Measuring the Deadweight Costs of Corporate Income Tax Thresholds under Monopolistic Competition

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Measuring the Deadweight Costs of Corporate Income Tax Thresholds under Monopolistic Competition

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27 November 2025

Abstract

This paper extends the model of Dixon et al. (2004) by introducing taxes on non-labour income with thresholds into a simple firm-size framework. The modification allows analysis of how threshold-based corporate tax provisions distort firms' output decisions and create deadweight losses. By linking firm counts and average costs to the presence of a tax threshold, the model quantifies the efficiency costs associated with discontinuities in the effective tax schedule. The framework provides a transparent way to assess how threshold policies influence aggregate efficiency without relying on a full general equilibrium setting.

JEL Codes: H21, H22, H25, L11.

Keywords: Monopolistic competition; Firm entry and scale; Tax efficiency; Tax incidence; Corporate income tax; Thresholds.

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1. Introduction

This paper examines the efficiency costs created by turnover-based thresholds in the corporate income tax system. Thresholds of this kind are commonly used to simplify administration or provide targeted support for smaller businesses. However, by creating abrupt changes in effective tax rates, they can also distort business decisions about scale and output, leading to higher resource costs across the economy.

To assess these effects, we develop a detailed firm-size model that maps the distribution of firms around a turnover threshold of A$1 billion (equivalent to about A$400 million in annual capital rents). The model builds on Dixon et al. (2004), who model the impact on firm behaviour of labour (payroll) tax thresholds. Herein, we generalise this to allow for corporate income tax thresholds and describe how firms adjust their output and cost structures when a corporate income tax surcharge applies only above this threshold, while keeping overall surcharge revenue constant.

This approach allows us to estimate the efficiency, or "deadweight," cost of the threshold—measured as the increase in resource use required to produce the same level of output.

2. The model

Assume a production constraint of the form:

$$F(A, X_1, X_2) = AX_1^{\beta} X_2^{1-\beta} = Y(Q)\,, \tag{1}$$

where

$$Y(Q) = Q + a(b - Q) + aQ \ln\left(\frac{Q}{b}\right)\,, \tag{2}$$

and

A>0 is technology;

X_1 and X_2 are factor inputs, specifically labour and capital;

Q is output;

0<β<1 is the labour factor cost share, set to 0.6 herein; and,

a and *b* are positive parameters,

The total cost of production *C* for a given firm is:

$$C = W_1X_1 + W_2X_2 + D_2\, T_2(W_2X_2 - H_2)\,, \tag{3}$$

where

$$D_2 = \begin{cases} 1 & X_2 > H_2 \\ 0 & X_2 \leq H_2 \end{cases}, \tag{4}$$

and

T_2 is the applicable capital tax rate;

H_2 is a threshold expressed in A$m on payments of the capital tax;

W_1 and W_2 are the unit factor costs.

We can redefine this slightly, in terms of the effective capital costs faced by firms:

$$\widetilde{W_2} = W_2(1 + D_2\,T_2), \tag{5}$$

leaving us with

$$C = W_1X_1 + \widetilde{W_2}X_2 - D_2\,T_2H_2\,, \tag{6}$$

To find the market equilibrium under perfect competition, we can minimise total cost (6) subject to the production function constraint in (1) and (2). Because we are using Cobb-Douglas technology, we our first-order conditions yield:

$$\frac{X_2}{X_1} = \frac{1-\beta}{\beta} \cdot \frac{W_1}{\widetilde{W_2}} = k\,. \tag{7}$$

Substituting (7) into (1) and (2) yields:

$$AX_1^{\beta}(kX_1)^{1-\beta} = AX_1k^{1-\beta} = Y(Q)\,, \tag{8}$$

or

$$X_1 = \frac{Y(Q)}{Ak^{1-\beta}}\,, \qquad X_2 = \frac{Y(Q)}{Ak^{-\beta}}\,. \tag{9}$$

We can also substitute (7) and (9) into the cost function in (6). Starting with (9):

$$C = X_1 \cdot \left(W_1 + \widetilde{W_2}k\right) - D_2\,T_2H_2\,, \tag{10}$$

And then, using (7) we can write W_1 in terms of W_2 and k:

$$W_1 + \widetilde{W_2}k = \left(1 + \frac{1-\beta}{\beta}\right) = W_1\frac{1}{\beta}. \tag{11}$$

With (9) used to substitute for X_1 and (11) used to substitute for W_1 in (10), the cost simplifies:

$$C(Q) = W_1\frac{1}{\beta} \cdot \frac{Y(Q)}{Ak^{1-\beta}} - D_2\,T_2H_2\,. \tag{12}$$

One can substitute for k using (7) to determine the unit cost parameter c_{unit}:

$$C(Q) = c_{unit}\left(W_1, \widetilde{W_2}\right) \cdot Y(Q) - D_2\,T_2H_2\,, \tag{13}$$

where

$$c_{unit}\left(W_1, \widetilde{W_2}\right) = \frac{1}{A}\beta^{-\beta}(1-\beta)^{-(1-\beta)}W_1^{\beta}\widetilde{W_2^{1-\beta}}. \tag{14}$$

From here, it is straightforward to define the average cost:

$$AC(Q) = \frac{C(Q)}{Q} = c_{unit}\left(W_1, \widetilde{W_2}\right) \cdot \frac{Y(Q)}{Q} - \frac{D_2\,T_2H_2}{Q}\,, \tag{15}$$

and the marginal cost:

$$MC(Q) = \frac{dC}{dQ} = c_{unit}\left(W_1, \widetilde{W_2}\right) \cdot \frac{dY(Q)}{dQ}\,. \tag{16}$$

At this stage, while the production technology is Cobb-Douglas, the input requirement is non-linearly related to output in general, via *Y(Q)*. Taking our specific functional form in (2) and substituting into (16) yields:

$$\frac{dY(Q)}{dQ} = \frac{d}{dQ}\left[a \cdot b + Q(1-a) + aQ\ln\left(\frac{Q}{b}\right)\right] = 1 + a \cdot \ln\left(\frac{Q}{b}\right), \tag{17}$$

or

$$MC(Q) = c_{unit}\left(W_1, \widetilde{W_2}\right) \cdot \left[1 + a \cdot \ln\left(\frac{Q}{b}\right)\right] . \tag{18}$$

Note that MC as defined here and for any $a>0$ will be a decreasing function of Q while $Q<b$, and will be an increasing function of Q for $Q>b$.

