT in Israel in order to mitigate income and leisure inequality. Section G proposes an alternative to differential VAT as an inequality-mitigating instrument—a standard rate of VAT plus a grant or credit for each household, worker, or resident.[4] Section H summarizes and concludes.

2. THEORETICAL BACKGROUND

a. What is Value Added Tax?

Until the middle of the previous century, European countries had a turnover tax, which was charged on firms' sales rather than their earnings or value added. Such a tax, although administratively simple and inexpensive, is unfair and inefficient. One producer may generate dozens of percent profit from turnover on a given level of sales, whereas another

[2] Recently, a novelty that would set a global precedent has been proposed in Israel —zero-rate VAT on a subgroup of products and customers (a zero rate for certain buyers of certain dwellings).

[3] Authors' calculation.

[4] Known also as Universal Basic Income (UBI).

producer with the same turnover might generate a smaller profit, or even a loss. A turnover tax imposed on a small-profit producer might even exceed the producer's profit. To avert this distortion, after World War II France introduced a negative tax on expenditure in addition to the turnover tax.[5] The combination of the two taxes in effect created a tax on the firms' value added, hence its name. After the European Union was established, all member states adopted VAT. To coordinate policy and prevent double taxation between EU countries, it was decided that each state would exempt its exports from VAT and tax its imports. This transformed VAT from a tax on firms' value added (production) into a tax on consumption.[6] Israel also adopted VAT in its European format. Namely, every firm adds VAT to its domestic sales and is credited for the VAT that it pays on all of its purchases from other firms. Only the end consumer, who is not a firm, pays VAT on the final consumer price. Consequently, the consumer pays VAT on all of her or his consumption expenditure in the domestic market. In this sense, VAT very closely resembles the American state sales tax, which is imposed only on the end consumer.

b. Cost vs. benefit

To analyze a taxation policy against its alternatives, one must first define the goals that the tax is supposed to help to attain. One then needs to determine whether the tax does attain the goals specified and, conversely, how much it costs. Determining the extent to which a tax achieves its goals is no simple matter because a tax imposed on one factor may affect other factors in equilibrium, actually making them share its cost. Assessing the costs of a tax is also not simple because the costs are composed of several factors (discussed below).

c. Differential VAT—for what purpose?

Taxes usually have three main microeconomic goals: (1) to fund public expenditure[7]; (2) to intervene in income distribution (usually to mitigate inequality); and (3) to encourage or discourage certain activities. Among these goals, the discourse surrounding the introduction of differential VAT in Israel centers on its possible effect on inequality between rich and poor individuals (vertical inequality) by imposing a high rate of VAT on luxury goods (the share of which in the consumption basket rises, on average, in tandem with the rise in

[5] Similar ideas had been broached earlier—in Germany, for example—but were not implemented.

[6] One may demonstrate this by means of the National Accounts equation. Sources: product (Y) and imports (M); uses: private consumption (C), public consumption (G), investment (I), and exports (X). Given that sources are equal to uses, Y+M=C+G+I+X, and since VAT is charged on all firms' production net of investment and exclusive of exports, and is also charged on imports, Y-X-I+M=C+G. That is, VAT is imposed on domestic consumption and public expenditure.

[7] Arguably, only the funding of public goods is at issue because the delivery of private goods under the state's auspices may also be categorized under the second goal—intervening in income distribution.

income) and reduced-rate VAT on staple goods (the share of which in the consumption basket declines, on average, with the rise in income). However, to estimate the full impact of differential VAT, its possible effect on encouraging (or discouraging) certain activities and the need to encourage these activities must also be examined. This includes such factors as the VAT exemption in Eilat, which is meant to stimulate consumption and employment in that city, or the zero-rate VAT imposed in Israel on fruit and vegetables, which some claim is important in stimulating their consumption. (In France, for example, reduced-rate VAT is charged on French-language books in order to stimulate consumption of local culture.)

d. Tax liability: Who pays the differential VAT?

To ensure the attainment of the goals of the tax, it is necessary to know who actually bears its burden. We know who pays the tax according to the tax code, but the answer to the question of who bears the tax burden, especially in the long term, might be different. If a 10 percent tax is imposed on a given good, service, or transaction and the price of the taxed object rises by 10 percent, the entire tax burden is borne by the buyer. If the price does not change, the entire burden devolves upon the seller; and if the price rises at a rate between 0 percent and 10 percent, the burden is divided commensurably. This may be seen when the rate of VAT or purchase tax is changed. The prices of some goods change at the full rate of the change (this usually happens in the case of commodities under price control), those of other goods do not change at all, and those of the rest are reset by part of, or even more than, the rate of the change.

- Even though both corporate tax (which is based on the firm's profits) and VAT are calculated on the basis of the firm's income less its expenses, VAT is perceived as a tax on consumers and corporate tax is seen as a tax on firms' owners. This, however, is not always the case. If the VAT rate on certain goods is lowered, for example, the decline in price will probably be partly transferred to the owners of the firms or to their employees, and not necessarily to the customers. Thus, inequality may not decrease or may decline at less than the expected rate. Even now, it is not clear how much of Israel's zero-rate VAT on fruit and vegetables reaches consumers and how much accrues to growers and marketing chains. In Section D below, we present an overview of studies that look into the distribution of tax cuts among economic units, allowing us to estimate the effect of lowering VAT on the inequality of income distribution.

e. What are the costs of differential VAT?

- The cost of a tax to the economy is the cost that exceeds the revenue that the tax brings in. It has two main components: behavioral-change cost and administrative costs (Yitzhaki, 1999).

- Behavioral-change cost originates in taxpayers' wish to pay less tax, which itself has three components: one perceived as legitimate, another plainly illegal, and a third belonging to the gray area. Legitimate behavioral change is welcomed if the tax is meant to influence behavior. In every other case, however, this change creates an excess burden because some individuals will choose to consume less of the taxed good, switching to goods that give them less utility, and some firms choose to produce less of the taxed good and replace it by manufacturing goods that offer less utility. This cost is called "substitution cost". The substitution effect of differential VAT depends on its characteristics, and is discussed in the next section.

The illegal behavioral change is tax evasion, in which the tax base does not change but is impaired by nonreporting, false reporting, or concealment from the tax authorities. Differential VAT creates somewhat greater opportunities for evasion by enabling producers to report the sale of a taxable product as though it were tax-exempt or subject to a reduced rate of tax. In France and the UK, for example, different rates of VAT are applied to adults' clothing and children's clothing, leading to occasional sales of size-46 "children's clothing" (Sofer, 2003)! In Britain, there is zero VAT on food, but ice cream, soft drinks, catering services, mineral water, and other goods are taxed at the full rate.[8] When many goods are subject to different VAT rates, opportunities for evasion increase.[9]

The third cost, the one that rests in the gray zone, is called tax planning or tax avoidance—a predictable development if differential VAT is put to broader use in Israel. Here, too, the goal is to reduce the tax base, but this time by interpreting the statutory definition of the base. Once differential VAT is introduced, it is worth the business's while to exploit loopholes in the law and redefine a product or service in order to exclude it from the tax base. Perhaps, too, instead of making use of existing statutes, producers will attempt to revise the law by recruiting lobbyists to have their product placed on the reduced-rate-VAT list.[10] Therefore, according to Holcombe (2002), it may be preferable to tax all goods at one rate as a political strategy designed to tie the government's hands than to introduce differential taxation. Everything said above about the connection between multiple tax rates and tax evasion is also valid in regard to tax planning, the difference being that evasion is patently illegal and tax planning sits in the gray area.

All of these costs trace to the desire to reduce the tax base and are by no means negligible. Even when the tax base is a given, however, there are still operating costs in order to collect the tax—the government's direct administrative costs for running the tax

[8] See "Rates of VAT on Different Goods and Services," http://www.hmrc.gov.uk/vat/forms-rates/rates/goods-services.htm

[9] The following are several items that Israeli parliamentarians have recently proposed for reduced-rate taxation: staples such as bread and dairy products, basic food items, water, electricity, and other necessities of daily life; prescription medicines, public transit, housing, and newspapers.

[10] This is said even though no empirical evidence of it has been found in the OECD countries. See Section C Part 2 below.

system, the state attorney's office, and the courts. These costs, too, are likely to increase if differential VAT is introduced.[11] The more complex a tax is and the more opportunities it presents for planning and evasion, the higher its operating costs will be. There is, however, an additional cost that far exceeds the cost to the government of collecting the tax: the compliance cost that taxpayers incur in order to satisfy the requirements of the law, such as bookkeeping, software, personnel, tax consultants, CPAs, attorneys, and so on. Here too, the more complex the law is, the higher the cost will be. Therefore, it will probably escalate if differential VAT and multiple tax rates are introduced.[12] It stands to reason that regulations promulgated to minimize tax planning and evasion will impose major compliance expenses on businesses—some of which will presumably be rolled over to consumers.

f. Testing the substitution effect: Differential rates vs. standard rate

Until the 1960s, many economists believed that a standard-tax system is neutral (i.e., has no effect on behavior—Salanié, 2012, p. 68) because if all goods are taxed at a standard rate, the price ratio is unchanged and no substitution effect exists. A standard-rate indirect tax on all products is mathematically identical to a wage reduction at the same rate.[13]

Such a tax affects the propensity to work and induces people to lower the labor supply in order to avoid it. Therefore, even a standard tax on all products (with the exception of leisure) comes with substitution costs. If the number of hours worked is subject to the individual's choice, a standard tax rate on all goods (except leisure) will not lower the substitution cost to a minimum. According to the Ramsey rule[14], if we wish to minimize the substitution cost, we should set optimum tax rates on different goods in inverse relation to the elasticity of the tax base relative to the tax rate that applies to the commodity in question. This explanation has been offered as a justification for differential taxation, provided the purpose of this form of taxation is not to mitigate inequality but to enhance efficiency. Therefore, the goods that are candidates for a reduced tax rate on the grounds of mitigating inequality may be different from those considered for reduced tax when efficiency is the goal. In fact, the two sets of products may even clash. If the considerations center on inequality, for example, public transit should be lightly taxed and domestic vacation and recreation should be heavily taxed. For efficiency considerations, however, the opposite would be the case because demand for public transit is inelastic and demand

[11] As a small example, after the VAT exemption in Eilat went into effect, a customs station was set up at the exit from the city.

[12] UK firms that are subject to more than one rate of output VAT spend more than twice as much on compliance than do firms subject to a standard rate (Cnossen, 2003).

[13] This assumes that all income is used for consumption during the full lifetime—a realistic supposition, as is shown below.

