The Optimal Threshold for GST on Imported Goods

John Creedy

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Abstract

This paper examines the determination of the optimal threshold value for Goods and Services Tax (GST) for imported units arising from internet orders. The concept of an optimal threshold is wider than simply the maximisation of revenue net of administrative costs. At the optimal threshold, the marginal cost of funds from GST is equated to the ratio of the marginal value of public funds to their marginal social value, reflecting the value judgements of a decision maker. The marginal cost of funds allows both for compliance costs and the marginal excess burden arising from a small increase in the threshold. Illustrative numerical values are reported, showing the sensitivity to administrative costs, the demand elasticity and, importantly, value judgements.

JEL Classification: H20 – General; H21 – Efficiency: Optimal Taxation

Keywords Goods and Services Tax; Marginal cost of Funds; *de minimis*.

Executive Summary

New Zealand's Goods and Services Tax (GST) has a very broad base, with few exemptions. However, financial services are not subject to GST, along with goods produced and sold by small firms whose earnings fall below a threshold of $60k per year. Another important class of exceptions includes the large number of imported goods arising from orders placed with overseas suppliers and passing through customs control, which fall below the *de minimis* threshold, which is currently set at $60. If only GST is relevant, the GST rate of 0.15 means that the threshold value applied to imported units is $400, since the tax liable, 0.15 multiplied by 400, is equal to the de minimis of $60.

The aim of this paper is to examine how an optimal threshold value can be determined. Value judgements always enter into the specification of what is meant by optimal, determining how the outcomes are evaluated by an independent judge. Hence, the implications of adopting alternative value judgements are examined.

The approach starts from a general equimarginal condition, which states that, from the point of view of the judge and for all tax structure components, the marginal benefit from taxation must equal the marginal cost. The benefit involves not only the net revenue, but the value attached to the resulting government expenditure. On the cost side are administrative, compliance costs and efficiency effects, and the value attached to these by the judge.

In the present context, more content can be added to this general statement by expressing these benefits and costs in an equation allowing the optimal threshold to be solved as a function of the costs, the GST rate and the elasticity of demand, along with a parameter that reflects value judgements (the ratio of the marginal value of public funds to the marginal social value of taxation).

It is shown that if the average and marginal administrative and compliance costs are constant, the determination of the optimal GST threshold does not depend on either the number of units imported or its distribution by value. This is a useful property because it means that changes in the distribution over time would not give rise to a need to adjust the threshold. These costs are unlikely in practice to be constant over the whole range of possible thresholds, but may be considered to be constant over the relevant range.

The implications of a range of values of the various elements of the optimal threshold are examined. The analysis suggests that the case for substantially reducing the existing threshold depends on the argument that administrative costs can be reduced to relatively low levels and that the marginal cost of funds from alternative sources is relatively high.

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1 Introduction

New Zealand's Goods and Services Tax (GST) has a very broad base, with few exemptions. However, financial services are not subject to GST, along with goods produced and sold by small firms whose earnings fall below a threshold of $60k per year.[1] Another important class of exceptions includes the large number of imported goods arising from orders placed with overseas suppliers and passing through customs control, which fall below the *de minimis* threshold, which is currently set at $60.[2] This threshold refers to the duty and/or GST payable. Duty is applied to clothing, shoes and accessories. Furthermore, GST is applied to the value of the goods, plus any applicable duty, plus postal/courier and insurance charges. To simplify the analysis, the present paper considers only GST. Hence, with a GST rate of 0.15, the threshold value is $400, since the tax liable, $0.15 \times \$400$, is equal to the *de minimis* of $\$60$.

The aim of the paper is to examine how an optimal threshold value can be determined. Reference is made throughout to the threshold *value of units* rather than the *de minimis*. The term 'unit' is used rather than, for example, 'package'. This is because separate packages which arrive at the same time for the same purchaser are combined into a single unit for tax purposes. The first, and most obvious, point to stress is that there is no objective or value-free optimal: value judgements always enter into the specification of what is meant by optimal, determining how the outcomes are evaluated by a judge or decision maker. Hence the most that can be achieved in a disinterested economic analysis of this kind is to examine the implications of adopting alternative value judgements.

[1] Firms whose earnings are expected to fall below the threshold, but who have large expenses (for example in early years of their operation) may wish to register so that they can claim GST paid on their inputs. There has been little detailed examination of the determinants of the optimal value of this threshold, but an important exception is Keen and Mintz (2002).

[2] The exchange rate applied is published eleven days before the effective date (the day goods arrive not when payment was made for the order). For a discussion of mainly administrative issues relating to taxation of cross-border services and goods, see Inland Revenue (2015).

One approach, as in the early treatment of optimal income and commodity taxation, is to specify an explicit form for a social welfare, or evaluation, function. This is maximised, subject to government budget and other constraints, in a structural model in which individuals' optimising behaviour is also treated explicitly. Very few general results are available, but the approach is well-suited to examine a range of assumptions, although very strong simplifying assumptions are needed to keep models manageable. Alternatively, it is possible to begin from a general fundamental equimarginal first-order condition requiring the equalisation of marginal costs and benefits for each tax and expenditure component. Stated in this blank way, such an obvious condition can appear to be almost content-free. However, when the costs and benefits can be expressed in tractable ways, it is sometimes possible to express results in terms of easily interpreted (though not necessarily easily-estimated) parameters, such as elasticities.[3]

This second approach is adopted here. However, as seen below, the cost of obtaining easily interpreted results is that there can remain a lack of clarity about the way in which value judgements are specified. Furthermore, the equimarginal condition is, as stated, necessarily part of an extensive tax system which includes other forms of taxation and benefits. When using the approach to consider a single tax, or indeed a single component of that tax, particular care is needed: it is often implicit that the rest of the tax and government expenditure system satisfies the related first-order conditions. A total revenue requirement is not imposed explicitly; that is, it is effectively assumed that any additional revenue can be obtained optimally from an alternative source (for example income taxation).