From (15), we can determine the optimal production point under perfect competition. Assuming free entry, and that firms continue to enter until average costs are driven to a minimum, we must solve:

$$\frac{dAC(Q)}{dQ} = 0 = c_{unit}\left(W_1, \widetilde{W_2}\right) \cdot \left[\frac{a}{Q} - \frac{a \cdot b}{Q^2}\right] + \frac{D_2\, T_2 H_2}{Q^2} . \tag{19}$$

Multiplying through by Q^2 and solving yields:

$$Q_{min,AC} = b - \frac{D_2\, T_2 H_2}{a \cdot c_{unit}\left(W_1, \widetilde{W_2}\right)} . \tag{20}$$

Given all parameters in the second term above are positive, the minimum of the average cost curve under a non-zero threshold lies to the left of efficient scale production, i.e., production per firm falls under a threshold ($H_2>0$). The numerator of the second term in (20) can be thought of as the refund received by a firm that must pay the (higher) company tax, due to the threshold being in place. How large is this numerator? Under the company tax scenario, we levy company tax at a rate of 10% of turnover above A$1b. While the threshold is expressed in turnover, because it is paid on capital (GOS) income, it makes sense to translate this to a threshold of A$400m=$H_2$ on capital income, assuming the economy-wide average capital/labour ratio. Thus, the numerator is a number like 40, and is only non-zero for firms whose total costs exceeds A$1b. For firms at the threshold, this is about 4% of total costs.

3. Market equilibria under no tax

At efficient scale production under no tax, we can set $T_2=0$ throughout. With $Q_{min,AC}=b$ and

$$AC_{min,T_2=0} = c_{unit}(W_1, W_2) = c_o , \tag{21}$$

where we have noted from (5) that the rental cost for the firm is equivalent to the pre-tax rental rate W_2 because we have assumed corporate taxes to be zero. To simplify proceedings further, we re-base output in terms of efficient scale out, $Q=nb$, and we can simplify *MC* and *AC* as:

$$AC(n) = c_o \cdot \frac{Y(n)}{nb} - \frac{D_2\, T_2 H_2}{nb} = c_o + a \cdot c_o \cdot \left(\ln n + \frac{1}{n} - 1\right), \tag{22}$$

$$MC(n) = c_o + a \cdot c_o \cdot [\ln(n)] . \tag{23}$$

With the above, we set a value for *a* in the following way. As per Dixon et al. (2004), given *a* sets the curvature of the AC curve, set it such that average cost is 4% above minimum when production is half efficient scale. Evaluating (22) at $n=0.5$ and $AC = 1.04 * AC_{min}$ yields:

$$a = \frac{0.04}{1 - \ln 2} \approx 0.13035. \tag{24}$$

In general, for any given demand function relating price, $P(Q)$, to sales, Q, we have:

$$AR(Q) = P(Q)\,, \tag{25a}$$

$$TR(Q) = P(Q)\ \cdot Q, \tag{25b}$$

$$MR(Q) = \frac{d}{dQ}[P(Q)\ \cdot Q] = P(Q) + \frac{dP(Q)}{dQ}Q. \tag{25c}$$

Under monopolistic competition, firms in the short-run choose their output level to maximise profit $\pi(Q)$:

$$\pi(Q) = TR(Q) - C(Q). \tag{26}$$

The first order condition yields:

$$0 = \frac{d\pi}{dQ} = MR(Q) - MC(Q), \tag{27}$$

showing that firms will produce up until the point where marginal revenue equals marginal cost. Under a downward sloping demand specification, this point coincides with $MR<P(Q)$ and $P(Q)>MC$. In the long-run and under free entry and exit, in addition to (27) profits are driven to zero by market entry, which yields from (26) the additional condition that:

$$P(Q) = AC(Q). \tag{28}$$

To make this concrete, assume a long-run environment where (27) and (28) hold, and assume a constant elasticity (isoelastic) demand function, where

$$P(Q) = K\ \cdot Q^{1/\eta}\,, \tag{29}$$

with $K>0$ and $\eta<-1$. The revenue functions are:

$$TR(Q) = P(Q) \cdot Q = P(Q) \cdot b \cdot n^{1+1/\eta}, \tag{30a}$$

$$AR(Q) = \frac{TR(Q)}{Q} = P(Q), \tag{30b}$$

$$MR(Q) = \frac{dTR(Q)}{dQ} = P(Q)\left[1 + \frac{1}{\eta}\right]. \tag{30c}$$

which is identical to the functional form in Dixon et al. (2004).

A convenient parameterisation of the demand and revenue curve is to set choose K in (29) such that at efficient scale $AR = AC = MC = c_o$. This condition is satisfied if we choose

$$K = c_o \cdot b^{-1/\eta}\,. \tag{31}$$

Now, assuming firms operate where $MR=MC$ producing n_o units of output relative to efficient scale. For exposition purposes, set c_o=1. This allows us to solve for n_o by solving:

$$n_o^{1/\eta}\left[1 + \frac{1}{\eta}\right] = 1 + a[\ln(n_o)]. \tag{32}$$

A general solution to (32) can be found in terms of the Lambert *W* function [see equation (33a)] while in cases where *a*=0, i.e., *Y*(*Q*) is a linear function of Q, the general solution simplifies to equation (33b):

$$n_o = \left[-\frac{a\eta^2}{\eta+1}W\left(-\frac{\eta+1}{\alpha\eta^2}e^{-1/(a\eta)}\right)\right]^{\eta} \qquad \forall a \geq 0, \qquad (33a)$$

$$n_o = (1+1/\eta)^{-\eta} \qquad a = 0. \qquad (33b)$$

Herein, we set *a* in accordance with (24). In addition, we set *η*=-5. One can either solve (32) numerically, or solve (33a) for *n.* Either approach yields n_o=0.51507. We can substitute this results into (22), (23), (29), (30b) and (30c) with c_o=1 and *a* set as in (24), which shows that our short-run solution satisfies the following conditions:

$$MR(n_o) \approx 0.91352 \approx MC(n_o)\,, \qquad (34a)$$

$$AR(n_o) \approx 1.1419 \approx P(n_o)\,, \qquad (34b)$$

$$AC(n_o) \approx 1.0362\,. \qquad (34c)$$

The firm studied here therefor maximises profit at n_o, because (34a) holds. Comparing (34b) and (34c), we see price exceeds average cost, so firms are earning short-run profits.