[14] Named for the British mathematician Frank Ramsey (1903–1930), who was the first to demonstrate this effect in 1927.

for recreation is elastic. In practice, many tax rates familiar to us are determined in accordance with the Ramsey rule even though they are plainly regressive. Taxation of capital, for example, is lower than taxation of labor because capital can easily be transferred from one country to another and because it leaves much room for tax planning. Similarly, taxation on fuel for private cars is high for reasons including its demand inelasticity. Aviation and marine fuels, in contrast, are exempt from VAT because owners of aircraft and ships can refuel abroad. International air travel, too, is not subject to VAT because tickets can easily be purchased abroad—whereas travel by bus is subject to VAT.

In sum, the question is: What does the Ramsey rule imply for setting differential VAT? The discussion above suggests that differential taxation is desirable for reasons of efficiency. But will the differential VAT rates to be set be a good fit for the Ramsey rule? If differential VAT in Israel is meant primarily to mitigate vertical inequality (see the next section), the rate should be lowered on products that are widely consumed by low-income population groups—basic commodities that have high demand elasticity. In other words, the differential VAT should act in the opposite direction of the Ramsey rule. Therefore, it would impair efficiency to a much greater extent than that required (in terms of the substitution effect) in order to raise a given sum in tax receipts. In view of the impairment of efficiency, the question of whether introducing differential VAT in Israel would attain at least part of its main goal—mitigating vertical inequality—needs to be examined.

g. Using differential VAT to mitigate vertical inequality

A common argument among opponents of standard-rate VAT is that such a tax is regressive. Since the wealthy spend a smaller share of their income than do the disadvantaged, it is claimed, standard-rate VAT takes a lower proportion of income from the wealthy than it does from the less well-off. This argument is true if inequality among individuals or households is measured on the basis of income in a certain year. If, however, it is measured in accordance with taxation of expenditure across the entire lifetime—a sum equal to lifetime income[15]—we find that standard-rate VAT is neutral and not regressive because it taxes the same percentage of income from both the wealthy and the less-so. According to another approach, VAT is even progressive because although it takes an equal percent from all income levels, the tax receipts are used to fund goods to the same extent

[15] "True" income—all receipts from wages plus (less) all gifts and inheritances received (given), plus (less) all investments realized (made)—is by definition equal to lifetime spending. Accordingly, the conclusion about the neutrality of standard-rate VAT would not change even if the wealthy transfer some of their wealth by bequeathing it, since this capital (including its accrued interest) will be taxed when the heirs spend the money on consumption.

across the entire population, as well as for social benefits.[16] (For discussion of this approach, see Caspersen and Metcalf, 1994.)

In contrast to standard-rate VAT, be it regressive, neutral, or to some extent progressive, differential VAT—in which low rates are applied to goods that occupy a smaller share of the consumption basket as income rises (staple goods) and higher rates are imposed on products with a growing share of the consumption basket as income rises (luxury goods)—is progressive by all accounts and mitigates vertical inequality. The questions here are: How effective is this method (to what extent does it indeed reduce inequality?) and how efficient is it (what costs does it incur relative to other ways of reducing inequality)?

Atkinson and Stiglitz (1976) showed that, on the basis of certain assumptions, when the purpose of the tax is to reduce inequality, the most effective way to accomplish this is progressive taxation of income alone. Differential taxation of goods may attain the same goal but will do so less efficiently. This conclusion finds expression in the saying "Subsidize the consumer, not the consumed." Atkinson and Stiglitz demonstrate this mathematically, while we clarify its underlying intuition in several respects:

- Demand for indispensable staple goods is usually more inelastic than demand for luxury goods. For the sake of efficiency, these staples should be heavily taxed and luxury goods, which can be forgone or purchased abroad or in duty-free shops, should be lightly taxed.[17]
- If the goal is taxing the rich by imposing a heavy tax on luxury goods, the wealthy must buy these products and pay more tax as a consequence. If they avoid the tax by eschewing the luxury goods (in Israel), the government will have to raise tax rates to attain the same level of revenue. Progressive direct taxation, in contrast, takes more from the wealthy but allows them to consume whatever they please with their after tax income.

Differential VAT can be progressive only on average and not among all households, because the negative correlation between household income and consumption of reduced-VAT goods is strong but not perfect. (See Section E below.)

Despite Atkinson and Stiglitz's assumption that tax on income and a flat-rate tax on expenditure for all goods are identical, Blumkin et al. (2012) show that taxation of expenditure has a smaller effect on labor supply (at least in the short term) than does a tax on labor income. Due to bounded rationality, individuals underestimate the decline in the real value of their income that occurs when consumer prices of goods rise. This gives

[16] Therefore, the highest rates of VAT are conventionally found in Scandinavia of all places—bastions of cradle-to-grave welfare systems—because these countries deal with inequality mainly on the expenditure side (Gillis, 2002).

[17] This is exactly what happens, although not necessarilly by means of differential VAT. It is easier to raise the VAT rate on domestic consumption that cannot be circumvented and to lower taxes on corporations and the income of the wealthy, who can easily move abroad. This kind of process, while not egalitarian, is efficient.

indirect taxation of consumption an advantage over direct taxation of income in the context of impairment to labor supply.

The question of how various taxes affect inequality also needs empirical examination. Boeters et al. (2006), running a simulation for the German economy, find that differential VAT has little effect on income distribution. Repealing the reduced rate of VAT and using the increase in revenues to lower income tax and increase benefits (including a negative income tax), in a way that leaves inequality and tax revenues unchanged, increase the utility from leisure and goods for all population groups. Bye et al. (2003) reach a similar conclusion using a dynamic simulation based on Norwegian economic data. The Bank of Israel (2006a, p. 20), looking into the effect of lowering the rate of VAT on food, found that the benefit would be divided almost equally among all income deciles. In contrast, however, a negative income tax—a direct subsidy for households that are headed by low-wage breadwinners and have children, would have a substantial upward effect on those households' income. Under such a program, 70 percent of the benefit built into the negative income tax would reach the three lowest income deciles and only 1 percent would accrue to the three highest deciles combined. The bulk of the benefit would reach households in deciles 2 and 3 (ibid).

Crawford et al. (2008), discussing the matter within the framework of a report on the tax system that the UK (where differential VAT has been introduced) needs for the twenty-first century, reach an unequivocal conclusion:

The case for using preferential rates of VAT to help the less well-off is weak: there are better redistributive instruments available to the UK government than fine-tuning rates of commodity taxation. […] The essence of this result is nothing new. Finding the political will to implement such a change needs to begin with a recognition of the fundamental unfairness—and wastefulness—of the [UK's existing differential VAT] rate structure (p. 277).

h. Using differential VAT to modify behavior (encouraging or discouraging use of a particular good)

Even though differential VAT is rarely the most efficient way to mitigate vertical inequality, there are additional reasons to impose differential indirect taxes. These, however, are associated with considerations not of inequality but of efficiency. They are specified below.

Corrective (Pigouvian) taxation

Corrective taxation (a.k.a. Pigouvian taxation, after the economist Arthur Pigou) is taxation designed to internalize negative externalities, such as a penalty for causing pollution/congestion, or a subsidy meant to internalize positive externalities such as those provided for healthcare, education, and public transit. The question in this context is: What

is the difference between lowering the VAT rate on a certain product and taxing all products at a standard rate and subsidizing one good that has positive externalities (or, alternatively, raising the VAT rate vs. introducing standard-rate VAT and taxing a product that has negative externalities)?[18] The main difference between differential VAT and standard-rate VAT plus subsidies (or taxes) is that VAT is effectively imposed only on goods that are sold to the end consumer, whereas a subsidy also affects the factor-input price. For example, if we exempt fruit and vegetables from VAT in order to encourage consumers to eat healthy food, then we exclude salad at a restaurant, which is no less healthy than salad at home, from this benefit. However, if vegetables are subsidized, the price of a salad at a restaurant is also affected.

Another distortion that comes about from an attempt to encourage consumption through reduced-rate VAT is that the benefit increases (decreases) when basic VAT rates are raised (lowered). Furthermore, the benefit accrues to players other than those whom the legislator had in mind. Israel's zero-rate VAT on fruit and vegetables is a case in point. A tomato costs less in Tel Aviv's open market than it does in the upscale Ramat Aviv quarter. When people buy a tomato in Ramat Aviv, they also pay for a clean venue of sale, air conditioning, the atmosphere, high rent, and even the prestige that comes with shopping together with others of similar social standing. Since all of these are included in the price of the tomato, VAT is paid on them, too. Thus, when we exempt vegetables from VAT, we also exempt the status symbols and indulgences of the uppermost decile. Consequently, when vegetables are taxed at a zero rate, a kilogram of vegetables is more heavily subsidized when bought by the rich than by the poor. If we want to encourage people to eat fruit and vegetables, the right way to do it is by setting VAT at a standard rate and subsidizing fruit and vegetables at a fixed sum per kilogram. That way, the subsidy will support greater consumption of vegetables at least to the same level as the zero-rate VAT, but a much lower cost to the economy.

Reduced-rate VAT as a way to encourage consumption of leisure-substitutes

Income tax creates a distortion by changing (raising) the relative price of goods relative to leisure.[19] Given the existence of this distortion and the impossibility of taxing leisure, the distortion can be mitigated by taxing goods that complement leisure or by subsidizing goods that are alternatives to leisure, although income tax has a stronger effect than a consumption tax at the same rate of leisure consumption (Blumkin et al., 2012).

[18] On the use of differential VAT for this purpose in European Union countries, see Section C Part 3 below.

[19] The term "leisure" here denotes all time in which people do not work for a material return. For our purposes, this includes home upkeep, childcare, cleaning, and working in the garden.

It is possible, for example, to alleviate the distortion by lowering the rate of VAT on a leisure substitute (e.g., daycare and commuting to work).[20] Notably, leisure is consumed only by consumers, not by firms. Therefore, if we wish to affect consumers' behavior only (and not firms' behavior), it would be more appropriate to lower VAT rates, which do not affect firms' conduct, than to give a subsidy, which will distort production efficiency if the good or service is also a factor input.[21]

The problem with this efficient method, however (as usual with such methods) is regressivity. High-income earners have to be subsidized more because an hour of their time is worth more. In their study on UK labor and consumption between 1978 and 1999, Crawford et al. (2008) found the following goods to be complementary to leisure and therefore recommended that they be more heavily taxed (partial list): food at home (eating away from home should be subsidized if it is a leisure substitute, i.e., if most of the eating is done on work time), cigarettes, home heating fuel, children's clothing, and books and newspapers. All of these, apart from the last, are consumed more intensively by the poor than by the wealthy. In contrast, lowering VAT on leisure substitutes such as children's daycare and home-repair services, although efficient, would serve the wealthy more than it would the poor and aggravate social disparities. Evidently, then, it is preferable to implement the subsidy by government support for daycare centers and travel to work[22] than by applying differential VAT, which would tax leisure goods heavily and leisure substitutes lightly. Furthermore, taxing leisure complements is problematic just as taxing leisure is: It is impossible to distinguish between those who consume leisure by choice and those who do so for lack of choice. If a given household uses large amounts of electricity, for example, this may attest to consumption of leisure but may also be indicative of unemployment, many children, working at home, and so on.