This paper presents a model of the optimal GST threshold, involving a modification and extension of the basic result established by Keen and Mintz (2004) in the related context of a GST threshold applied to the total value of sales by domestic firms. First, the case of revenue maximisation is examined in Section 2. The general conditions required for an optimal threshold are discussed in Section 3. Section 4 derives expressions for the various components, including the marginal revenue and cost implications of changing the GST threshold, along with welfare changes. An expression for the optimal threshold is then obtained in Section 5. Numerical examples are provided in Section 6. Brief conclusions are in Section 7.

[3] Each approach is essentially an exercise in welfare economics, asking what threshold would be imposed by a fictitious independent decision maker who has no vested interests in the outcome, but has easily-summarised value judgements. This differs from a 'political economy' approach which asks what outcome would arise from alternative voting mechanisms.

2 Net Revenue Maximisation

Consider first the simplest case where the policy objective is to maximise tax revenue net of administration costs. The optimal threshold is thus the value for which the marginal revenue is equal to the marginal administrative cost, for a small increase in the threshold. Suppose there is a constant administration cost per unit of c_a.[4] The tax-exclusive GST rate is τ and the threshold value above which units incur GST is y^*. A marginal increase in y^* reduces tax revenue by τy^* multiplied by the number of units taken out of the tax net. The reduction in administrative costs is simply c_a multiplied by the same number of units that are no longer subject to taxation. Equating marginal cost and marginal revenue thus gives $\tau y^* = c_a$ and the net revenue maximising threshold is given by:

$$y^* = \frac{c_a}{\tau} \tag{1}$$

The net revenue-maximising threshold in this simple case is therefore simply the ratio of the (constant) administrative cost per package to the GST rate. The total number of units and their distribution by value are irrelevant since, for any small increase in the threshold, the amount by which the tax per item (the threshold multiplied by the GST rate) and the administrative cost per item are multiplied to obtain the marginal changes in *total* costs and revenues are the same. Hence they cancel from both sides of the equation.

This result also suggests that the price elasticity of demand for imported units, η say, is not relevant in determining the 'optimal threshold'.[5] However, this needs to be qualified if general equilibrium considerations are taken into account. The substitution away from taxed goods towards the untaxed goods at the margin, as the threshold increases, implies that the marginal revenue is larger in absolute terms. The loss of revenue includes the goods taken out of the tax net by the

[4] Nonlinear costs are considered in the Appendix. Hintsa *et al.* (2014) regard the optimal *de minimus* as the value that maximises total net revenue. However, their detailed analysis of a number of components of the administrative cost produces a non-constant (U-shaped) marginal and average cost.

[5] Domestic suppliers are likely to argue that the elasticity matters to them since it affects the extent to which consumers switch from equivalent domestically-supplied goods to imported goods. If this loss of custom to domestic suppliers is included by decision makers in their evaluation function, the elasticity then has an additional role to play. Of course many imported goods cannot be obtained from domestic sources: this is often cited as a major reason given by consumers for making internet purchases. These considerations are not discussed further here. Producers' surplus is also explicitly excluded from the following analysis by the assumption that the supply price is constant.

threshold increase, plus the loss of revenue from the reduction in the demand for other domestically supplied and taxed goods. However, here it is the substitution elasticity that matters rather than η. This type of consideration is largely neglected below: indeed it is very difficult to obtain necessary information about cross elasticities.

Can current New Zealand policy be rationalised in terms of a simple objective of net revenue maximisation? The New Zealand Customs Service states that Customs does not collect the duty and/or GST payable, 'when the total amount payable is less than $60. This is because below $60 more would be spent on the administration and collection than would be collected in revenue'.[6] This might be interpreted as suggesting both that the administrative cost per unit is $60, and that a revenue-maximising strategy is being followed. However, this seems to be an unrealistically high administration cost, especially when it is recognised that, 'Once the threshold of $60 of duty and/or GST payable is reached an Import Entry Transaction Fee (IETF) of NZ$49.24 (GST inclusive) is also payable. This includes the Ministry for Primary Industries biosecurity system entry levy of $19.98 (GST inclusive)'.

Further evidence suggesting that revenue maximisation is not the primary concern is provided by the fact that when the GST rate was increased from 0.125 in 2010, the *de minimis* was raised from $50 to $60. This ensured that the threshold value applied to units remained constant at $400. From (1), net revenue maximisation would alternatively have suggested a lower threshold. The way in which allowance can be made for a much broader objective is considered in the following section.

3 The Optimal Threshold

This section describes, in general terms, the condition required to achieve an optimal GST threshold, where 'optimal' is defined more broadly to include compliance as well as administrative costs, and the efficiency effect (reflected in the excess burden) of taxation. In addition, the marginal benefit from a change in the tax structure is considered to be measured in terms not simply of the net revenue obtained, but of the perceived benefits from spending that revenue. As explained

6 See the Customs Service web site: http:/www.whatsmyduty.org.nz/faq.

in Section 1, the approach does not begin by specifying a form of social welfare function and structural model of the economy. It instead takes the 'higher level' approach of simply stating the first-order conditions for an optimal, in terms of concepts familiar from the public finance literature.