In the long-run, the situation for firms at n_o should induce firm entry, shifting *AR* in until (28) is satisfied. Next, we illustrate this. The first step is to enforce the long-run condition in (30c), by substituting (22) with c_o=1 for *P*(*Q*). For zero threshold, this yields:

$$MR(n_{LR}) = \left[1+\frac{1}{\eta}\right]\cdot\left[1+a\left(\ln n_{LR}+\frac{1}{n_{LR}}-1\right)\right]. \qquad (35)$$

Next, equating *MR* and *MC*, the equation we must solve for long-run output relative to efficient scale, n_{LR}, is :

$$1+a\ln(n_{LR}) \;= \left[1+\frac{1}{\eta}\right]\cdot\left[1+a\left(\ln n_{LR}+\frac{1}{n_{LR}}-1\right)\right]. \qquad (36)$$

You can show that the solution to (36) is

$$n_{LR} \approx 0.374225. \qquad (37)$$

At this point, we find:

$$MR(n_{LR}) \approx 0.87188 \approx MC(n_{LR})\,, \qquad (38a)$$

$$AC(n_{LR}) \approx 1.08985 \approx \frac{MC(n_{LR})}{0.8}\,, \qquad (38b)$$

Herein, we forced *P=AC* by substituting (22) into (30c). We can formalise the long-run demand curve and thus the *AR* curve in the long-run by equating (22) with (29) and solving for the implied value of *K* in the long-run, which yields the following long-run demand curve:

$$P(n) = 0.89535\,\cdot n^{1/\eta} = AR(n)\,. \qquad (39)$$

We can verify that, at n_{LR}, (39) yields a price and average revenue that align with average cost. We can also plot these functions. See Figure 1.

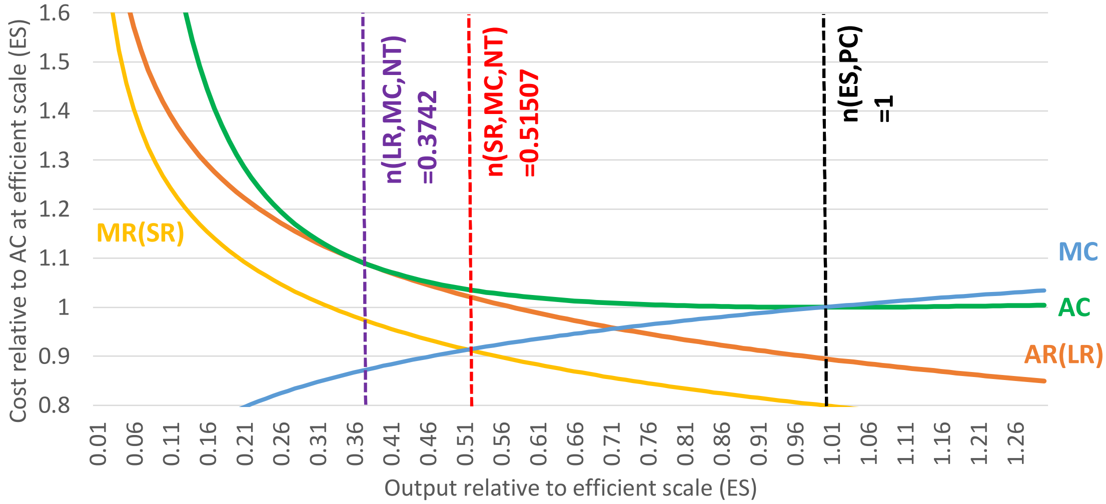

Figure 1: Cost and revenue cost curves along with market equilibria under monopolistic and perfect competition in the absence of taxes and thresholds.

4. Analysis in the presence of a flat company tax rate

The curves in Figure 1 are plotted for no threshold and zero company tax. How do these curves shift under a uniform company tax rate? To explore this, assume a 50% discount on the headline corporate income tax rate for exposition purposes, e.g., due to interest and depreciation deductions which trim the base. The tax rate is thus T_2=0.15, but D_2 is set at zero for all X_2. Under this assumption, (22) becomes:

$$AC(n) = (1 + T_2)^{1-\beta} \cdot c_o \cdot \frac{Y(n)}{nb} = (1 + T_2)^{1-\beta} \cdot AC_o(n), \tag{40}$$

while (23) is altered in similar fashion:

$$MC(n) = (1 + T_2)^{1-\beta} \cdot MC_o(n). \tag{41}$$

Both of *AC* and *MC* are therefore vertically translated. Under perfect competition, firms operate at the minimum of their *AC* curve; under a uniform corporate tax, we define this point as n_{UT}, and from (42) below we can see that the equation we solve to determine n_{UT} is identical to the equation we solve to determine the level of production under no corporate tax:

$$\frac{dAC(n_{UT,PC})}{dn} = (1 + T_2)^{1-\beta} \cdot \frac{dAC_o(n_{UT,PC})}{dn} = 0. \tag{42}$$

Under a uniform corporate tax of 15% and a capital share of 40%, we can therefore overlay the revised *AC* and *MC* curves in Figure 1, which are included alongside the other curves in Figure 1 in Figure 2.

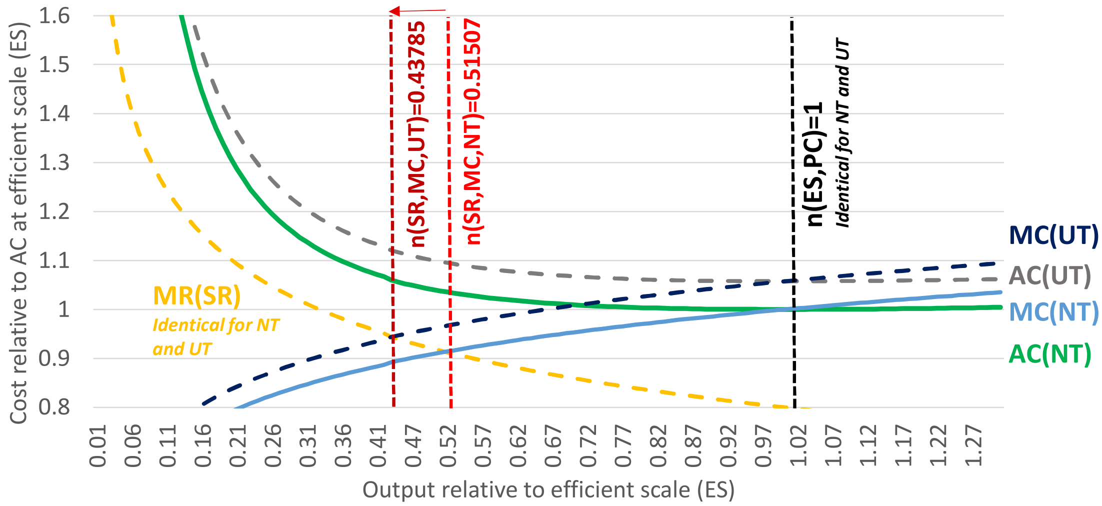

Figure 2: A comparison of the no tax and uniform tax short-run cost and revenue cost curves along with market equilibria under monopolistic and perfect competition, ignoring thresholds.