3. INTERNATIONAL OVERVIEW OF DIFFERENTIAL VAT

In this section, we present an overview of differential VAT in various countries, the main goods to which the reduced rates apply, and the turnover of transactions to which the reduced VAT rate applies. One of the arguments raised by opponents of differential VAT is that it is a slippery slope: once the taboo against different rates is breached, VAT will be

[20] The widespread tax evasion among service providers (plumbers, fixit people, gardeners, domestics, caregivers, babysitters, etc.) may be efficient because the less expensive these people are, the less work people have to forgo to do these tasks themselves.

[21] If a plumber, for example, works in both private homes and at businesses, subsidization will also affect businesses, whereas reduced-rate VAT will affect only households.

[22] As with the question of inequality and subsidization of income and not basic commodities, it is preferable to subsidize the thing itself and not a product that has a correlation, however strong, with the object of the subsidy.

lowered on more and more goods. Therefore, we also ask whether, over the years, the list of products on which VAT is reduced has been growing and whether goods that originally benefited from a lower rate of VAT have been given additional decreases. Namely, we examine the change that took place in the turnover of transactions to which reduced VAT rates have been applied over the years.

a. Extent of exemption and reduced VAT rates in Israel and other countries

In Israel, most of the effect of reduced-rate VAT originates in zero-rate VAT on vegetables, a VAT exemption on exports of tourism products (e.g., tourist hotel stays), and a VAT exemption on most transactions in the city of Eilat. The State Revenue Administration report for 2009–10 shows that VAT generated about NIS 68 billion in revenues in Israel that year. The Administration estimated the loss of VAT revenue on account of exempt and zero-rate transactions at about NIS 3 billion—NIS 1.89 billion on account of zero-rate VAT on fruit and vegetables, NIS 0.59 billion due to the exemption of incoming-tourism services, and NIS 0.54 billion due to the exemption in Eilat (State Revenue Administration, 2011).

Apart from Israel, we chose to examine countries that are members of the OECD and/or the European Union (twenty of the thirty-four OECD member states also belong to the EU), for two reasons: the resemblance of some of their economies to Israel's and (mainly) the availability of data due to two recent comprehensive studies on differential VAT in those countries (source of data on EU member states: European Commission, 2012, and on OECD member states that are not EU members: OECD, 2011).

The standard VAT rates among OECD member states varies greatly—from 5 percent in Japan to 27 percent in Hungary. Among EU member states, too, the standard rate differs considerably: from 15 percent in Luxembourg to 27 percent in Hungary (as of 2012). The number of goods to which reduced-rate VAT applies, the level of expenditure on these goods, and the extent of the reduction also vary widely among both OECD and EU member states, as the EU constitution allows. (See discussion in the next section.) In Chile, for example, which has 19 percent VAT (all data on OECD countries that are not in the EU are as of 2008), no product is exempt from VAT or taxed at a reduced rate. In quite a few countries, including Greece and Ireland, the list of goods on which VAT is exempt or reduced is rather lengthy. Notably, all EU countries have more than one rate of VAT: five have four rates, eight have three rates, and two have two rates (Friedman, 2011). The average effective VAT rate in the European Union is 10.5 percent, compared with the 19.4 percent average that one would expect to find if differential VAT were not implemented. By comparison, in Israel in 2009, the effective rate of VAT was 13.8 percent due to reduced rates, compared with 16 percent that would be the case without differential VAT.[23]

[23] Calculated by the authors.

b. Statutory framework for VAT exemption or reduced rates in EU countries

European Union countries are not at liberty to set their own VAT rates, as they are subject to EU decisions. The Union has established a list of goods that countries may exempt from VAT or tax at a reduced rate. According to the Sixth EU Directive, which concerns itself with VAT, each member state is allowed (but not required) to set up to three rates of VAT: standard, reduced, and super-reduced (including zero-rate or exemption). According to the directive, the basic VAT rate must be 15 percent or more and the reduced rate may be no less than 5 percent. The ability to set a reduced rate is, as stated, limited to certain products (subject to exceptions for specific countries, as specified below). The main goods on the list are food and beverages (not including alcoholic beverages); water; medicines; accessories for persons with disabilities; books and newspapers; use of sporting goods and admission to sporting events; repair, renovation, and cleaning of private dwellings (excluding materials); and restaurant services. The following appear on the list of goods that may be subjected to the super-reduced rate of VAT (as of 2008): labor-intensive products, domestically manufactured goods (in order not to impair competition), goods for which it can be shown that lowering the VAT rate would stimulate demand and employment, and goods delivered mainly to end consumers (Tsaddik and Tikva, 2008; see Appendix A for a partial list of VAT rates itemized by countries and goods).

The two (partial) lists above show a wide variety of goods to which individual EU countries may apply reduced-rate VAT. Analysis of the lists shows that reducing the VAT rate is meant to lower prices for two main purposes: helping the disadvantaged (e.g., food products and water), i.e., mitigating inequality, and fine-tuning consumers' behavior toward the use of these products due to positive externalities that their use may have, as in reduced-rate VAT on home renovations (which promote home upkeep and labor, and not consumption of leisure for do-it-yourself repairs), use of sporting goods, and consumption of books and newspapers.

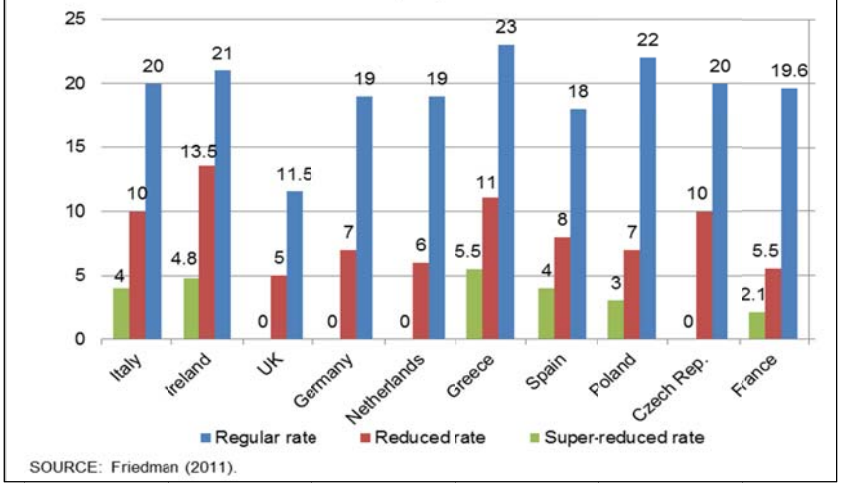
An EU study (European Commission, 2011) provided an overview of goods to which reduced-rate VAT applies in the various countries. According to the study, almost all EU member states lowered their VAT rates on accessories for persons with disabilities and on books and newspapers, and most states established zero or reduced rates for food products and water.[24] (Exemptions and reductions relating to other products on the lists are less common in EU countries.)

[24] In this context, it is noteworthy that Israel only recently applied VAT to the supply of water, when the transition to water supply companies was made. Even before the corporations were established, however, the price of water to the consumer included VAT indirectly, because the water was delivered by municipal authorities, which, as not-for-profit institutions, are not credited for input VAT and are subject to payroll tax (in lieu of VAT). Accordingly, even before VAT was officially applied to water, the price of the water included a component that reflected the existence of VAT in Israel.

Comparison of these lists with the situation in Israel shows that Israel makes much less use of reduced VAT rates than most EU countries, even before goods on which specific countries are allowed to impose reduced VAT rates are taken into account, as specified below.

For historical reasons and due to the desire to smooth the integration of states into the European Union, EU members are also allowed to set reduced rates of VAT for products not on the list, either under specific provisions of the Sixth Directive, which allow several states to deviate from the general VAT rates set for EU members at large, or due to the possibility given to EU countries to maintain a reduced VAT rate on goods for which a reduced rate was in effect in 1991 (the "parking rate") for many years. The figure below itemizes the VAT rates in main EU countries.

Figure 1
VAT Rates in Selected EU Countries, July 2010



SOURCE: Friedman (2011).

It is important to note that the number of products exempt from VAT or taxed at a reduced or zero rate does not accurately represent the extent to which each country uses differential VAT. This is because one country may exempt many goods from VAT even though their consumption volume as a share of total household expenditure is negligible, whereas another country treats only a few products in this manner but expenditure on them figures heavily in households' consumption expenditure. To surmount this distortion, the authors of the study on VAT in the OECD countries (OECD, 2011) developed an index called VRR (VAT Revenue Ratio) that tests the ratio of VAT actually collected in each country against the total collection potential. Collection potential is defined as the total

VAT that would be collected if all consumption expenditure countrywide were taxed at the standard (nonreduced) VAT rate.[25] The formula used to calculate the index is the following:

$$\text{VRR} = \frac{\text{Total VAT receipts}}{(\text{Total consumption expenditure - total VAT receipts}) * \text{standard VAT rate (pct.)}}$$[26]

Using this formula, we found that the index in Israel in 2008 was 0.68 (meaning that 68 percent of potential VAT revenue, as defined above, was collected). This ranked Israel fifth among the thirty-two countries compared (OECD, 2011), indicating that Israel's share of consumption expenditure that is exempt from VAT or taxed at a reduced rate is low by OECD standards. New Zealand tops the list, with an index of 0.98, while Mexico is at the bottom with an index of 0.35.[27] Therefore, in practice there is much diversity in the extent of goods subject to reduced-rate VAT, as well as in reduced VAT rates among EU countries. Table 1 (below) demonstrates the large difference among EU countries in their VAT policies—something that is allowed, as stated, due to the individual-country provisions of the Sixth Directive.

[25] Apart from information about the extent of exemptions and reduced VAT rates, this index also reflects the level of tax evasion (e.g., non-reportage of sales, reportage of fictitious expenditures [fake invoices], or switching a product code from a fully taxed one to another that is taxed at a reduced or zero rate.

[26] Defined on the basis of the National Accounts. In the denominator, total VAT collected is subtracted from total consumption expenditure because VAT is calculated on total expenditure not including VAT, whereas the total consumption expenditure data in the National Accounts include VAT.

[27] The index for Chile—0.75—is puzzling in terms of our ability to infer the extent of exemption from and partial application of VAT from the VRR index. Since Chile subjects all products, without exception, to standard-rate VAT, its index should be 1. It follows that the deviation of the index from the expected value attests not to the existence of exemptions and reduced rates but to large-scale tax evasion and/or measurement problems that may recur in other countries' indices as well. In Israel, for example, there is a discrepancy between private consumption in the National Accounts and the picture of expenditure based on the Household Survey. (The National Accounts data show a larger amount.)