This method has been explored more recently, for example by Saez (2001), Saez and Stantcheva (2012), Brewer *et al.* (2010) and Mirrlees (2011) in the context of income taxation, and by Keen and Mintz (2004) in the context of the threshold value of earnings above which firms must be registered for GST. However, each contribution begins from a different statement of the condition, rather that setting out the principles involved.[7] It is therefore useful to explain the basic approach in some detail here.

The equimarginal condition states that, from the point of view of the decision maker and for all tax structure components, the marginal benefit from taxation must equal the marginal cost. On the marginal benefit side, consider starting from a given threshold value of y^*, as defined above, and introducing a small increase. This increase leads to a reduction in tax revenue, as a result of units at the margin no longer being subject to GST. This revenue change is the marginal revenue, MR, arising from the threshold increase. In addition, the fact that some units are no longer subject to GST means that there is also a reduction in administrative costs, denoted MAC. Thus there is a net change in revenue of $(MR - MAC)$.

An obvious consequence is that the government has less revenue to spend. This does not directly measure the marginal loss from the threshold increase, since it is necessary to consider the valuation of foregone benefits arising from public expenditure. Instead of an explicit statement of the value judgement of the decision maker in the form of a social welfare function, these are described in terms of the 'marginal value of public funds', $MVPF$: this is the value attached to an extra unit of government expenditure by the decision maker.[8] Hence the marginal benefit from a change in the tax structure is equal to $MVPF$ multiplied by $MR - MAC$.

In terms of the marginal cost, this depends on the weight the decision maker attaches to the losses or gains incurred by consumers and suppliers. Consumers

7 For comparisons and further examination of the approach in the context of income taxation, see Creedy (2015).

8 No explicit reference is made to the form of expenditure, since in the optimal structure, all adjustments are made to both the tax and expenditure side to achieve the equimarginal condition for all cases.

who were at the initial threshold (whose units had the same value as the threshold) benefit from not having to pay GST; this is reflected in the MR. They therefore experience an effective reduction in the price, which gives rise to an associated welfare change, expressed in money terms as WC. In the present context of a GST threshold increase, this welfare gain comprises the tax reduction along with the (now negative) 'marginal excess burden', MEB, of the tax. Hence, for consumers at the margin, the welfare change is $WC = MR + MEB$. In this partial equilibrium view, a rise in the threshold provides a gain to marginal consumers in excess of the reduction in the tax paid. However, an alternative general equilibrium perspective, in which all domestically produced goods are subject to GST, would argue instead that the threshold increase involves a movement away from a uniform commodity taxation structure, and therefore involves a loss of efficiency.[9] This aspect is discussed further below, where both cases are considered.

The threshold increase also means that for suppliers there is a reduction in their total compliance cost: this change is denoted MCC. In this context the compliance cost is borne by overseas suppliers, so it is not clear how these would be viewed by domestic policy makers. This also depends on perceptions about the extent to which such costs may be passed to consumers.

These effects on consumers and producers are not necessarily assessed purely in terms of their absolute money values. The decision maker also has a view about a weight attached to them, depending on the context. The relevant value judgements may be expressed in terms of what is generally called the 'marginal social value', MSV. This is likely to be influenced by the perceived distributional consequences of the tax change. For example, if the tax affects high-income groups and the decision maker is highly averse to inequality, a lower weight is attached to the welfare change.[10] The marginal cost from a change in the tax structure is thus MSV multiplied by $WC + MCC$.

The first-order condition for maximising the implicit social welfare function is that the marginal cost of the extra public expenditure is equal to the marginal benefit,

[9] Elimination of the threshold (that is, its reduction to zero) would result in uniform taxation and thus an efficiency gain despite the tax increase. In the absence of a general equilibrium model capable of dealing with these interactions, the following analysis uses only a rough approximation.

[10] Without a structural model, the distributional consequences are not evident. In the context of income taxation, consideration can be given to those falling into different marginal income tax brackets. But even then, views are not always transparent; see Creedy (2015) for further discussion.

or:[11]

$$(MSV)\,(WC + MCC) = (MVPF)\,(MR - MAC) \tag{2}$$

This condition, for an optimal tax and expenditure system, must apply to all tax components and all expenditure types. Rewrite this condition as:

$$\frac{MVPF}{MSV} = \frac{WC + MCC}{MR - MAC} \tag{3}$$

The right hand side of this expression is the sum of the marginal welfare change and the marginal compliance cost per unit of extra net revenue foregone by the rise in the threshold. The term, $\frac{WC+MCC}{MR-MAC}$, is often referred to as the marginal cost of funds, MCF.[12] Hence the first-order condition can be rewritten more succinctly as:

$$\frac{MVPF}{MSV} = MCF \tag{4}$$

For convenience, define $\delta = MVPF/MSV$, and using $WC = MR + MEB$, (4) can be rewritten as:

$$\delta = \frac{MR + MEB + MCC}{MR - MAC} \tag{5}$$

Given a value of δ, it is possible to envisage gradually raising the GST threshold (thereby gradually reducing GST net revenue) until the condition in (4) is satisfied.[13] Considering only cases where $MR - MAC > 0$, the MCF is likely to be relatively high when the threshold is very low, a small increase in the threshold from a low value produces low net revenue relative to the welfare and compliance costs involved. The MCF then decreases as the threshold is increased, until the first-order condition is satisfied.

It is likely that the decision maker attaches a value to $MVPF$ greater than unity; that is, a dollar in the hands of the government is valued as being worth more than the dollar in the hands of taxpayers. For example, extra government expenditure may be thought to give rise to externalities or subsidise merit goods. Hence, even if it assumed that a dollar of welfare and compliance loss is valued fully as a dollar (the decision maker attaches the same value as those taxpayers affected), $\delta > 1$ is the most appropriate range to consider.