For clarity, we denote previous curves "NT" or no-tax in Figure 2, and new plots are labelled "UT" for uniform tax. As shown in Figure 2, under perfect competition, while by *MC(UT)* and *AC(UT)* are translated upwards relative to *MC(NT)* and *AC(NT)*, the translation does not alter their intersection point, or the minimum of the average cost curve; hence, firm output levels are unaltered relative to efficient scale under no-tax, however costs are higher.

Under monopolistic competition, in the short-run firms operate where *MC*=*MR* and maximise profits. Because *MR* is unchanged from (30c), the translation of the *MC(UT)* relative to *MC(NT)* reduces the short-run output level relative to the level under no-tax; see the intersection of *MR(SR)* and *MC(UT)* in Figure 2, which lies to the left of the intersection of *MR(SR)* and *MC(NT)*. Mathematically, this shift is evident when we equate (30c) with (41), yielding:

$$n_{UT,SR,MC}^{1/\eta}\left[1+\frac{1}{\eta}\right]=(1+T_2)^{1-\beta}\cdot\left(1+a\left[\ln\left(n_{UT,SR,MC}\right)\right]\right). \tag{43}$$

In the long-run, profits are driven to zero via firm entry, and price equals average cost. Because the average cost curve is shifted vertically in response to a uniform price, we find that marginal revenue in (35) under a non-zero, uniform tax differs relative to the no-tax case:

$$MR\left(n_{UT,LR,MC}\right)=(1+T_2)^{1-\beta}\left[1+\frac{1}{\eta}\right]\cdot\left[1+a\left(\ln n_{UT,LR,MC}+\frac{1}{n_{UT,LR,MC}}-1\right)\right], \tag{44}$$

which simplifies to:

$$MR\left(n_{UT,LR,MC}\right)=(1+T_2)^{1-\beta}\cdot MR(n_{LR}). \tag{45}$$

Because *MR* and *MC* are shifted by the same proportion in the long-run, running through the algebra we find that monopolistically competitive firms produce at the same level relative to efficient scale, irrespective of whether a uniform corporate tax is levied or not. While costs are higher under this scenario, there is no additional incentive for firms to reduce their optimal production level, i.e., it does not bias their size decision. This is illustrated in Figure 3, where we plot cost curves under an assumption of a uniform corporate tax of 15%.

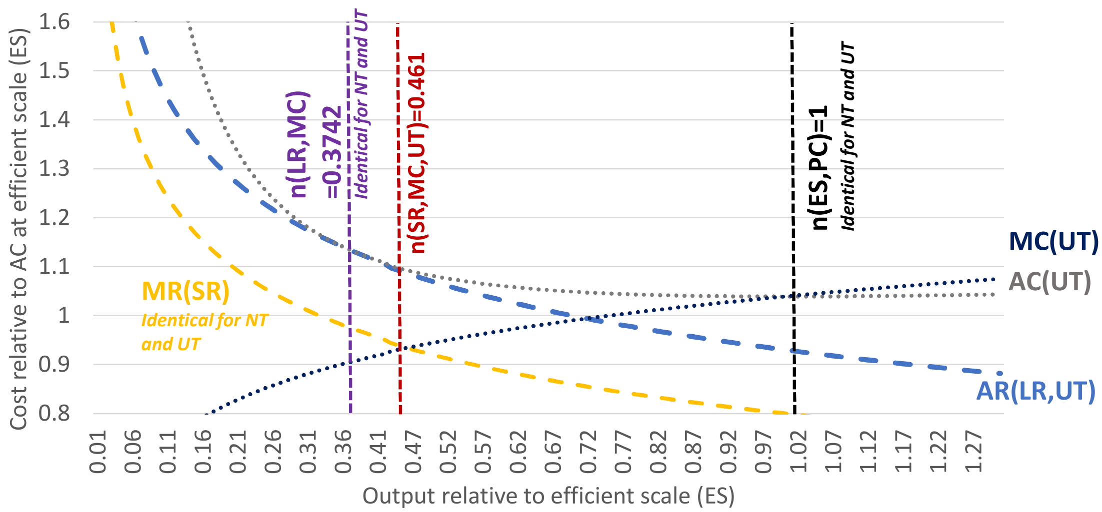

Figure 3: Cost and revenue cost curves along with market equilibria under monopolistic and perfect competition in the presence of a uniform corporate tax of 10% but no threshold. *The optimal production levels under perfect competition and monopolistic competition in the long-run are identical to the no-tax case in Figure 1, but costs and prices are higher.*

5. Analysis in the presence of a company tax with a threshold

The curves in Figure 1 and Figure 3 are plotted for no-tax and no threshold, respectively. It remains to recalculate the market equilibria in the presence of a CIT of 20% of GOS on firms with turnover below A$1b, and 30% of GOS on firms above A$1b in turnover, and measure how the firms' cost curves change relative to a no threshold situation where a smaller tax rate is levied on all firms in uniform fashion.

To begin, we will assume a threshold in the following sense: the tax rate is zero below a threshold in turnover of A$1b, and 10% above the threshold.

5.1. Perfect competition: No tax below the threshold, 10% tax above the threshold

Under perfect competition, firms produce at the minimum of their average cost curves. In the presence of a threshold, the cost curves are composites of the curves we have seen in Figures 1 and 3. So long as costs lie below the threshold, the average cost curve follow the green solid line in Figure 1. Once capital costs rise above the threshold level, and firms are liable for the capital tax of 10%, the curves begin to track toward the grey dashed average cost curve in Figure 3, lying somewhere between the two ultimately. Algebraically, we can express the costs in piecewise fashion. If turnover lies below A$1b (or, assuming Cobb-Douglas technology, below A$0.4b), then costs are:

$$C(Q) = c_o \cdot Y(Q), \qquad AC(Q) = c_o \cdot \frac{Y(Q)}{Q}, \qquad MC(Q) = c_o \cdot \frac{dY}{dQ}, \tag{46}$$

and if we make the substitution *Q=nb* we arrive at:

$$C(n) = c_o \cdot b \cdot [a + n(1-a) + an \ln n], \tag{47a}$$

$$AC(n) = c_o \cdot \left[\frac{a}{n} + (1-a) + a \ln n\right], \tag{47b}$$

$$MC(n) = c_o \cdot (1 + a \ln n). \tag{47c}$$

For firms where turnover lies above the threshold, using 1-*β* as the capital cost share, we find:

$$C(Q) = c_o \cdot (1 + T_2)^{1-\beta} \cdot Y(Q) - T_2 \cdot H, \tag{48a}$$

$$AC(Q) = \frac{c_o \cdot (1 + T_2)^{1-\beta} \cdot Y(Q)}{Q} - \frac{T_2 \cdot H}{Q}, \tag{48b}$$