Table 1
Percentage of consumption at the various VAT rates within the tax base, selected EU countries, 2000

Country	0% rate	Most reduced rate	Reduced rate	Basic rate	Parking rate	Other rate*
Germany	0	0	14	85	0	0
Denmark	0	-	-	100	-	-
Greece	-	2	35	62	-	1
Spain	-	10	44	46	-	0
France	-	4	25	71	-	0
Ireland	12	0	37	50	n/a	-
Netherlands	-	-	26	74	-	0
UK	19**	-	3	78	-	0
EU average	6	9	25	67	-	0

* Applies mainly to agricultural farms.
** The number is apparently downward biased, since traders that deal only with goods for which there is 0% VAT are not required to register with the VAT authorities.
SOURCE: Mathis (2004).

From Table 2, one may infer that there is neither an overall upward trend in the number of products to which zero- or reduced-rate VAT applies nor a general downward trend in the rates of reduced VAT. In most countries, spending on goods that are taxed at reduced rates as a share of total expenditure hardly changed between 1992 and 2008. Ireland and Spain—two countries that are known for frequent economic crises—are outliers in this respect. In these states, expenditure on reduced-VAT goods as a share of total expenditure changed frequently over the years, possibly due to frequent changes in VAT policy in accordance with the country's economic situation.

Table 2
Development of the VRR index in selected OECD countries, 1992–2008

	1992	1996	2000	2005	2008	Total change in the index, 1992–2008
Australia	-	-	0.46	0.56	0.49	0.03
France	0.52	0.51	0.5	0.51	0.49	-0.03
Germany	0.62	0.6	0.6	0.55	0.55	-0.07
Greece	0.45	0.42	0.48	0.46	0.46	0.01
Ireland	0.46	0.53	0.6	0.66	0.55	0.09
Israel	n/a	0.68	0.64	0.64	0.68	0.04
Japan	0.69	0.72	0.7	0.72	0.67	-0.02
Netherlands	0.59	0.57	0.6	0.61	0.6	0.01
Spain	0.57	0.45	0.53	0.56	0.45	-0.12
UK	0.48	0.49	0.48	0.48	0.46	-0.02
OECD average (not weighted)	0.53	0.6	0.58	0.59	0.58	0.05

SOURCE: OECD (2011).

Summing up this issue, in most OECD countries there is no evidence that the reduced rates of VAT creep into additional goods over the years. Thus, one cannot infer from the EU data that the introduction of differential VAT is a slippery slope that will result in the taxation of more and more goods at reduced rates, as some opponents of differential VAT have argued.

c. Use of VAT to change behavior in EU countries

Like any tax, VAT can be used to change behavior. A country may wish to do this due to externalities (positive or negative) or in response to some official priority (e.g., the desire to encourage people to live in a given district for political reasons).

In a 2008 study, the European Union examined the possibility of lowering VAT rates on green-energy products in order to reduce pollution caused by energy production (European Commission, 2008). The study found that several EU countries had already been using reduced rates of VAT to promote the production and consumption of products that cause less or no harm to the environment. Between 1993 and 2004, for example, the Czech Republic lowered its VAT rate on several products, including biofuel and recycled paper. In Portugal, equipment needed for the production and use of renewable energy is taxed at 12 percent instead of the standard 21 percent. According to the authors of the study, it is hard to know whether the VAT reduction led to greater use of the products on which the VAT was reduced, because both countries' governments took additional actions at the same time to stimulate the use of the same goods. The authors believe, however, that the lowering of VAT did little to increase the use of these goods. One possible reason for this, mentioned in reference to Portugal, was that the alternative commodities—natural gas and electricity—were still taxed at a lower rate (5 percent).

In the UK, reduced-rate VAT is applied to (professional) installation of energy-saving equipment. Private consumers, however, made little use of this benefit. A possible reason for this, according to the authors, is that installers who purchase the accessories pay the low tax rate but private consumers (the end consumers of the products) may gain nothing from that.

In sum, despite several attempts by European Union countries to use reduced-rate VAT as a way to influence individuals' behavior, there is no evidence that lowering VAT brings about the desired change. Accordingly, one cannot cite these countries' experience as an indication that cutting VAT is an effective way of influencing buying behavior. In the researchers' opinion, however, the possibility of achieving such an influence in the future cannot be ruled out.

4. PASS-THROUGH OF VAT REDUCTION TO THE END CONSUMER: SIMULATIONS AND COMPARISON WITH OTHER TAXATION METHODS

The success of any VAT reduction scheme, be it intended to mitigate inequality or to encourage consumption of specific goods, depends foremost on the extent to which the reduction is passed on to the end consumer (see discussion in Section B Part 4). This depends largely on two factors: the level of competition in the industry and the elasticity of consumer demand.

According to the Israel Tax Authority Annual Report for 2005 (Dotan, 2006), a total cancellation of VAT on basic food products would probably result in a loss of revenue of about NIS 3.25 billion per year. It would likely save households in the lowest decile NIS 180 per month and those in the highest decile NIS 250. 28.6 percent of the total reduction would accrue to the three lowest deciles—even lower than their share in the population. Notably, the monthly saving per household is an upper bound of the potential saving because it is based on the assumption that the entire VAT cut would be passed on to consumers.

The Bank of Israel (2006b) examined the effect of four policy alternatives, each at a fiscal cost of NIS 1 billion, on income distribution: (1) an across-the-board reduction of the VAT rate; (2) lowering VAT on food products (excluding restaurants) to 12 percent; (3) replacing the lower bracket of health tax with an income tax; (4) introducing a negative income tax for low-income households with children. The study yielded the following: If the VAT rate on food products is lowered to 12 percent, the three lowest deciles would enjoy 29 percent of the benefit and the three highest deciles would come away with 32 percent. However, lowering VAT to 12 percent on food products only would be much more progressive than cutting the standard rate by 1 percentage point across the board, as the three lowest deciles would enjoy only 20 percent of the benefit in that case, and the three highest deciles would come away with 40 percent. When a negative income tax is introduced, 70 percent of its cost would benefit the three lowest deciles, whereas replacing the lower bracket of health tax with an income tax results in only 19 percent of the cost of the reduction benefiting the three lowest declines. Thus, the Bank of Israel clearly recommends the use of budget surpluses for the introduction of a negative income tax. (Notably, the study was written before such a tax was introduced in Israel. Its current importance therefore concerns widening the usage of this tax.) It is also noteworthy that the Bank of Israel circumscribes its conclusions about the effect of lowering the VAT rate on income distribution because its calculations are based on the assumption that the entire cut would be passed on to consumers. (A similar difficulty occurs in regard to the effect of a negative income tax because employers might exploit it to reduce wages; such a move, however, could contravene the Minimum Wage Law.)

In the aforementioned European Union study (European Commission, 2011), an attempt was made to estimate the effect of the VAT rate on prices of goods in order to gauge the expected impact of lowering VAT on various goods on income distribution and inequality.

The authors of this study cited another study, by a group of economists in Copenhagen (Copenhagen Economics, 2007), that looked into the expected effect of changing the VAT rate on the prices of several products in several EU countries. It was assumed in the latter study that the price of a good is dependent on its previous price, previous VAT rates, and other variables, but not on substitute goods. The authors examined VAT reductions of at least 2 percentage points (so that the intensity of the change would be large enough to induce a detectable change in price). The main finding is that, in the long term, much of the VAT reduction would be passed through to the product price but, in the medium term, the strength of the pass-through would vary widely among the products examined.

The findings of the study are summarized in Table 3:

Table 3
The effect of VAT reduction on the prices of various products

Field	Country	Rate of change in VAT	Rate of VAT reduction that is passed on to the final consumer price
Books	Spain	-19%	82%
Beverages	Portugal	-7%	0%*
Restaurants	Portugal	-5%	19%
Hair styling	Ireland	-8%	46%

* The change in the product price is not significantly different than zero, or in the opposite direction to the change in VAT.
SOURCE: Copenhagen Economics (2007).

Another study quoted in the EU publication is that of Carbonnier (2007), who tested the effect of two reforms to indirect taxation in France. In the first of the reforms (1987), the purchase tax on cars was lowered from 33.3 percent to 18.6 percent. In the second reform (1999), the tax on home renovation services was slashed from 20.6 percent to 5.5 percent. Carbonnier found that 77 percent of the tax cut on new cars and 57 percent of that relating to home renovation services reached the end consumer. (Both estimates are statistically significant, as is the difference between them.)

The EU study also quotes an investigation concerning the effect of a VAT cut in Finland relating to food products purchased in shops (as opposed to restaurants) on the prices of those goods (European Commission, 2011, pp. 320–321). This examination is important for our purposes because in Israel, one of the main alternatives broached in the public debate is to lower VAT on food products. The VAT rate on such commodities in Finland was reduced in October 2009 from 17 percent to 12 percent. The change was made as part of a 1 percentage point increase in the general VAT rate and the lowering of VAT on restaurant services in July 2010. Several large commercial enterprises undertook to bring down the price of products by the full rate of the VAT cuts. In an examination of 171 food products on which VAT was lowered, it was found that one month after the VAT reduction, the price of these goods dropped by 5.7 percentage points on average (i.e., more than the

VAT cut) but rose by 1.7 percentage points in the four months after the reduction (up to January 2010). In an analysis of a control group of (non-food) goods on which VAT was not reduced, prices were found unchanged between October 2009 and January 2010.

An additional study extended the investigation of the change in the prices of food products to October 2010, a year after the VAT cut. It found that after the decrease that immediately followed the VAT cut, prices went up by 3.4 percentage points from where they had been when the VAT reduction was introduced, whereas the prices of non-food products climbed during that time by only 1.2 percentage points (despite the 1 percentage point increase in the general VAT rate—demonstrating the offset in the price reduction of goods on which VAT is reduced). Importantly, however, during the period of time investigated, there were increases in some food prices, such as those of cooking oil and agricultural products, that were beyond retailers' control (e.g., due to changes in import prices).

The European Union study also describes an interesting experiment in which nine member states reduced their VAT rates from January 2000 onward (ibid., p. 301). In the experiment, VAT on labor-intensive goods was cut in order to stimulate employment and economic growth and to mitigate tax evasion. A 2003 EU analysis of the effect of the experiment showed that the VAT cut was not fully passed on to end consumers in any country or for any commodity. Among the services on which VAT was lowered, the pass-through to the consumer was strongest in home renovations and repairs. Another finding, similar to that in Finland, is that over time—in several countries and in respect to several products—following the initial downturn in the consumer price of the product shortly after the decrease in VAT, the price rose by more than the inflation rate, thereby offsetting some of the decrease that had been passed through to consumers.