11 As mentioned above, the analysis does not impose a total revenue requirement, so no constraint and associated Lagrangean is required in considering the first-order condition.

12 On this concept see, for example, Creedy (1998) and Dahlby (2008).

13 Depending on the context, the first-order condition may give rise to multiple solutions. Similarly, solutions are not necessarily guaranteed to satisfy second-order conditions, and may generate mimimum rather than maximum social welfare (that is, in terms of the decision makers' evaluation function). However, these possibilities are not relevant in the present context.

For example, suppose value judgements are such that $\delta = 1.2$ and optimality conditions apply to other tax parameters (including the GST rate itself). Suppose that revenue from these alternative sources could be increased without raising their MCF.[14] There is thus no point in setting a GST threshold such that the MCF is greater than 1.2: the extra revenue can be obtained more efficiently elsewhere, by assumption. Similarly, a threshold which gives a MCF of less than 1.2 would not be chosen. In other words, an optimal tax *system* is one in which the MCF is equalised across tax sources.

4 Marginal Changes

This section provides the structure needed to give more content to the general optimality condition discussed in the previous section. The various cost and revenue components are derived in subsection 4.1, which follows Keen and Mintz (2004) closely, despite the different context. The welfare changes are examined in subsection 4.2.

4.1 Revenue, Administrative and Compliance Costs

Suppose the value of an imported unit is y, with arithmetic mean, $\bar{y}$, distribution function $F(y)$, and associate density function, $f(y)$. The total number of units imported is n. If the tax-exclusive GST rate is τ, total GST revenue, R, is expressed as:

$$\begin{aligned} R &= \tau n \int_{y^*}^{\infty} y dF(y) \\ &= \tau n \bar{y} \{1 - F_1(y^*)\} \end{aligned} \tag{6}$$

where $F_1(y^*)$ represents the proportion of the total value contributed by those units with $y < y^*$, and these form a proportion, $F(y^*)$ of the total number of units.[15] Hence, marginal revenue, MR, resulting from an *increase* in y^*, is given by:

$$MR = \frac{dR}{dy^*} = -\tau y^* n f(y^*) \tag{7}$$

[14] This is somewhat unrealistic, but such general equilibrium considerations are, as already indicated, beyond the scope of the present analysis.

[15] In general, the term $F_1(y)$ denotes the 'first moment distribution function' of y, defined as $F_1(y) = \int_0^y u dF(u) / \bar{y}$.

This is simply (the negative of) the product of the tax paid on marginal units, τy^*, and the number of those units, $nf\left(y^*\right)$. As discussed above, MR is negative since the marginal increase in the threshold takes some units out of the tax 'net'. If there is an increase in demand for those items formerly at the threshold, this clearly has no effect on revenue. In addition, there is no reason to expect any change in demand for units remaining above the threshold.[16]

A marginal increase in y^* is also expected to reduce administrative costs. Suppose the administrative cost per unit subject to GST is c_a: this average cost is assumed to be fixed, independent of the number of units subject to taxation. The total administrative cost, A, is thus given by:

$$A = c_a n \left\{1 - F\left(y^*\right)\right\} \tag{8}$$

and the marginal administrative cost, MAC, is:

$$MAC = \frac{dA}{dy^*} = -c_a n f\left(y^*\right) \tag{9}$$

Again this is negative since an increase in the threshold is being considered: it is simply the cost per unit multiplied by the number of units, $nf\left(y^*\right)$, which no longer need to be processed.

The increase in the threshold is also associated with lower costs imposed on suppliers. Suppose the compliance cost per unit subject to GST is c_c, and is assumed to be fixed. The total compliance cost, C, is:

$$C = c_c n \left\{1 - F\left(y^*\right)\right\} \tag{10}$$

so that the marginal compliance cost is:

$$MCC = \frac{dC}{dy^*} = -c_c n f\left(y^*\right) \tag{11}$$

4.2 Marginal Welfare Changes

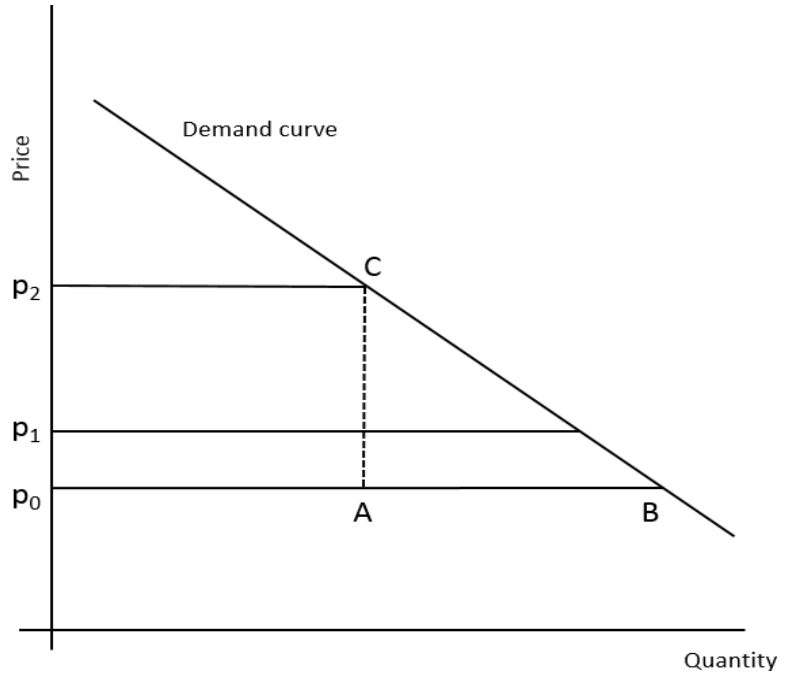
This subsection considers the welfare change arising from a marginal increase in the GST threshold. On the assumption that such units form a small part of each individual's budget, any 'income effects' of the effective price change, arising from