$$MC(Q) = c_o \cdot (1 + T_2)^{1-\beta} \cdot \frac{dY}{dQ}. \tag{48c}$$

Equation (48) can be simplified by substituting for *Y*(*Q*), yielding:

$$C(n) = c_o \cdot b \cdot (1 + T_2)^{1-\beta} \cdot [a + n(1-a) + an \ln n] - T_2 \cdot H, \tag{49a}$$

$$AC(n) = c_o \cdot (1 + T_2)^{1-\beta} \cdot \left[\frac{a}{n} + (1-a) + a \ln n\right] - \frac{T_2 \cdot H}{nb}, \tag{49b}$$

$$MC(n) = c_o \cdot (1 + T_2)^{1-\beta} \cdot (1 + a \ln n). \tag{49c}$$

Comparing (47) and (49), we see that *AC* is continuous at the threshold, but *MC* shifts vertically once we cross the threshold with T_2>0. We plot the *AC* curve under no-tax [*AC*(NT)], uniform tax [*AC*(UT)], and a tax with a threshold [*AC*(THR)] in Figure 4. As highlighted, *AC*(THR) tracks *AC*(NT) until the threshold is exceeded. Thereafter, the curve moves towards *AC*(UT), which is shifted vertically upward relative to *AC*(NT).

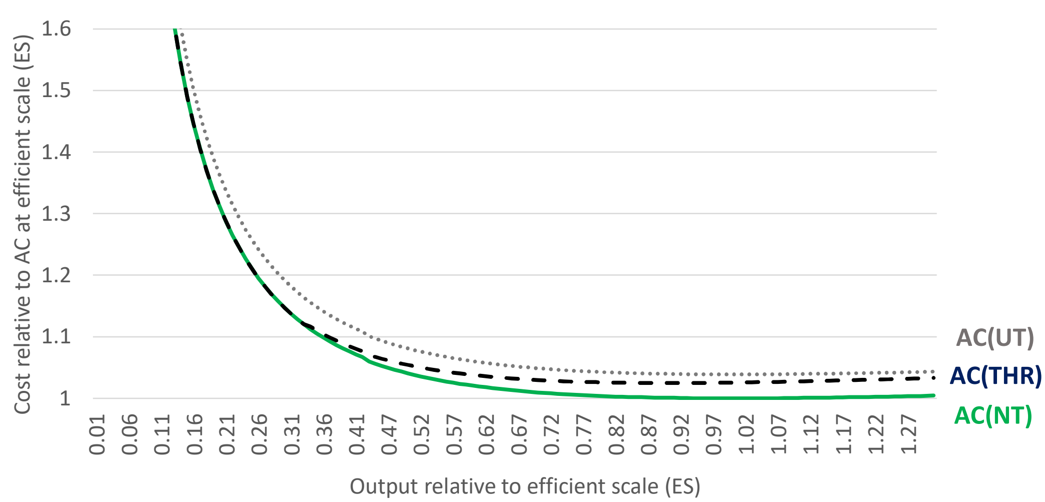

Figure 4: Average cost curves under no-tax, a uniform capital tax, and a capital tax with a threshold. The curves are drawn for a firm with turnover of A$3b, a capital tax of 10%, and a threshold of A$1b of turnover, which at a capital ratio of 40% translates to a threshold on capital income of A$0.4b.

Assume a firm is large enough so that the threshold lies below efficient scale production. Under a 10% tax levied above a threshold of A$1b in annual turnover, this might be a firm of turnover equal to A$3b. In this case, the capital tax binds and must be paid, unless the firm contracts relative to efficient scale production of A$3b. Solving for the cost-minimising output level under perfect competition, we arrive at a similar equation to (20). Below, we have re-written it in scaled terms:

$$Q_{min} = b - \frac{T_2 H_2}{a \cdot c_0 \cdot (1 + T_2)^{1-\beta}} \,. \tag{50}$$

Herein, the threshold for paying the capital tax is H_2=A$0.4b (0.4*A$1b), which is equivalent to a turnover threshold of A$1b for triggering the capital tax because the cost function is Cobb-Douglas. Holding *a* as in (24), setting average cost at efficient scale (c_0) to 1 as before, and aligning *b* to turnover pre-tax of A$3b, we find:

$$Q_{min} = 3 - \frac{0.1 \cdot 0.4}{0.13035 \cdot 1 \cdot (1 + 0.1)^{0.4}} = 2.7046m. \tag{51}$$

The result in (51) is approximately 0.901 of efficient scale production; the imposition of a threshold of A$1b in firm turnover has caused firms of A$3b to scale back production (assuming perfect competition) by about 9.9%. Under perfect competition, the deadweight loss per unit of output can be measured by the difference between the no-tax level of average cost at efficient scale (herein, set to 1), and the no-tax level of average cost at the new output level of 0.901 times efficient scale. The rise in resource costs per unit output is small if firms are perfectly competitive, and equal to 0.00073, or about 0.073%.

Most of the rise in average cost is therefore a result of the tax, rather than deadweight cost. We see this by substituting (51) into (49b), or by setting *n*=0.901 in (49b), which yields:

$$AC(0.901) = 1 \cdot (1.1)^{0.4} \cdot \left[\frac{0.13035}{0.901} + 0.86965 + 0.13035 \ln 0.901\right] - \frac{0.1 \cdot 0.4}{0.901 \cdot 3} = 1.025. \tag{52}$$

Using (49), we can also show that:

$$C(0.901) = 2.77 < b = 3, \tag{53a}$$

$$AC(0.901) = 1.025 = MC(0.901), \tag{53b}$$

$$Y(0.901) = 3 \cdot [0.13035 + 0.901 \cdot 0.86965 + 0.13035 \cdot 0.901 \cdot \ln 0.901] = 2.706, \tag{53c}$$

$$CIT_{REV} = 0.1 \cdot (0.4 * 2.706 - 0.4) = 0.0682 \tag{53d}$$

where in (53d), we calculate revenue based on capital costs using (53c), not a share of total costs, which now include taxes.

In principle, there will be many firms making decisions such as these. Because firms operate at higher average costs, the threshold introduces a deadweight cost. This deadweight cost is not captured within VURMTAX. We use models of many firms, operating in this way, and calculate the deadweight losses caused by the threshold.

5.2. Monopolistic competition: No tax below the threshold, 10% tax above the threshold

Under monopolistic competition, firms operate at output levels that are well below efficient scale production.