There are two main implications of these studies (and others): (1) the more competitive a market is, the more a decrease in VAT is passed through to product price; and (2) the effect of a VAT decrease on product price needs to be examined over time and not shortly after the reduction, because product prices sometimes rebound after the initial downturn. Accordingly, even if differential VAT is implemented, the products that will be taxed at a reduced rate must be examined carefully and the tax should be cut, to the extent possible, only on products for which there is a competitive market or price control, so that most of the decline in taxation will be passed through to end consumers and will not remain in the hands of firms.

5. TEST CASE FOR THE ISRAELI ECONOMY—THE EFFECT OF ZERO VAT ON FRUIT AND VEGETABLES ON INEQUALITY AND ALTERNATIVE USES OF THE TAX EXEMPTION COST FOR MITIGATING INEQUALITY

As of this writing, the most significant reduced VAT rate in Israel is the zero rate that applies to fruit and vegetables. In the discussion thus far, the application of VAT to fruit and vegetables was viewed favorably for several reasons of principle, including the mitigation of inequality among income groups (vertical inequality).

Therefore, in this section we ask, and answer empirically, whether repealing the zero-rate VAT on fruit and vegetables and spending the tax receipts thus collected on alternative measures to reduce inequality will indeed reduce vertical inequality in Israel.

Table 4 presents monthly net income and consumption of fruit and vegetables among households by deciles of net income per equivalized person.[28]

As Table 4 shows, fruit and vegetables are a normal good, i.e. consumption increases when income increases, but by declining proportions (i.e., its income elasticity falls between 1 and 0). Since the conventional measurement of inequality relates to relative income, the conclusion to draw from Table 4 is that imposing VAT on fruit and vegetables will, in itself, increase relative inequality, when ignoring inequality in leisure. This is because even though it will make the wealthy pay more tax on average, this payment will constitute a smaller share of income as income grows. Thus, zero-rate VAT on fruit and vegetables mitigates relative inequality as measured on the basis of income deciles.

The cost of this exemption, calculated in accordance with household expenditure in 2010 on fruit and vegetables multiplied by 18 percent (the VAT rate in effect in 2014), is NIS 1.962 billion per year.

Below we examine the impact on inequality of using the revenue obtained by applying 18 percent VAT to fruit and vegetables to fund other inequality-mitigating mechanisms: child allowances, an earned income tax credit and spending more on a public good.[29] Notably, when we calculate the revenue that would be obtained if fruit and vegetables were subjected to VAT, we take account of the change that may occur in the tax base. (See discussion below.)

[28] This is the scale that the Israel Central Bureau of Statistics and the National Insurance Institute use to calculate inequality and the poverty line.

[29] An alternative would be to give every resident a grant, referred to in the literature as a negative income tax (elaborated on below).

Table 4
Net monthly income, monthly expenditure, and monthly consumption of fruits and vegetables, by decile

Decile	Avg.	1	2	3	4	5	6	7	8	9	10
Average expenditure on fruits and vegetables	**416**	**333**	**373**	**350**	**363**	**384**	**404**	**430**	**442**	**477**	**533**
Average disposable income	12,667	2,884	4,801	5,551	7,461	9,384	11,392	13,368	15,765	18,843	30,809
Fruits and vegetables as a percentage of income	3.3%	11.6%	7.8%	6.3%	4.9%	4.1%	3.5%	3.2%	2.8%	2.5%	1.7%
Average consumption expenditure	13,496	7,931	8,664	8,650	10,084	11,531	12,608	14,802	15,711	17,923	22,495
Fruits and vegetables as a percentage of expenditure	3.1%	4.2%	4.3%	4.0%	3.6%	3.3%	3.2%	2.9%	2.8%	2.7%	2.4%

We choose the alternatives presented for two reasons. First, in the state budget for 2014, child allowances were reduced by a sum that approximates the revenue that would be raised by taxing fruit and vegetables. Second, income tax is the instrument mentioned in the literature as preferable to a differential consumption tax. Therefore, we chose two types of negative income tax: the earned income tax credit that is conventionally used in Israel (which the public refers to as the "negative income tax"), and a negative income tax as understood in the economic literature, which is essentially a grant for every household.

When a change in the tax level and the distribution of the tax burden due to an important reform is discussed, the outcome should be examined through the use of a general-equilibrium model because results obtained in partial equilibrium sometimes cancel each other out (or even act in the opposite direction) in general equilibrium. Conversely, a general-equilibrium model has the drawback of requiring numerous assumptions about the economy's response functions. In the case of the simulations presented below, we eschew an analysis of the general economic equilibrium that would result from applying the proposed reforms. Instead, we model only the expected change in the tax base as an initial approximation (without rebound effects).[30]

[30] Notably, reducing consumption of fruit and vegetables by subjecting them to VAT will not, in itself, change the tax base because the entire sum no longer used to buy fruit and vegetables will enter the VAT base by being spent on other goods, to which VAT applies. Similarly, consumers' switching from one product to another will not directly affect income distribution.

The change in the tax base taken into account in all the simulations originates in the change in supply of hours worked (intensive margins) due to the change in taxation. This change flows from a substitution effect (a change in hourly wage) and an income effect. At first glance, repealing the VAT exemption on fruit and vegetables would not change the hourly wage. The wage of relevance in individuals' work decisions, however, is the real wage. This wage declines by the rate at which the consumer's consumption basket becomes more expensive. This increase in price is equal to the rate of VAT multiplied by the share of fruit and vegetables in the household's consumption basket. Given the share of expenditure on fruit and vegetables shown in Table 4 above, the consumption basket of the first decile will rise in price by 0.7 percent and that of the uppermost decile will increase by 0.4 percent, lowering real wages at similar rates. The effect (in terms of elasticity) of the decrease in real wage on hours worked (intensive margins) has been estimated in various studies at 0.1–0.3 (McClelland and Mok, 2012). At 0.2 elasticity, the decline in real wage reduces hours worked by 0.001 percent, causing the tax base to contract NIS 310 million[31,32], or 15 percent.[33]

As for the effect of the proposed policy measures on inequality, we start from the base point of the inequality index, which is predicated on the ranking of households by disposable monetary income. To test of the effect of the proposed policy measures, the increase or decrease in monetary sources available to the household as a result of the change in tax policy is compared and the outcome is presented with a breakdown by income deciles.[34]

[31] This is the upper bound of the effect on the tax base because it assumes total elasticity of labor demand. Any inelasticity of labor demand would partly raise the nominal wage and offset some of the decrease in real wage and its effect on the tax base.

[32] Notably, a price increase in fruit and vegetables, tantamount to a decline in real wage, also triggers an income effect on labor supply. This effect, however, is likely to be negligible due to the cumulative impact of two factors: (a) In all simulations proposed, an increase in VAT on fruit and vegetables would be fully offset (in money terms) by an alternative policy measure. Therefore, the change in individuals' welfare (the cause of the income effect on labor supply) would probably be small. (b) Various studies have found that the income elasticity of labor supply ranges from 0 to -0.1 (McClelland and Mok, 2012). In the simulation that we run below, the impact of the income effect on the tax base ranges, in absolute terms, from NIS 1 million to NIS 1.5 million per year—a negligible sum relative to the tax bases and therefore not included in the simulations.

[33] The VAT tax base is private consumption. Total household income per year was NIS 333 billion. Assuming that the decrease in supply of hours worked would induce a matching percent decline in consumption expenditure, the change would be: VAT as a share of expenditure (including VAT) * fruits and vegetables as a share of the consumption basket * elasticity of the alternative * consumption expenditure = 0.15 * 0.031 * 0.2 * 333 = NIS 0.310 billion.

[34] This is not a standard inequality index because it examines income net of VAT liability as opposed to the standard practice of examining income inequality alone. The use of the standard indicators based on income inequality only would not lead to a change in inequality as a result of changes in the rates of VAT on different goods, even though it is universally agreed that changing the VAT rate affects the standard of living and, therefore, may also impact inequality. In addition, we

Increasing child allowances

Due to the political balance of forces in recent years, child allowances in Israel have been slashed and fruit and vegetables have been exempted from VAT. For considerations of both economic efficiency and inequality, however, both of these policies should be reversed, as the data below show.

In Table 5, we calculate the gain and loss of each household that appears in the Household Expenditure Survey. The basic assumption in the computation is that applying VAT to fruit and vegetables would generate NIS 1.655 billion in revenue (i.e., a NIS 306 million decrease due to the contraction of labor supply), making it possible to boost child allowances by NIS 58 per child per month. Although this policy is fiscally neutral, Table 5 shows that it would reduce inequality (see below). It would also enhance economic efficiency by eliminating the adverse effect of the distortion of relative prices of fruit and vegetables relative to goods on which VAT is imposed.

Table 5 shows that households in deciles 1–5 would gain, on average, between NIS 64 (2.29 percent of income) and NIS 2 per month (respectively) and that deciles 6–10 would lose NIS 4–NIS 44 per month (0.1 percent of income), respectively. Imposing VAT on fruit and vegetables and raising child allowances by NIS 58 per child is preferable to leaving the child benefits and the zero-rate VAT on fruit and vegetables in place, because its fiscal cost is identical to zero-rate VAT but it has less of a negative impact on inequality. By combining this outcome with the result presented in Section B above, by which a standard-rate of VAT on all goods is preferable to different rates in terms of economic efficiency, we conclude that boosting child allowances as a substitute for zero-rate VAT on fruit and vegetables is preferable in both economic and social terms.

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keep the decile distribution of labor income where it is before the proposed policy measures are adopted, even though households' labor income falls (due to the aforementioned decline in labor supply). This is because the change in labor income traces to households' choice to increase their hours of leisure at the expense of hours at work (due to the increase in fruit and vegetable prices, which is considered tantamount to a downturn in real wage). Therefore, the decrease in labor income should not be seen as the precipitant of a change in inequality because it is induced by choice and is accompanied by an increase in leisure.