[16] As suggested above, if all domestically supplied goods are subject to GST, substitution towards imported goods, as a result of the threshold increase, will reduce tax revenue further.

items at the margin no longer being liable for GST, can be ignored. Hence welfare changes can be measured in terms of consumers' surplus.[17]

Consider first the standard partial equilibrium approach, and suppose that the supply curve is horizontal: that is, each consumer can purchase any number of units without any change in price. Figure 1 magnifies the effect of a small change, whereby the demand curve around an existing threshold is approximated by a straight line.[18] The price in the absence of compliance costs and tax is p_0. If the compliance cost is passed to consumers, the price becomes p_1 and the addition of a unit indirect tax, imposed at the rate t per unit, leads to a final consumer price of p_2.

Figure 1: Welfare Changes



This excess burden, meb, is the area of the triangle, ABC, and is equal to:

$$meb = \frac{1}{2}\Delta q \Delta p \tag{12}$$

The proportional change in price is equal to $\Delta p/p_0 = (t + c_c)/p_0 = \tau + c_c/p_0$, where, as above, τ is the *ad valorem* GST rate. Making the strong but convenient assumption that the elasticity, $|\eta| = \left|\frac{\Delta q}{q_0}\frac{p_0}{\Delta p}\right|$, is constant and the same for all types

[17] The consumers' surplus measure uses, as below, the uncompensated own-price demand elasticity. Welfare measures based on equivalent or compensating variations would use the compensated elasticity.

[18] The illustrations below effectively assume that the demand elasticity is constant, implying a demand curve that is instead linear in the logarithms. However, the approximation is reasonable for the marginal changes that are relevant for considering marginal excess burdens.

of good, the change in quantity in absolute terms is therefore:

$$\Delta q = |\eta| \, q_0 \left(\tau + \frac{c_c}{p_0} \right) \tag{13}$$

Substituting this expression into (12), again using $\tau = t/p_0$, and setting $p_0 q_0 = y^*$, gives:

$$meb = \frac{|\eta|}{2} y^* \left(\tau + \frac{c_c}{p_0} \right)^2 \tag{14}$$

This measures the change in the excess burden for each individual at the margin. Hence for the $nf\,(y^*)$ units at the margin, the total change, MEB, is simply equal to $MEB = (meb)\, nf\,(y^*)$.

Under this partial equilibrium view, a reduction in the threshold leads to a positive excess burden as a result of the higher consumer price for goods brought into the tax net. Similarly a rise in the threshold produces a negative excess burden, reflecting a welfare gain in addition to the reduced tax paid. However, these changes are likely to be reversed in a general equilibrium framework in which all domestically supplied goods are taxed, so that a reduction in the threshold involves a reduction in indirect tax distortions. The implications of both views are examined below.

5 The GST Threshold

Using the results in Section 4, (5) becomes:

$$\delta = \frac{(\tau y^* + c_c) + \frac{|\eta|}{2} y^* \left(\tau + \frac{c_c}{p_0} \right)^2}{(\tau y^* - c_a)} \tag{15}$$

Hence the terms in $nf\,(y^*)$ cancel and the optimal threshold is the solution, y^*, to this nonlinear equation. The solution to (15) can be simplified by assuming that c_c/p_0, in the term $\left(\tau + \frac{c_c}{p_0} \right)^2$, can be neglected, as compliance costs are likely to be small in relation to the threshold.[19] This amounts to assuming that shifting compliance costs to consumers in the form of higher prices has a negligible effect on welfare changes, relative to that of GST. This gives y^* simply as:

$$y^* = \frac{\delta c_a + c_c}{\tau\,(\delta - 1) - |\eta|\, \tau^2/2} \tag{16}$$

[19] Calculations based on orders of magnitude used in the illustrations below showed that the approximation is very close to the exact value (obtained by numerically solving the equation). Values for the optimal threshold differ by only around $1.

The optimal threshold does not depend on the form of the distribution of unit values or their total number. This is a very convenient result in view of the difficulty of obtaining information about the complete distribution of values. Furthermore, it means that inevitable changes in the distribution over time would not lead to changes in the optimal threshold. The implications of allowing average administrative costs per package to vary with y^* are discussed briefly in the Appendix.

Clearly the optimal threshold is zero only in the unrealistic case where compliance costs are ignored and administrative costs are zero. The New Zealand Retailers Association (2011, p. 12) argued that the *de minimus* should 'be set at zero and that the focus goes onto finding an administrative solution'. But of course administrative costs could never be reduced to zero. It also suggests (2011, p. 12) that, 'the underlying purpose of de minimis is to exempt some from the burden of tax – we disagree with this underlying purpose'. This also implies that they believe there should be no threshold relating to GST registration for NZ firms.[20]

An increase in the absolute demand elasticity, $|\eta|$, results in a higher threshold, y^*, as a result of the higher excess burden associated with the tax. For $\delta > 1$ the threshold, y^*, exceeds the revenue-maximising value of c_a/τ. However, if it is argued that there is a welfare gain from reducing tax distortions in a general equilibrium framework where all domestically supplied goods are subject to tax, an approximation may be obtained (in the absence of a full structural model) by changing the sign on $|\eta|$ in (16). This implies that a higher elasticity produce a lower threshold and thus more tax collected from this source. In this case it is possible for y^* to be less than the revenue-maximising value if the absolute value of η is sufficiently large – that is, if the efficiency gains from more uniform prices outweigh the administrative and compliance costs.