Assume a firm operates at a scale that is sufficient to pay the capital tax, despite the threshold. In the short-run, the output level relative to efficient scale is given by equating marginal revenue and marginal cost and solving for *Q*. As we noted earlier, while a threshold both scales average cost (due to the imposition of a tax) and translates it (due to the threshold), because the translation (threshold effect) functions like a refund, it does not impact marginal cost. Hence, the equation to solve is identical to the uniform tax case, which we reported in equation (43) previously but include below for convenience:

$$n_{THR,SR,MC}^{1/\eta}\left[1+\frac{1}{\eta}\right] = (1+T_2)^{1-\beta}\cdot\left(1+a\left[\ln\left(n_{THR,SR,MC}\right)\right]\right). \tag{54}$$

Short-run market outcomes under monopolistic competition with a threshold are thus identical to the uniform tax case if the tax is binding; see Figure 3. If firms lie below the threshold, then short-run outcomes will match no-tax outcomes reported earlier and depicted in Figure 1.

In the long-run, firm entry and exit drives price to average cost. Because the average cost curve is both vertically shifted (tax effect) and translated (threshold effect), long-run firm outcomes are altered by the threshold if the firm operates with a turnover level above the threshold. Equation (44), which reports the marginal revenue function in the long-run under monopolistic competition for a uniform capital tax becomes:

$$MR\left(n_{THR,LR,MC}\right) = \left[1+\frac{1}{\eta}\right]\cdot\left\{(1+T_2)^{1-\beta}\left[1+a\left(\ln n_{THR,LR,MC}+\frac{1}{n_{THR,LR,MC}}-1\right)\right]-\frac{T_2\cdot H}{b\cdot n_{THR,LR,MC}}\right\}, \tag{55}$$

which must be equated to:

$$MC\left(n_{THR,LR,MC}\right) = (1+T_2)^{1-\beta}\cdot\left(1+a\ln n_{THR,LR,MC}\right). \tag{56}$$

The resulting expression can then be solved for production relative to efficient scale, $n_{THR,LR,MC}$, in the long-run under monopolistic competition in the presence of a capital tax of 10% and a threshold of A$1b in turnover. As highlighted in Figure 4, output relative to efficient scales falls to 0.34 of efficient scale production, compared to 0.3742 of efficient scale production under a uniform tax, and no tax. Output per firm falls by about 10%.

How large are the deadweight losses in this section of the cost curve? Using equation (22), we can study the average costs for firms at production levels of 0.3742 of efficient scale production (1.0898), and 0.34 of efficient scale production (1.112), a difference of 0.0223. This is equivalent to a rise in resource cost per unit output of about 2%, which is much larger than was the case under perfect competition.

The above holds for one firm with turnover of A$3b. Our goal is to assess aggregate changes in resource cost per unit output across all firms in response to the threshold. We suspect that the aggregate figure will be lower than for firms of A$3b, because very large firms will see little change in their behaviour due to threshold, because their turnover is very much larger than the threshold.

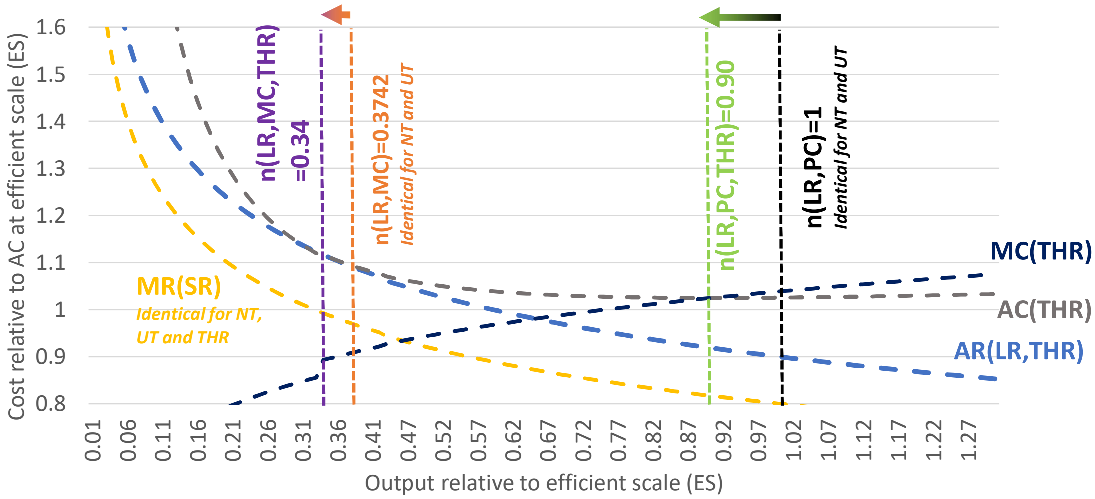

Figure 5: Cost and revenue cost curves along with market equilibria under monopolistic and perfect competition. The curves are drawn for a firm with turnover of A$3b, a capital tax of 10%, and a threshold of A$1b of turnover, which at a capital ratio of 40% translates to a threshold on capital income of A$0.4b. *The optimal production levels under perfect competition and monopolistic competition in the long-run differ compared to those in Figure 3 for a uniform tax, because the threshold alters the curvature of the average cost curve (which impacts optimal production under perfect competition), and the marginal revenue curve in the long-run.*

6. Using firm turnover ranges to model the economy-wide deadweight costs

To examine the impact of turnover thresholds on deadweight costs, a highly discretised distribution of firm costs and turnovers is required, with particularly fine resolution around the A$1 billion turnover threshold (or, assuming a labour cost share of 0.6, a corresponding capital-cost threshold of A$400 million). The analysis begins with the estimation of an employment distribution by firm size.

Publicly available data from ABS (2025) are not sufficiently granular for this purpose. These data report firm counts across only four employment-size classes—1–4 employees, 5–19 employees, 20–199 employees, and 200+ employees—and therefore cannot identify discontinuities or spikes in the firm-size distribution. The turnover threshold of A$1 billion lies well within the upper class (200+ employees), corresponding to approximately 6 000 employees per firm, given national average large-firm wage costs of A$96 000 and capital rents of A$122 000 per unit of capital (derived from 2022–23 National Input–Output data).

We therefore assume that, in the absence of a turnover threshold, the cumulative employment distribution is a smooth, increasing function of firm size. This distribution is represented by a scaled log-uniform (reciprocal) cumulative function:

$$CDF_{EMP}(f_i) = EMP_{TOT} \cdot \frac{\ln\left(\frac{f_i}{C}\right)}{\ln\left(\frac{f_{max}}{C}\right)}, \tag{57}$$

where EMP_{TOT} is aggregate employment (headcount), f_{max} is a large number representing an assumed maximum employment head count for a firm in Australia (set to 200 000 employees), C is a calibration parameter set to 0.8, and f_{size} denotes firm size. The calibration yields a share of firms employing 200+ employees consistent with ABS (2025) data (approximately 0.5 per cent).