Table 5
The effect of cancelling the VAT exemption on fruits and vegetables and converting it to child allowance

Decile	Average	1	2	3	4	5	6	7	8	9	10
Average disposable income	12,667	2,884	4,801	5,551	7,461	9,384	11,392	13,368	15,765	18,843	30,809
Loss from the change in the VAT base	-63	-58	-63	-58	-59	-60	-61	-64	-65	-69	-70
Profit from a monthly NIS 58 allowance to each child	63	121	104	69	69	62	58	54	50	42	26
NET addition (deficit) in NIS per month	**0**	**64**	**41**	**11**	**11**	**2**	**-4**	**-10**	**-14**	**-27**	**-44**
Net after the change	12,184	2,948	4,842	5,561	7,471	9,387	11,388	13,358	15,751	18,816	30,765
Loss from VAT on fruits and vegetables	From net	-2.0%	-1.3%	-1.1%	-0.8%	-0.6%	-0.5%	-0.5%	-0.4%	-0.4%	-0.2%
Profit from allowances	From net	4.2%	2.2%	1.2%	0.9%	0.7%	0.5%	0.4%	0.3%	0.2%	0.1%
Addition (deficit) as a share of net	**From net**	**2.2%**	**0.9%**	**0.2%**	**0.1%**	**0.0%**	**0.0%**	**-0.1%**	**-0.1%**	**-0.1%**	**-0.1%**

Just the same, this conclusion should be circumscribed if raising child allowances would cause birthrates among weak population groups to rise or if the enlarged benefits would dampen participation in the labor force—an outcome that might exacerbate income inequality.

Increasing the earned income tax credit

To avert the potential adverse effects of enlarging the child allowances, some of which are described above, the earned income tax credit can be increased instead.[35] The sum allocated for an increase in earned income tax credit outlays (in lieu of zero-rate VAT on fruit and vegetables) is NIS 1.658 billion, a decline of NIS 304 million in the tax base after elasticity in hours worked is taken into account in the model.[36]

To measure the effect of this policy measure on inequality, we divided the aforementioned total into an additional (negative) income tax bracket (-30 percent) for all workers whose total income, from all sources, was less than NIS 3,500 per month per equivalized person in 2010. The negative tax that we examined applies to labor income up to a maximum of NIS 1,586 per equivalized person[37] and then fades out to a grant on labor income of NIS 3,500 per month per equivalized person.[38]

As shown in Table 6, households in deciles 1–4 will earn, on average, between NIS 136 (2.8 percent of income in Decile 2) and NIS 57 (2 percent of income in Decile 1) per month, and those in deciles 5–10 will lose NIS 23–NIS 70 per month (0.2 percent of income), respectively.

The decile that will gain the most from the change is the second one; Decile 1, populated by fewer workers, will receive a smaller increase on average. In terms of the Gini index, the use of fruit and vegetable VAT receipts to increase the negative income tax is progressive, lowering the index by 0.24 percent.

In sum, imposing VAT on fruit and vegetables and using the proceeds for negative income tax will alleviate inequality. Furthermore, standard-rate VAT would be more efficient and employment in the lower deciles would increase due to the negative income tax. Therefore, it is preferable to take this route than to leave the VAT rate on fruit and vegetables at zero.

[35] Both tools can also be implemented together.

[36] The analysis assumes that only persons working at the time of the survey will also be working after the earned income tax credit is increased i.e., that the quantity of workers will not grow. Since it is more realistic to assume that the number of workers will increase, our calculation is a lower bound for the possible effect of the negative income tax.

[37] Income per equivalized person is shown in order to give expression to household size (number of children, single parenthood, and so on) in a manner that is easy to calculate. These parameters are used in Israel's "earned income tax credit" (negative income tax) system.

[38] In fiscal terms, these figures correspond to the sum that would be collected by applying VAT to fruit and vegetables. However, one may consider other parameters for a negative income tax and its tax brackets. These numbers are an example only.

Table 6
The effect of cancelling the VAT exemption on fruits and vegetables and converting it to an earned income tax credit

Decile	Average	1	2	3	4	5	6	7	8	9	10
Average disposable income	12,667	2,884	4,801	5,551	7,461	9,384	11,392	13,368	15,765	18,843	30,809
Loss from the change in the VAT base	-63	-57	-62	-58	-58	-60	-62	-65	-65	-69	-70
Profit from earned income tax credit (NIS per month)	63	114	198	183	161	38	0	0	0	0	0
NET addition (deficit) in NIS per month	**0**	**57**	**136**	**125**	**102**	**-23**	**-62**	**-65**	**-65**	**-69**	**-70**
Net after the change	12,184	2,941	4,937	5,675	7,563	9,362	11,330	13,303	15,700	18,774	30,738
Loss from VAT on fruits and vegetables	From net	-2.0%	-1.3%	-1.0%	-0.8%	-0.6%	-0.5%	-0.5%	-0.4%	-0.4%	-0.2%
Profit from earned income tax credit	From net	3.9%	4.1%	3.3%	2.2%	0.4%	0.0%	0.0%	0.0%	0.0%	0.0%
Addition (deficit) as a share of net	**From net**	**2.0%**	**2.8%**	**2.2%**	**1.4%**	**-0.2%**	**-0.5%**	**-0.5%**	**-0.4%**	**-0.4%**	**-0.2%**

Increasing public expenditure

We also tested the use of the proceeds from imposing VAT on fruit and vegetables to increase public expenditure. The effect this would have on inequality depends, of course, on the type of expenditure made. Therefore, we assumed that the increase would be used for a public good from which all households benefit (in shekel terms) proportionally to the

number of equivalized persons in the household. Here, too, the standard measurement of income inequality rarely relates to in-kind income, let alone to public goods. To subject the measure to quantitative analysis, however, we assumed that the benefit for each equivalized person from the increase in public expenditure would be a flat sum of NIS 23 per month.[39]

Table 7
The effect of cancelling the VAT exemption on fruits and vegetables and converting it to a fixed grant per equivalized person

Decile	Average	1	2	3	4	5	6	7	8	9	10
Average disposable income	12,667	2,884	4,801	5,551	7,461	9,384	11,392	13,368	15,765	18,843	30,809
Loss from the change in the VAT base	-63	-58	-63	-59	-59	-60	-61	-64	-65	-69	-70
Profit from public product (NIS per month)	63	75	70	61	63	63	63	63	62	59	53
NET addition (deficit) in NIS per month	**0**	**17**	**7**	**2**	**5**	**3**	**2**	**-2**	**-3**	**-10**	**-17**
Net after the change	12,184	2,901	4,808	5,553	7,465	9,388	11,393	13,366	15,763	18,833	30,792
Loss from VAT on fruits and vegetables	From net	-2.0%	-1.3%	-1.1%	-0.8%	-0.6%	-0.5%	-0.5%	-0.4%	-0.4%	-0.2%
Profit from benefits	From net	2.6%	1.5%	1.1%	0.8%	0.7%	0.6%	0.5%	0.4%	0.3%	0.2%
Addition (deficit) as a share of net	**From net**	**0.6%**	**0.1%**	**0.0%**	**0.1%**	**0.0%**	**0.0%**	**0.0%**	**0.0%**	**-0.1%**	**-0.1%**

Table 7 shows that as a result of this change, households in deciles 1–6 would gain, on average, between NIS 28 (0.6 percent of income) and NIS 2 per month (respectively) and those in deciles 7–10 would lose NIS 2–NIS 17 per month (0.1 percent), respectively. This measure is progressive but less so than the two methods previously tested.

[39] This is the sum obtained by dividing NIS 1.659 billion in the expected proceeds of VAT on fruit and vegetables (after taking into account the contraction of the tax base due to the decrease in labor supply) by twelve months and by the number of equivalized persons.

The foregoing analysis shows that applying VAT to fruit and vegetables and using the proceeds to support all households commensurate with their number of equivalized persons would mitigate inequality and would also enhance efficiency due to the standardization of VAT.

Effect on horizontal inequality

The effects of policy measures on horizontal inequality are usually overlooked in the public and economic debate. A change in horizontal inequality tests the effect of policy measures on the kind of inequality that the measures create among households that have equal income per equivalized person.

To examine the effect of zero-rate VAT on fruit and vegetables on horizontal inequality, we used the income and household expenditure surveys for 2010 to sort households by income deciles and by fruit and vegetable expenditure deciles. Figure 2 presents the distribution of the differences, meaning the percent of households within each interval between an income decile and a fruit and vegetable expenditure decile. When the difference is negative, the household in the decile ranks higher in consumption of fruit and vegetables than it does in income. For example, (-2) means that the household is two deciles higher in consumption of fruit and vegetables than it is in income. In contrast, a positive difference of 3, for instance, means that the household is three deciles lower in consumption of fruit and vegetables that it is in income.

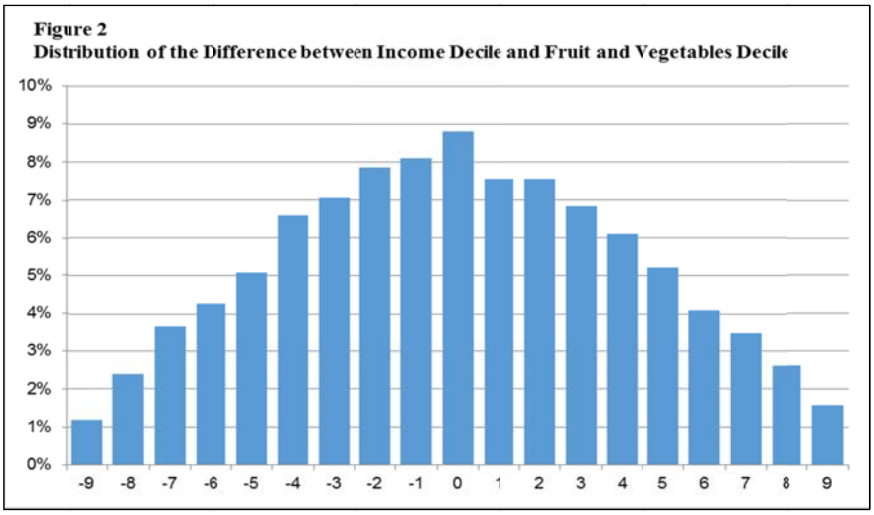

Figure 2 shows that only 8.8 percent of households are in the same decile in both income and consumption of fruit and vegetables; 39.9 percent deviate by up to two deciles; and 23.3 percent do so by six deciles or more.

These data show that, although the current situation of exempting fruit and vegetables from VAT induces a slight decrease in measured vertical inequality (excluding leisure), it creates many situations in which low-income persons gain nothing from this tool because they do not consume fruit and vegetables on a significant scale relative to their income. Concomitantly, there is a rather large group of high-income persons who benefit from the zero rate of VAT on fruit and vegetables because they consume these commodities abundantly. In addition, the current exemption leads to a situation in which households with similar income are subsidized differentially by the zero rate of VAT on fruit and vegetables, thus impairing horizontal equality.

In summation, in this section we demonstrated quantitatively that there are more efficient tools than differential VAT for intervention in income distribution. Since these tools already exist, their use is unlikely to affect administrative cost and will also enhance economic efficiency as a result of the standardization of VAT rates.

6. EMPIRICAL MODEL: TESTING THE NEED TO APPLY REDUCED-RATE VAT TO DIFFERENT PRODUCTS IN ORDER TO MITIGATE INEQUALITY

In this section we examine empirically the need to lower the VAT rate on various goods in order to reduce inequality among households that have different levels of earning ability.