6 Some Illustrative Examples

This section uses the result established in the previous section to examine the implications of adopting alternative values of δ, the elasticity of demand, $|\eta|$, and

[20] Ignoring the excess burden of taxation by setting $\eta = 0$ gives the result corresponding to that in Keen and Mintz (2004, p. 563). The only difference is that they introduce a term, v, to reflect the proportion of sales of firms that is value-added. They write $v(y)$, but they clearly assume that it is constant, otherwise y^* would be the root of a more complex equation, since y^* would also appear, in $v(y^*)$.

the cost components. Information about compliance costs is extremely difficult to obtain, and values reported by Hintsa *et al.* (2014) vary widely.[21] A higher compliance cost unambiguously increases the optimal threshold, as seen from equation (16). All calculations are obtained for the current GST rate of $\tau = 0.15$.

In considering appropriate values of δ, this obviously depends on the value judgements of the decision maker and so only the implications of adopting alternative values can be considered. A higher value of δ implies that public projects yield higher benefits relative to the perceived costs, and relatively more tax can be obtained from the source: hence the GST threshold value per unit can be lower. On the other hand, if public projects are not valued so highly in relation to the cost imposed on taxpayers, less tax should be collected from this source and the threshold is relatively high.

Reference is sometimes made to a marginal cost of income taxation of around 1.2, with lower values for indirect taxes.[22] However, this raises difficulties in view of the fact that precise estimates are not available for New Zealand. International evidence, summarised for example by Dahlby (2008), gives a wide range of values for different tax sources. In addition, marginal excess burdens, and hence the marginal cost of funds, vary substantially among different demographic groups.

The variation in the optimal threshold for variations in δ and for two levels of c_a is shown in Figure 2. The illustrations are based on values of $c_c = 5$ and $c_c = 0$. The constant administrative cost takes two values of 5 and 4 per unit. Data for current administrative costs are not available, although these values are much lower than the current *de minimis* on the grounds, discussed above, that the current system is not based on revenue maximisation (so that the *de minimis* is not a guide). The demand elasticity is set at $|\eta| = 0.1$ in each case. Steel *et al.* (2013), in a review of issues and literature, report a very wide range of elasticity estimates: the assumption made here is representative of values reported, and the sensitivity of results is also examined below.

[21] For a broad review of literature and details relating to New Zealand firms, see Gupta and Sawyer (2015). However, they do not provide details which could be used for the present analysis.

[22] This perception was part of the rationale for changing the tax mix in New Zealand in 2010. for examples relating to direct taxation in Australia, see Creedy *et al.* (2011). Estimates of welfare costs of excise taxes in New Zealand for different groups are reported in Creedy and Sleeman (2005).

Figure 2: Relationship Between Optimal Threshold and $\delta = MVPF/MSV$

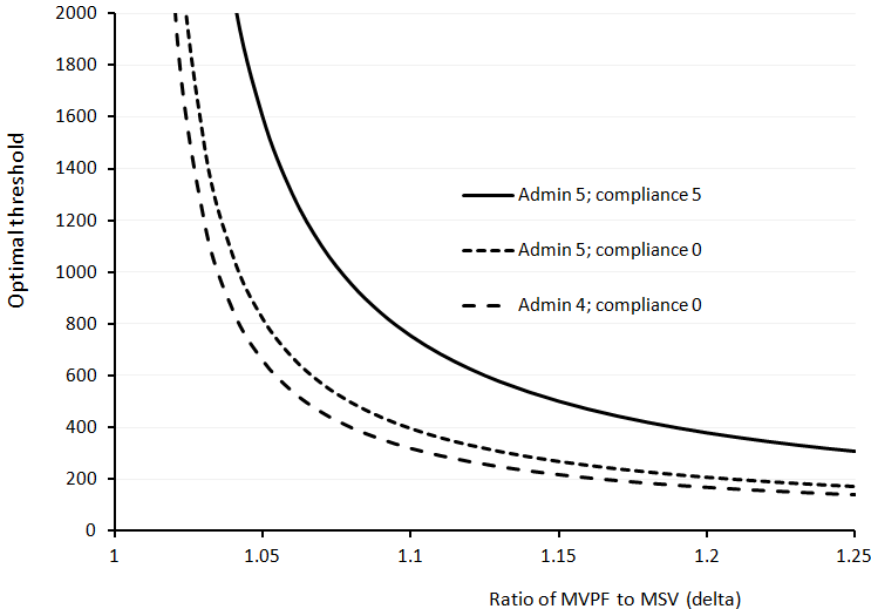
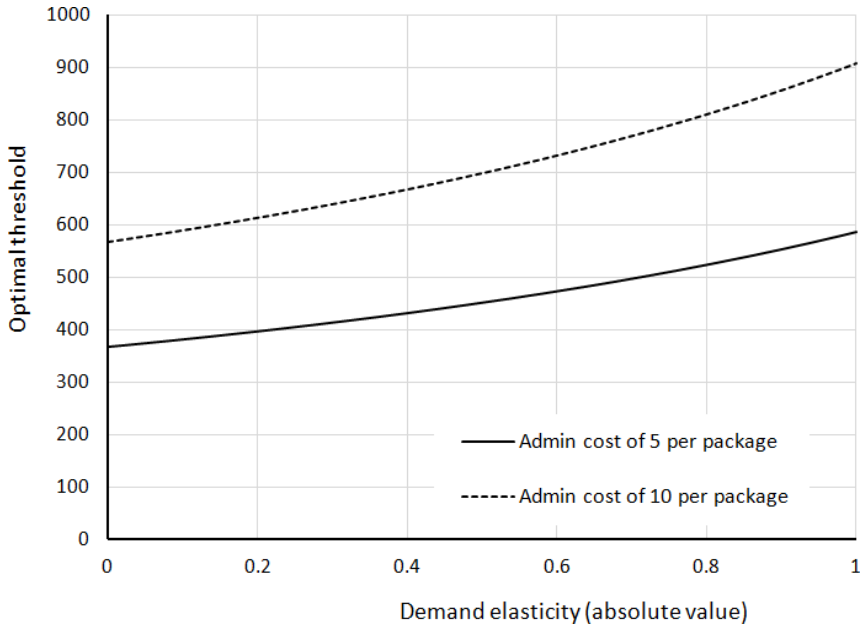