Employment within each firm-size interval is computed as the discrete difference:

$$I_{EMP}(f_i) = CDF_{EMP}(f_i) - CDF_{EMP}(f_i + R), \quad (58)$$

where R is the bin width. In the initial discretisation R is set to 0.5, producing 400 000 bins.

For model implementation, the distribution is aggregated to 945 bins, with finer resolution retained for firms with 4 500–24 000 employees. In this range, capital rents per firm are estimated to vary between approximately A$300 million and A$1.5 billion. The turnover threshold of A$1 billion is translated to a capital-rent threshold of A$400 million, assuming an economy-wide capital cost share of 0.4. This threshold lies within the highly granular region of the initial distribution. Following Dixon et al. (2004), who report that firm resource use per unit of output is sensitive to thresholds over approximately twice the threshold value, the firm-size distribution is maintained at high granularity up to 3–4 times the A$400 million capital-rent threshold. This allows us to measure the change in resource cost per unit output caused by the threshold' impact on firm size decisions.

Our initial model setup assumes a uniform, low corporate income tax surcharge of 1.5% applies to all capital rents and all firms, irrespective of size, in addition to a uniform core tax rate of 20% less allowable deductions.[4] The initial firm distribution follows the scaled log-uniform distribution described previously. Our counterfactual scenario introduces a threshold at A$400m in capital rents (equivalent to A$1 billion in turnover, because the capital share is exogenous by assumption), and holds surcharge revenues exogenous via the endogenous determination of the corporate income tax surcharge rate.[5]

The model is coded and solved using GEMPACK [Horridge et al. (2018)].

6.1. Results

This section begins with a discussion of our core set of results. Subsequently, we outline the results of a sensitivity analysis on two key assumptions that underlie our analysis. First, we study the impact of changes in the slope of the average cost schedule, set by the parameter a in equation (24). In our core scenario, this parameter is set so that when firm size is 50 percent of its efficient scale level, average costs are 4 percent above their efficient scale level. Second, we adjust the demand elasticity for firm output in equation (29), set to η=-5 under our core scenario.

6.1.1. Core scenario

Figure 6 illustrates the shocks underlying our analysis. The blue line plots the initial assumed corporate income tax surcharge payable by firms with capital rents from A$320 million per annum to A$1.2 billion per annum. The slope of this line is the corporate income tax surcharge uniform rate, set at around 1.5%. The black dashed vertical line is the A$1 billion threshold, translated to a threshold on capital rents assuming a 40 percent capital rental share (this translates to a threshold of A$400 million). The orange line plots how this changes in response to the introduction of a corporate income tax surcharge threshold of A$400 million on capital rents (or A$1 billion on firm turnover), under the assumption of no change in aggregate surcharge revenue achieved via endogenous

[4] Deductions trim the effective rate by about 2/3 relative to the marginal rate.
[5] The uniform (core) tax rate remains unaltered.

determination of the tax rate. The slope of the orange line (after the A$400 million threshold level is reached) is greater than the slope of the blue line, because the effective corporate income tax surcharge rate has increased to 8.6 percent to satisfy our constraint of revenue neutrality. This is similar, but slightly higher, than what one may guess as an effective corporate income surcharge rate if the legislated rate is 10 percent and one third of the tax base can be offset by deductions. The rate in such an example (6.7 percent) lies below the rate implied by our analysis, because some firms whose turnover levels were originally above the threshold alter their resource use per unit output to drive turnovers below the A$1 billion threshold. This reduces the economy-wide tax base, necessitating a higher effective tax rate.

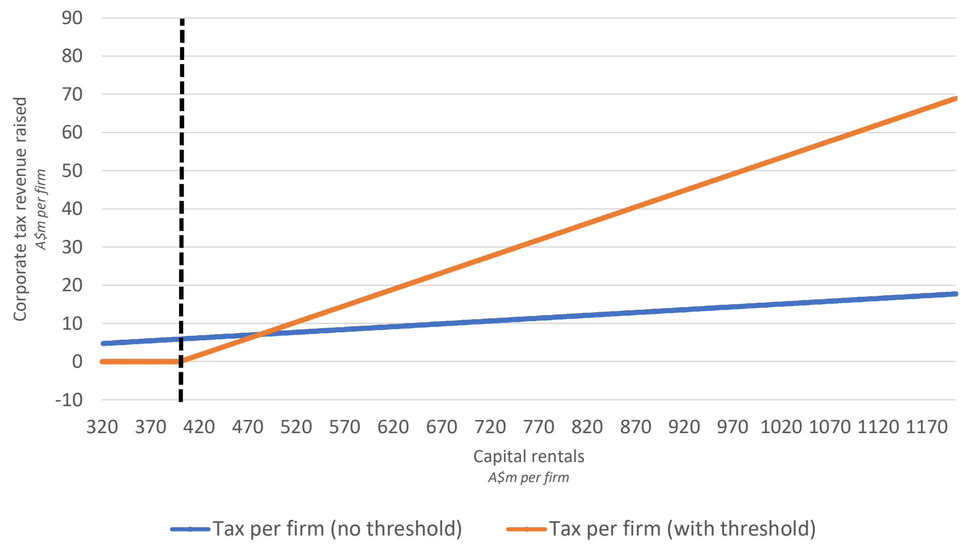

Figure 6: Tax revenue by firm capital rentals, for firms with capital rentals between A$320 million per annum to A$1.2 billion per annum. *This figure is drawn assuming the capital rental share in their primary factor costs is 40%, that this share in unaltered under the counterfactual, that the turnover threshold for the corporate income tax surcharge is A$1 billion per firm, and that the initial corporate income tax surcharge is levied at a uniform rate of approximately 1.5% (see the blue line).*

This is evident in Figure 7, where we plot firm counts under a no-threshold (blue line) and A$1 billion turnover threshold (orange line). As firm capital rents approach the turnover threshold (black dashed line, translated to a threshold of A$400 million on capital rents), we see the orange line rise relative to the blue line, indicating firm counts rising relative to the no-threshold case below the threshold of A$400 million. Firm counts fall sharply above the threshold; as expected, firms reduce output relative to efficient scale in response to the threshold. Under no-threshold and a uniform tax of 1.5%, monopolistically competitive firms facing demand elasticities of -5 and average cost curves with a set as in (24) operate at 0.3427 of efficient scale production. Once the threshold is introduced, firms with turnovers that were slightly above the A$1 billion threshold under the no-threshold scenario, reduce production to 0.314 of efficient scale levels under a threshold. Because average cost curves are downward sloping, these reductions in output levels drive average costs of production higher. Resource costs per unit output rise; this is a deadweight cost caused by the threshold. The effects discussed diminish for higher turnover levels: as capital rents rise to A$1.2 billion (equivalent to a turnover of A$3 billion in our analysis), the impact of the threshold begins to subside and production levels relative to efficient scale are similar under the two scenarios. This is also evident from Figure 7, where we see the orange and blue lines beginning to track one another closely for larger firms with capital rents of A$1.2 billion. For very large firms, the threshold has little impact on resource costs per unit output.