The initial assumption behind the following analysis is that inequality should be measured not only relative to income purchasing power but also in relation to leisure. By this reasoning, income tax should be applied to individuals' earning ability and not to their wage, as is done today. This is because the taxing of wage allows individuals who have high earning ability to reduce their tax liability by working fewer hours. An example of a tax based on earning ability is one applied to wage per hour. Such a tax, however, is impracticable due to the ease of manipulating per-hour reportage and the numerous workers who are employed on a global basis.

Another reason why individuals are not taxed on the basis of their abilities in many countries' tax systems (including Israel's) is that capital income, which research has found to be positively correlated with individuals' earning ability, is taxed at a flat rate that is also lower than the marginal rate of taxation on labor.

In view of these factors, the economic literature proposes that the existing income tax be augmented by taxes at differential rates on different products as a way of reflecting individuals' capabilities more accurately than the existing income tax does (e.g., Saez, 2002).

In this section, we apply an estimation proposed by Pirttila and Suoniemi (2014) to identify goods consumed by households with low earning ability in the labor market. The model controls for household earning ability in the labor market by testing the number of hours worked for a given wage (an alternative possibility would be to examine wage per hour) (Gordon and Kopczuk, 2014).

In Pirttila and Suoniemi's model, the dependent variable is a household's hours worked, and the explanatory variables include gross wage (in a nonparametric form) and a linear function of household capital income, household demographic characteristics, and household expenditure on selected groups of products. Products on which expenditure correlates significantly and positively with earning ability (i.e., correlates negatively with hours worked at a given wage) will be candidates for higher taxation, and vice-versa.[40]

The groups of products included in the model that we estimated are based on Pirttila and Suoniemi's first model, except that, in several cases, product groups that they included en bloc were split into subgroups where there is a specific interest in such a subgroup in the Israeli economy. (For example, we separated fruits and vegetables from the other food products because we wanted to examine the effect of Israel's zero-rate VAT on fruit and vegetables in this context.)[41]

Accordingly, the model estimated is the following:

$$H_i = f(W_i) + X_i'\beta + Z_i'\gamma + U_i$$

where:

H_i is the number of monthly hours worked by the spouses in the household (or by the head of household where there is only one head of household).

W_i is the total gross monthly wage of spouses in the household (or of the head of household where there is only one head of household).

X_i is a vector of household characteristics.[42]

Z_i is a vector of expenditure on various goods included in the model.

The averages and standard variations of the variables are shown in Appendix B.

The model was estimated using the Stata program and the plreg command. This method allowed us to perform a nonparametric estimation of one explanatory variable and parametric estimations of the others.

[40] Unlike Pirttila and Suoniemi, we chose not to include the estimated value of potential hours worked by non-working persons, meaning that households that had no working spouse at the time of the sample were omitted from the estimation. Furthermore, to avoid outlier observations, we did not include households that had total monthly labor income of less than NIS 1,000 or more than NIS 60,000, and households in which monthly capital income exceeded NIS 25,000.

[41] We considered splitting off several additional product groups in the model presented below. However, the coefficients obtained for the effects of these subgroups are not shown in this paper because they lack statistical significance.

[42] The following household characteristics were included in the model: (1) monthly household capital income; (2) a dummy variable denoting the presence or absence of a second spouse in the household; (3) the man's age and age-squared (or the woman's age and age-squared if the household is composed of a woman only); (4) the number of additional adults (apart from head of household and his/her spouse); (5) the number of children living in the household in each of the following age groups: 0–3, 4–5, 6–11, 12–15, 16–18.

Using Pirttila and Suoniemi's methodology, we estimated the effect of (gross) wage on labor supply nonparametrically while estimating the effect of household characteristics (including capital income) and total expenditure on the various product groups included in the model parametrically (linearly).

Wage was estimated nonparametrically due to the need to optimize the explanation of the connection between wage and hours worked in each household. In this manner, the residual of hours worked not explained by wage (and household characteristics) will yield a reliable index for use in testing the connection between individuals' capabilities in the labor market and the extent of their consumption expenditure on different products.

The results of the estimation are shown in Appendix C. They show that capital income is negatively (and significantly) correlated with hours worked (at a given wage). This means that individuals who are more capable in the labor market have higher capital income. Since capital in Israel is taxed linearly (with several exceptions, such as an exemption on the sale of one residential dwelling under certain conditions) and less heavily than labor, the meaning of the results obtained is that to enhance equality, a progressive and/or steep tax on capital income is also needed. This result matches the one obtained by Pirttila and Suoniemi on Finnish data and the one produced by Gordon and Kopczuk using US data.

Testing the estimated coefficients for a relation between the various product groups and hours worked, we found several groups that correlate negatively (and significantly) with hours worked (at a given wage) and therefore justify, for considerations of equality, the imposition of a consumption tax (such as VAT) at a higher rate. These groups include, ironically, fruit and vegetables, to which zero-rate VAT applies today.

The meaning of this result is that zero-rate VAT on this group of products aggravates inequality in Israel, contrary to the conventional wisdom.

Additional product groups for which expenditure is negatively (and significantly) correlated with hours worked are current expenditure on housing (not including costs of home purchase/rent) and domestic travel expenditure.

Surprisingly, it was found that while expenditure on an owned dwelling (an imputed expenditure) is, as expected, positively correlated with labor market capabilities (i.e., negatively with hours worked at a given wage), the correlation is not significant. In contrast, rent expenditure shows a significant positive correlation with labor market capabilities, indicating the need to raise the tax rate on residential rents. This tax increase is expected to mitigate economic inequality by imposing heavier taxation on landlords' capital income and on rent payments, because both variables show a positive correlation with labor market capabilities.

It is very important to examine the behavior of the food products group (net of fruit and vegetables) relative to hours worked due to recent proposals, in the public discourse, to lower the rate of VAT on goods that belong to this group.

The estimation results show that expenditure on this group of products is indeed higher among households that have lower levels of labor-market earning ability—a factor that may

justify lowering the VAT rate that applies to it for reasons of equality. The result obtained, however, is not statistically significant.

Expenditure on the other product groups that we examined was not found to be significantly correlated (at a 95 percent level) with labor market capabilities. Furthermore, a negative correlation was found between expenditure on tobacco products and labor market capabilities at 90 percent significance, meaning that the taxation of tobacco products exacerbates inequality. However, since the taxation of these products is also meant to discourage consumption for reasons of health, it cannot be said that the tax on these products should be lowered.

In summation, we have shown that Israel's zero rate of VAT on fruit and vegetables and its partial exemption from income tax on rental income leads to increased inequality commensurate with earning ability. No other product group was found for which the rate of VAT should be lowered in order to mitigate economic inequality. This includes the food products group, regarding which the possibility of setting a lower VAT rate has been mentioned recently in the public discourse.

7. AN ALTERNATIVE TO DIFFERENTIAL VAT: PROGRESSIVE VAT

We have seen above the built-in either-or that exists between equality (or justice) and efficiency. Standard-rate VAT is an efficient, simple, and inexpensive tax; however, it is neutral if not regressive in its effect on income distribution. Differential VAT, in contrast, mitigates vertical inequality to some extent (when ignoring inequality in leisure) but exacerbates horizontal inequality and is costly in terms of extra tax burden, tax planning and evasion, and administrative costs to both taxpayers and the tax authorities. We also argued that direct taxation, i.e., directly taxing high-income persons and subsidizing those of low income, is a better way to intervene in income distribution than taxing goods that correlate strongly with income level.

Another kind of tax that may facilitate change in income distribution while causing less harm to welfare than differential VAT is *progressive VAT*—a combination of standard-rate VAT and a grant for every household or a credit for every worker.[43]

This grant may depend on household size or some other parameter by which the revision of national income distribution seems appropriate. It may be applied in several

[43] A grant for every household (a.k.a. negative income tax) would do more to mitigate inequality and enhance efficiency because it would allow the same level of inequality to be attained at a lower tax rate (as demonstrated by Davies and Hoy, 2002), and would obviate the need to determine who should qualify for negative income tax and who should not. However, if we wish to avoid reducing labor supply at low levels and prevent the formation of a poverty trap due to the negative income tax, another possibility is to reserve the negative income tax for working persons (making it an "earned income tax credit" or a subsidy for labor).

ways: (1) a grant is transferred to every household's bank account (as is done with child allowances today); (2) employers may offset a fixed sum from their VAT remittances for every worker on their payroll and transfer this sum to the worker; (3) every resident would be given the option of receiving a refund of VAT that they pay on their purchases up to a specified level.[44] The latter method may not only be more effective than differential VAT in reducing inequality but may also enhance VAT enforcement. Table 8 presents an example of progressive VAT at the rate of 25 percent of the sum net of VAT (corresponding to 20 percent of the sum including VAT) and a monthly credit of NIS 1,000 per resident or household.

Table 8
Sample of imposing progressive VAT at a rate of 25% and a NIS 1000 credit per resident

Monthly expenditure	25% VAT	Monthly credit	Net VAT payment	Tax as a percentage of expenditure
2,500	500	-1,000	-500	-25.00%
5,000	1,000	-1,000	-	0.00%
10,000	2,000	-1,000	1,000	12.50%
20,000	4,000	-1,000	3,000	18.75%
30,000	6,000	-1,000	5,000	20.83%
50,000	10,000	-1,000	9,000	22.50%

The table shows that low-income persons pay no VAT at all and also receive negative income tax. The more they spend on consumption, the higher the rate of VAT they pay, making the tax progressive. By using this method, all problems of enforcement, compliance, and substitution that flow from differential VAT are avoided; horizontal inequality does not increase; avoidance of the tax by switching to alternative non-taxed products is impossible; and poor individuals who consume less of the reduced-VAT goods will not be harmed. Also, the tax rate required to compensate for the cost of the negative income tax is lower than the rate that would be needed to compensate for the decrease in differential-VAT receipts for the same extent of inequality mitigation.

A method of this kind is so attractive that some economists have proposed abolishing the income tax—an expensive, complicated, and loophole-intensive vehicle—and applying practices such as progressive VAT in its stead.[45] This reform would be efficient in bringing in revenue and would effectively rule out tax planning; it would entail a minimum of extra burden and other distortions; and it would probably be more just. In addition, such a method would facilitate effective and efficient intervention in income distribution. An example of this appears in *The Flat Tax* (1981). The authors, Hall and Rabushka, propose

[44] This method is practiced in Canada for some of its citizens.
[45] Examples include Yaacobi (2009), Bradford (1986), Hall and Rabushka (1995), and Hall (2005).

doing away with income tax and imposing a 19 percent tax on firms' cash flow (total revenues less total payments) plus a standard-rate tax on wage above a certain bracket. Their proposal strongly resembles progressive VAT plus an earned income tax credit.[46] Later, Robert Hall (2008) also proposes explicitly using progressive VAT. For a simple, progressive way of applying a progressive consumption tax, he recommends starting with standard-rate VAT and making it progressive by giving a structured credit (a negative income tax) on workers' wage.[47] Nir Yaacobi (2009) elaborates on this method and adapts it to the Israeli economy. Studies that simulated the replacement of income tax with a flat-rate consumption tax (i.e., one without tax brackets) and a negative income tax show a perceptible increase in product and welfare with no increase in inequality.[48]

In summation, this analysis shows that the best way to use VAT to reduce inequality is through progressive VAT and not differential VAT.