Figure 3: Relationship Between Optimal Threshold and Demand Elasticity



For this absolute elasticity, and the low administrative cost of 5 per unit, the current threshold of 400 is consistent with a value of δ of 1.19. If the compliance cost is neglected, by setting $c_c = 0$, the same administrative cost gives the current threshold as optimal with the lower value of $\delta = 1.1$. The optimal threshold is not very sensitive to variations in δ above about 1.15, but for lower values there is more sensitivity. If the administrative cost is higher at 10 per unit, the values of δ needed for the optimal threshold to be equal to the current threshold are respectively 1.29 and 1.19 for c_c of 5 and 0. By comparison, the higher cost of $c_a = 10$ implies that the values of δ of 1.19 and 1.1 give optimal thresholds of 617 and 793 respectively (for compliance costs of 5 and 0). With a higher absolute elasticity, the profiles shift upwards. The sensitivity of the optimal GST threshold to the demand elasticity is shown in Figure 3, for two levels of c_a, and for $\delta = 1.1$, with $c_c = 5$.

Consider the values of δ required for the optimal threshold to be $200, which is half of the current threshold. With $|\eta| = 0.1$, and $c_a = c_c = 0.5$ this would require $\delta = 1.41$, although if compliance costs are neglected, this drops to 1.21. However, if $c_a = 10$, the required δ values are respectively 1.76 and 1.51. These values are of course higher if the elasticity is higher. The assumption of a constant average administrative cost is reasonable for small changes over a range of threshold values. But in practice the consideration of such a large reduction in the threshold, involving a substantial increase in the number of items to be processed, may require additional storage and other facilities, and even the introduction of new processes (for example, registration of certain suppliers). Any proposal for a large reduction in the threshold would therefore need to be clear about how the implications for costs.

It is also useful to consider the case where a reduction in the threshold is considered to produce welfare gains (that is, a negative excess burden) by moving towards a more uniform tax structure. In this case a higher elasticity, in absolute terms, would imply a lower value of δ needed for any given y^* to be optimal. The current threshold of $400 is optimal, when $|\eta| = 0.1$, and $c_a = c_c = 0.5$, for $\delta = 1.17$ compared with 1.19 in the partial equilibrium case above. The sensitivity is shown in Table 1, which shows values needed to achieve an optimal threshold of $200.

The case for halving the current threshold would thus seem to require establishing some combination of the following characteristics: a relatively low administrative cost per unit; a relatively high demand elasticity (in this general equilibrium context

Table 1: Values of Delta Needed for Optimal Threshold of 200: Reduction in Threshold Assumed to Lead to Efficiency Gains (Negative Excess Burden)

	$\|\eta\| = 0.1$		$\|\eta\| = 0.5$		$\|\eta\| = 1.0$	
	$c_c = 0$	$c_c = 5$	$c_c = 0$	$c_c = 5$	$c_c = 0$	$c_c = 5$
$c_a = 5$	1.19	1.39	1.155	1.355	1.11	1.31
$c_a = 10$	1.49	1.74	1.440	1.690	1.39	1.66

of Table 1); low compliance costs (or their neglect) and; value judgements such that δ is relatively high (or establishing that the marginal cost of funds from other tax sources is relatively high). The required values are shown to be highly sensitive to administration and compliance costs and to depend on the way excess burdens are treated (in partial or general equilibrium contexts), though they are less sensitive to the elasticity of demand.

7 Conclusions

This paper has examined the determination of the optimal threshold value for Goods and Services Tax (GST) for imported units arising from internet orders. At the optimal threshold, the marginal cost of funds from GST is equated to the ratio of the marginal value of public funds to their marginal social value, reflecting the value judgements of a decision maker. The marginal cost of funds allows both for compliance costs and the marginal excess burden of taxation. This concept of an optimal threshold therefore involves a higher threshold than that resulting from simply the maximisation of tax revenue net of administrative costs.

The condition for an optimal threshold is derived from the general first-order condition for an optimal *tax system*, namely that the perceived marginal cost of taxation is equal to the marginal benefit from public expenditure, for all taxes and related parameters and all types of expenditure. This condition clearly does not hold in practice. In considering just one component of the GST structure, the threshold value for imported units, there is nevertheless an implicit assumption that the remainder of the tax structure is in fact optimal. For example, the marginal cost of funds from income taxation is equated to the required ratio, so that in an optimal system, the GST threshold should be adjusted so that its marginal cost of funds is equal to that from the alternative. If it is lower, the threshold should lowered and more tax obtained from imported units, and if it is higher, the threshold should be

raised and any additional required revenue obtained from the alternative source.

It was found that if the average and marginal administrative and compliance costs are constant, the determination of the optimal GST threshold does not depend on either the number of units imported or its distribution by value. This is a useful property because it means that changes in the distribution over time would not give rise to a need to adjust the threshold. These costs are unlikely in practice to be constant over the whole range of possible thresholds, but may be considered to be constant over the relevant range: that is, very low and very high thresholds are ruled out.