Aggregating the cumulative effect of many firms altering output levels in this way, we find the deadweight cost of the threshold is A$1.7 billion under our core scenario. This is about 10 percent of the revenue cost of the policy in 2026 reported by Nassios et al. (2025), while relative to GDP in Australia in 2022/23, this translates to a 0.07% one-off reduction in productivity compared to where it would otherwise have been.

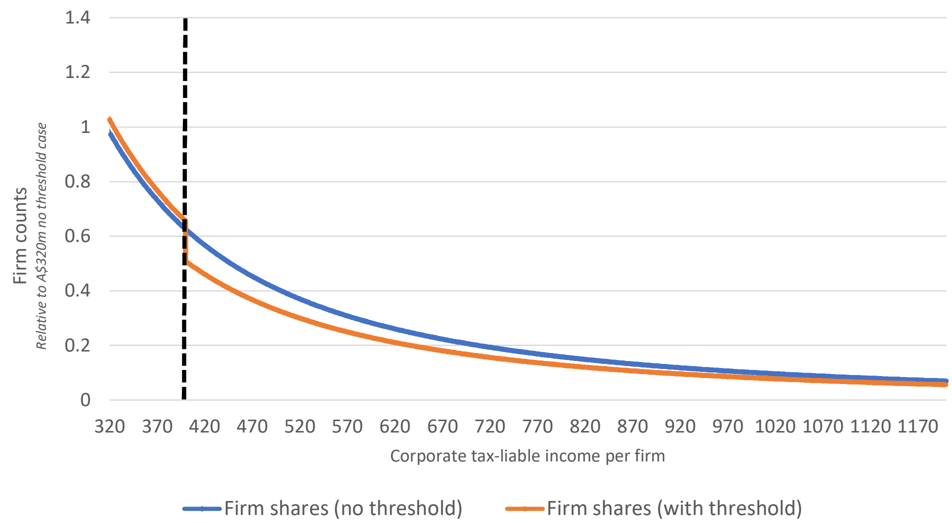

Figure 7: Firm counts relative to no-threshold counts at A$320 million (assigned a relative count of 1), for firms with capital rentals between A$320 million per annum to A$1.2 billion per annum. *This figure is drawn assuming the capital rental share in their primary factor costs is 40%, that this share in unaltered under the counterfactual, that the turnover threshold for the corporate income tax surcharge is A$1 billion per firm, and that the initial corporate income tax surcharge is levied at a uniform rate of approximately 1.5% (see the blue line).*

6.1.2. Sensitivity analysis

In this section, we examine how the central estimate of deadweight costs reported in Section 6.1.1 responds to two key parameter assumptions:

(1) the sensitivity of average costs to deviations from efficient scale, governed by parameter a in equation (24); and
(2) the degree of competition, reflected in the ratio of marginal to average costs in the long run, or equivalently, the demand elasticity η.

Our default calibration sets $\eta = -5$, implying that marginal costs equal 80 per cent of average costs. Results are reported in Table 1, with the core scenario highlighted in bold in row 1, column [3].

Inspection of Table 1 suggests that when firms operate under monopolistic competition and perceive demand elasticities with magnitudes below 10, the introduction of a turnover threshold at A$1 billion generates deadweight costs of approximately A$1.1 billion to A$1.8 billion—equivalent to about 0.045 to 0.075 per cent of GDP.

Table 1: Impacts of changes in degree of competition and the slope of average cost curves on the deadweight cost of introducing a threshold in the corporate income tax schedule at A$1 billion.

Competition / AC at 0.5*n_{ES}	*MC=P* Column [1]	*MC=0.9xP* Column [2]	MC=0.8xP *Core specification* Column [3]	*MC=0.7xP* Column [4]	*MC=0.6xP* Column [5]
4 percent *Core specification* Row 1	*626*	*1758*	**1787**	*1497*	*1134*
8 percent Row 2	*431*	*1590*	*1824*	*1732*	*1441*

Two opposing forces drive these results. First, increasing the slope of the average cost curve (moving from row 1 to row 2) reduces deadweight costs under perfect competition or highly elastic demand (columns [1]–[2]), but raises them under less elastic demand (columns [3]–[5]). The first effect dominates in columns [1]–[2]: with a steeper average cost curve, a given threshold induces a smaller proportional reduction in output relative to efficient scale, dampening the associated efficiency loss. In contrast, for columns [3]–[5], where firms operate on steeper regions of the average cost schedule, even small contractions in output can generate disproportionately large deadweight costs. Consequently, in these cases, moving from row 1 to row 2 raises the estimated efficiency loss.

7. Conclusion

In this paper we show that introducing a turnover threshold of A$1 billion in the corporate tax system could impose efficiency costs of around A$1.7 billion, or roughly 0.07 per cent of GDP. These losses arise because firms close to the threshold reduce their output below efficient scale to avoid higher tax rates, which raises production costs per unit of output. The impact is likely to be larger in markets where firms face limited competitive pressure or where production costs rise steeply as firm size declines. These effects are not modelled herein, with firms nationally assumed to adopt similar cost structures to long-run averages. Future work may explore the impact of differential cost structures on deadweight costs, or of alternative specifications for the turnover threshold. One complication we foresee with such changes is that, while the threshold is turnover-based, the tax is paid on gross operating surpluses less allowable deductions (herein, capital rents). Importantly, the impact of a turnover threshold on corporate income tax liabilities will change as firm cost structures change. This does not factor into our analysis, which assumes Cobb-Douglas production technology and thus a fixed capital income share. Understanding the impact this may have on firm decision making also warrants further analysis.

While turnover thresholds can serve legitimate policy objectives—such as easing compliance and tax burdens for small businesses—they also create measurable economic inefficiencies, one of which is quantified herein. In addition, corporate tax thresholds do not directly address all underlying causes of high input costs that constrain the competitiveness of Australian firms both domestically and internationally. A clearer understanding of why these input costs are so high, and targeted measures to reduce them, may also be an effective response to boost competition and dynamism in the Australian economy.

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