8. SUMMARY AND CONCLUSIONS

One of the demands that was expressed following the social protests in Israel in the summer of 2011 was the introduction of different rates of Value Added Tax on different products (differential VAT) in order to reduce inequality.

The international comparison presented in this paper shows that Israel applies reduced-rate VAT to a small portion of the consumption basket relative to other European Union and OECD countries. Most of these countries established reduced- or zero-rate VAT on food products, water, accessories for persons with disabilities, books and newspapers, and other goods. This being the case, the demand for differential VAT in Israel appears logical and warranted.

Even though this method is rather widely used, the economic literature does not support the introduction of differential VAT as a way to reduce inequality. This is for several theoretical reasons. Among them: different rates of VAT impair efficiency by diverting consumers' resources to goods that are taxed at the lowest rate. It is hard to identify the beneficiaries of the tax cut (as opposed to identifying the purchasers of price-lowered goods) due to the effects of the price cut on market equilibrium and on other markets when the beneficiaries are determined in accordance with elasticities in the markets in question. There is concern that amid the profusion of VAT rates producers will dupe the tax authorities by falsely classifying goods subject to full-rate VAT as being entitled to the

[46] This is truly a tax on added value, unlike VAT, which is a tax on consumption. The difference between them is that under Hall and Rabushka's flat tax, exports are taxed and imports are exempt, and with VAT it is the other way around—making VAT a consumption tax.

[47] Page 182.

[48] Simulations of the American economy appear in Aaron and Gale (1996) and Zodrow and Mieszkowksi (2002). Simulations of the Israeli economy are presented in Yaacobi (2010).

reduced rate. In addition, rationales that favor the introduction of differential VAT for reasons of behavior modification (e.g., a high rate of VAT on pollutants) lose their validity in the case of purchases of inputs by businesses because VAT paid on input prices is fully deductible for businesses.

Simulations based on data from various countries show that abolishing the reduced rate of VAT and using the resulting increase in revenue to support disadvantaged population groups in various ways will cause inequality to decrease at no fiscal cost (e.g., Crawford et al., 2008, who looked into cancelling the reduced rates of VAT in the UK).

The results of this study in respect to the Israeli economy are consistent with those in the literature. (See for example, recently, Gupta et al., 2014.) Our examination of Israeli economic data by means of a simulation based on the Household Expenditure Survey for 2010 shows that repealing zero-rate VAT on fruit and vegetables and allocating the revenue increase to social benefits and to two kinds of negative income tax will not only reduce inequality but also enhance economic efficiency. Calculations by the Bank of Israel (2006b) yield a similar result.

The theoretical reasoning mentioned in the economic literature in support of the need to institute differential VAT (or differential taxation of products through another tax, such as purchase tax) as a tool to complement income tax in order to mitigate inequality relies on a definition of inequality that includes not just income inequality (in terms of purchasing power) but also inequality in the level of leisure.

According to this approach, the need for differential taxation of products is due to the difficulty in taxing income according to the individuals' labor market capabilities, since people with high capabilities can also reduce their work hours, thereby reducing their tax liability. However, by reducing work hours, those individuals enjoy greater untaxed leisure, which creates inequality. Therefore, the tax on products purchased by those with lower labor market capabilities should be reduced.

Another reason for differential taxation of products in order to reduce inequality is in the case where there is a positive correlation in any economy between income from capital and individuals' labor market capabilities, where the tax on income from capital in that economy is not progressive. This situation exists in many economies, including, as found in this study, the Israeli economy.

Common models in the literature for examining goods that are candidates for reduced-rate VAT due to the considerations presented above are based on an examination of the connection between the work hours of the family unit and the family's expenditure on various groups of products, after controlling for total income from labor and from capital and the demographic characteristics of the family (or alternatively, examining the connection between the family's hourly wage and their expenditure on various groups of products after controlling for income from capital).

Estimating this model on the Israeli economy through the Household Expenditure Survey for 2010 reveals that there is not any product group on which we can significantly recommend a reduction in the rate of VAT. While it was found regarding the food products

group, which has been mentioned in the public discourse as a central candidate for reduced-rate VAT, that the reduced-rate VAT that is applied to it will lead to reduced inequality, this result was not statistically significant. In contrast, we found that the zero-rate VAT applied to fruits and vegetables actually leads to increased inequality in the economy, when taking into account the inequality in leisure as well.

In view of the results, it seems that the policy for mitigating inequality in Israel must include measures other than expanding the applicable VAT rates in Israel. If we want to reduce inequality other than through changes in income tax, it seems that we would do well to use a uniform VAT rate with a fixed grant per household. This tax, known as progressive VAT, combines the advantages of uniform VAT as an efficient, simple and inexpensive tax with the effectiveness of direct (negative) tax in reducing inequality.

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Appendix A: VAT rates in selected European countries

Country	Basic VAT rate	Reduced VAT rate	Super-reduced VAT rate
Germany	19%	7% - food and agricultural products	
UK	17.50%	5% - electricity, fuel, and some efficient energy products for residential purposes and charities; grants for installing heating systems for the elderly who receive welfare payments, medical protection products for women, child safety seats, and bicycle and motorcycle helmets	0% - food products, pharmaceuticals and aids for the elderly, children's clothing and footwear, newspapers and books, water products, use of public transit, new homes and homes intended for charitable use, and the services of contractors building new homes
France	19.60%	5.5% - personal grooming services, household labor, hotel services	2.10%
Italy	20%	10% - hotel services	0%–4.5%
Spain	16%	7% - restaurant and hotel services	4% - milk products
Netherlands	19%	6% - food products, newspapers and books, advertising in newspapers, pharmaceuticals, use of public transit, hotel services	0%
Belgium	21%	12% - natural medications, margarine, pay-to-view television, public housing	6% - food products, pharmaceuticals, newspapers and books, works of art, collectibles and antiques, vehciles for the elderly, social organization services, renewal of buildings, agricultural services, use of public transit, sport and leisure facilities, intellectual property services, medical equipment, hotel and catering services
			0%
Sweden	25%	12% - food products	6% - culture and sport
			0%
Denmark	25%	5% - artists selling for the first time	0% - newspapers
Finland	23%	17% - food products	8% - use of public transit, books, pharmaceuticals, hotel services
			0%
Austria	20%	10% - hotel services	
Ireland	21%	13.5% - hotel services	0%–4.8%
Greece	19%	9% - food products, pharmaceuticals, fuel products, hotel services	4.5% - books and newspapers
Portugal	21%	12% - restaurant services	3% - hotel services
Luxembourg	15%	6%	

SOURCE: Tzadik and Tikva (2008).

Appendix B: Averages and standard deviations of the variables in the empirical model*

(per-month data)

Variable	Average (standard deviation in parentheses)
Work hours	250 (115)
Monthly wage	13,801 (10,705)
Income from capital	3,887 (2,819)
Expenditures on food (excluding restaurants)	1,578 (1,104)
Expenditures on restaurants	538 (592)
Expenditures on fruits and vegetables	439 (328)
Expenditures on the purchase of a home (imputed)	3,674 (1,408)
Expenditures on the rental of a home	2,403 (1,331)
Current residential expenditures	1,346 (1,164)
Expenditures on home equipment	685 (1,326)
Expenditures on clothing and footwear	677 (803)
Expenditures on healthcare (excluding health tax)	721 (1,201)
Expenditures on obtaining an education (including kindergarten)	1,335 (1,310)
Expenditures on culture sport and leisure	964 (3,483)
Expenditures on tourism and hotels	537 (662)
Expenditures on leisure products	317 (413)
Expenditures on trips in Israel (excluding busses)	1,197 (1,906)
Expenditures on busses	227 (257)
Expenditures on tobacco	455 (455)
Age of the male (or of the female if there is no male in the household)	46 (14)
Married	0.75 (0.43)
Number of adults in the household other than the couple	0.62 (0.97)
Number of children aged 0-3 in the household	0.32 (0.60)
Number of children aged 4-5 in the household	0.14 (0.38)
Number of children aged 6-11 in the household	0.44 (0.81)
Number of children aged 12-15 in the household	0.25 (0.57)
Number of children aged 16-18 in the household	0.13 (0.36)

* The averages are calculated only for observations where the expenditure is positive.

Appendix C: Estimation results

Variable	value Estimate (standard deviation in (parentheses
Income from capital	-0.0028 (0.0011)*
Expenditures on food (excluding restaurants)	0.0030 (0.0023)
Expenditures on restaurants	-0.0048 (0.0036)
Expenditures on fruits and vegetables	-0.0248 (0.0070)*
Expenditures on the purchase of a home (imputed)	-0.0030 (0.0019)
Expenditures on the rental of a home	-0.0072 (0.0020)*
Current residential expenditures	-0.0057 (0.0020)*
Expenditures on home equipment	0.0002 (0.0015)
Expenditures on clothing and footwear	0.0010 (0.0026)
Expenditures on healthcare (excluding health tax)	-0.0015 (0.0017)
Expenditures on obtaining an education (including kindergarten)	0.0020 (0.0017)
Expenditures on culture sport and leisure	-0.0014 (0.0008)
Expenditures on tourism and hotels	0.0055 (0.0043)
Expenditures on leisure products	0.0071 (0.0044)
Expenditures on trips in Israel (excluding busses)	-0.0026 (0.0012)*
Expenditures on busses	-0.0061 (0.0101)
Expenditures on tobacco	0.0094 (0.0056)
Age of the male (or of the female if there is no male in the household)	6.15 (1.09)*
Age of the male squared (or of the female if there is no male in the household)	-0.08 (0.01)*
Married	75.81 (7.02)*
Number of adults in the household other than the couple	-18.15 (2.35)*
Number of children aged 0-3 in the household	-14.91 (3.38)*
Number of children aged 4-5 in the household	-12.00 (4.67)*
Number of children aged 6-11 in the household	-7.54 (2.48)*
Number of children aged 12-15 in the household	-3.43 (3.40)
Number of children aged 16-18 in the household	-4.90 (5.26)
N	2822
^{2}**R**	0.179

* Statistically significant to a level of 95%.