Precise details about the cost components and the demand elasticity, along with the marginal cost of funds from alternative tax sources, are extremely difficult to obtain for New Zealand. In the absence of reliable estimates, illustrative numerical values were reported, showing the sensitivity to administrative costs, the demand elasticity and, importantly, value judgements.

It must be acknowledged that the information needed to determine an optimal threshold is not available and is not likely to become available in the near future. However, this is of course not unusual in public finance analyses: the same is true regarding, for example, the income tax and benefit structure, and excise taxes. An analysis of this kind can provide an indication of the relevant relationships and the orders of magnitude involved. There is no value-free or simple way to determine an optimal value, but the analysis suggests that the case for substantially reducing the existing threshold depends on the argument that administrative costs can be reduced to relatively low levels[23] and that the marginal cost of funds from alternative sources is relatively high.

[23] It may be that such costs can be substantially reduced by the use of registration of major foreign sellers. The various alternative administrative approaches are beyond the scope of the present paper.

Appendix: Non-constant Administrative Costs

The implications of allowing average administrative costs per package to vary with y^* can be seen as follows. Write $c_a(y^*)$ to indicate that c_a is a function of the threshold. it can be shown that the denominator of (15) becomes:

$$\{\tau y^* - c_a(y^*)\} - \eta_{c_a,y^*}\left[c_a(y^*)\left\{\frac{1-F(y^*)}{y^* f(y^*)}\right\}\right] \tag{A.1}$$

Here, η_{c_a,y^*} denotes the elasticity of the average administrative cost with respect to the threshold. The term in curly brackets is the ratio of the number of packages liable to GST divided by the value of packages at the margin. The term in square brackets is the ratio of the total administrative cost to the value of packages at the margin. In this case changes over time in the form of the size distribution of packages by value lead to changes in the optimal *de minimus*.

Even in the much simpler case where the objective is net revenue maximisation, the threshold can be shown to be the solution to the nonlinear equation:

$$1 - \frac{\tau y^*}{c_a(y^*)} = \eta_{c_a,y^*}\left[\frac{1-F(y^*)}{y^* f(y^*)}\right] \tag{A.2}$$

When $\eta_{c_a,y^*} = 0$, the simple result mentioned in the introduction applies, where $y^* = c_a/\tau$. An allowance for varying average costs clearly introduces considerable complexity, even in the otherwise simple case of maximising net revenue.

If c_a is not constant, the term, $\delta\eta_{c_a,y^*}\left[c_a(y^*)\{1-F(y^*)\}/y^* f(y^*)\right]$ must be added to the numerator on the right hand side of equation (16). The solution to the resulting nonlinear equation again clearly depends on the form of the distribution of package values.

References

Brewer, M., Saez, E. and Shephard, A. (2010) Means-testing and tax rates on earnings. In *Dimensions of Tax Design* (chair: Sir James Mirrlees), pp. 90-173. Oxford: Oxford University Press for the Institute for Fiscal Studies.

Creedy, J. (1998) *Measuring Welfare Changes and Tax Burdens*. Cheltenham: Edward Elgar.

Creedy, J. (2015) The elasticity of taxable income, welfare changes and optimal tax rates. *New Zealand Economic Papers*, 49, pp. 227-248.

Creedy, J. and Sleeman, C. (2005) Excise taxation in New Zealand. *New Zealand Economic Papers*, 39, pp. 1-35.

Creedy, J., Hérault, N. and Kalb, G. (2011) Measuring welfare changes in behavioural microsimulation modelling: accounting for the random utility component. *Journal of Applied Economics*, 14, pp. 5-34.

Dahlby, B. (2008) *The Marginal Cost of Public Funds*: *Theory and Applications*. Cambridge; Mass: The MIT Press.

Gupta, R. and Sawyer, A.J. (2015) The costs of compliance and associated benefits for small and medium enterprises in New Zealand: Some recent findings. University of Canterbury.

Hintsa, J., Mohanty, S., Tsikolenko, V., Leischnig, A., Kähäri, P., Hameri, A.P. and Cadot, O. (2014) The import VAT and duty de-minimis in the European Union – where should they be and what will be the impact? *Final Report, Cross-border Research Association, Lausanne*.

Inland Revenue (2015) GST: Cross-border services, intangibles and goods. Wellington: A Government Discussion Document available at: http://taxpolicy.ird.govt.nz/publications/2015-dd-gst-cross-border/overview.

Keen, M. and Mintz, J. (2004) The optimal threshold for a value-added tax. *Journal of Public Economics*, 88, pp. 559-576.

Mirrlees, J.A. (1971) An exploration in the theory of optimal income taxation. *Review of Economic Studies*, 38, pp. 175-208.

Mirrlees, J.A. (Chair) (2011) *Tax by Design*. Oxford: Oxford University Press for the Institute for Fiscal Studies.

New Zealand Retailers Association (2011) Submission prepared by the NZ Retailers Association for the NZ Customs Service. Wellington: NZ Retailers Associations.

Saez, E. (2001) Using elasticities to derive optimal income tax rates. *Review of Economic Studies*, 68, pp. 205-229.

Saez, E. and Stantcheva, S. (2012) Generalized social marginal welfare weights for optimal tax theory. *National Bureau of Economic Research Working Paper*, no. 18835.

Steel, W., Dalglish, T., Marriott, L., Gemmell, N. and Howell, B. (2013) E-Commerce and its effects on the retail industry and government revenue. *New Zealand Institute for the Study of Competition and Regulation, Victoria University of Wellington*.