The Silver Lining of Red Tape

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Abstract: An increasing number of international agreements require “non-discrimination” from their participants, i.e. the government of one country cannot treat foreign firms differently from domestic firms. This is at odds with a government’s desire to benefit its own citizens rather than foreign citizens. I show that the use of red tape – a wasteful application process – can achieve de-facto discrimination. Key to this result is firm heterogeneity since, although the red tape cost is constant across firms, only those sufficiently benefiting from an incentive program will find it worth the cost of applying. If the benefits of targeting subsidies outweigh the burden of red tape on domestic firms, red tape will be used.

JEL Classification: H2; F1

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1. Introduction

Increasing globalization has challenged what is perhaps the fundamental motivation of policy makers – “protect your own”. Whether a government acts to maximize the welfare of its own citizens, appease those with the greatest political power, or line its own pockets, the limit of those for whom it accounts rarely extends beyond its own borders. Nevertheless, the rise in globalization has given rise to both economic and political pressures to do so as the distortions from self-benefitting policies grow due to increased interdependence and government recognition that there are mutual gains from jointly removing such policies. With this in mind, many governments have pledged “non-discrimination”, that is, it will treat foreign firms operating in its borders the same as domestic ones. This concept is a cornerstone of the European Union, the World Trade Organization and its supplementary agreements, the North American Free Trade Agreement, and the OECD’s and UN’s model tax treaties.\(^1\) Despite these provisions, it remains a fact that a government often unilaterally prefers to restrict government contracts, subsidies, tax breaks, and other incentives to domestic firms as this tends to provide a greater benefit to itself and/or its constituents. In this paper, I demonstrate how a government can use red tape – the wasteful requirements a firm must fulfil in order to participate in an incentive program – to achieve de-facto discrimination while making an incentive policy equally available to domestic and foreign firms.\(^2\)

Red tape can take on many forms. First, there is the obvious filling out of complex paperwork. This, combined with the inevitable man-hours spent dealing with the bureaucratic process, can provide a significant barrier to a firm interested in applying for a government

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\(^2\) The evidence of Hines (1988) and Hufbauer (1992) indicates that many tax rates are de-facto discriminatory because of different utilization rates between domestic and foreign firms, suggesting that red tape is indeed a method of discrimination.
program. A second example is time itself. If a firm must wait on government approval of its application before choosing production levels or making other critical decisions, such delays create costs.³

An important aspect of these requirements is that they are the same across all firms, foreign and domestic. Since non-discrimination requires that all firms be offered the incentive, not that all firms actually apply for it, the common fixed cost of red tape creates a barrier so that only the firms that benefit most from the incentive actually apply. Thus, red tape creates de-facto discrimination since it stops the least benefitting firms from accepting the incentive. Note that this requires firm heterogeneity. If all firms are identical, then either all firms will apply for the incentive or no firms will. Further, if the goal is to target the incentive to domestic firms, it requires that domestic firms gain relatively more from the incentive than foreign firms do. It is important to note that even in this case, this does not imply that red tape will actually be used. This is because red tape is itself costly. Thus, the benefit of not providing the subsidy to foreign firms must be weighed against the cost of wasteful red tape. Nevertheless, under certain circumstances, red tape will indeed be used in equilibrium.

I demonstrate these conditions using a variant of the well-known Brander and Spencer (1985) model of exporting firms.⁴ In their model, two firms, one producing in the home country and the other in the foreign country, compete in quantities by exporting to a third market. The home government’s policy instrument is an export subsidy which it offers to its firm to encourage output. As they discuss, doing so shifts the home firm’s best response output, moving the equilibrium from the Nash outcome towards the Stackelberg outcome.

³ In addition to red tape, governments might require a firm to install green technologies, undertake added worker training, or the like before it can take advantage of a program. These do not fit my definition of red tape (which is a pure cost) since they would provide benefits such as a better environment or higher skill levels. See Davies and Ellis (2007) for a discussion of these “performance requirements”.
⁴ See Brander (2005) for a survey of theoretical literature following the original model and Reimer and Stiegert (2006) for a survey of the empirical work.
This then creates a first-mover advantage which increases the home firm profits and home welfare. I alter this model in two ways. First, in my variant, both firms produce in the home country.\(^5\) Since non-discrimination does not require a government to offer its incentives to firms operating outside its borders, this is necessary for a non-discrimination constraint to have meaning. Second, I allow for cross-border ownership, that is, home country citizens retain a fraction of the profits of each firm, with this fraction being greater for the “home” firm. In addition, the home country is able to retain profits of both firms through a common profit tax. Thus, a greater share (although not necessarily all) of foreign firm profits are repatriated back to their own country.

This distinction in who retains the profits is important because since subsidizing a firm’s exports gives it a first mover advantage, the benefit to the home government from doing so is larger when the home firm has this advantage. Thus, the benefit of subsidizing the domestic firm is greater than that of subsidizing foreign one. In fact if discrimination were possible, the home government would prefer to tax the foreign firm even as it subsidizes the home firm. When discrimination is not possible and no red tape is used, the same subsidy must be applied to both firms. As a result, the home government cannot create a first mover advantage since both firms are subsidized. Therefore, no positive subsidy will be offered.

Red tape, however, can stop the foreign firm from accepting the subsidy. In the context of export subsidies, one form this red tape can take is the “special economic zone” where, in order to avail itself of an export subsidy, a firm must locate in a particular location.\(^6\) Since this creates additional competition for land in these areas (or they were undesirable locales to begin with), there is an added burden to a firm choosing locate there. If the home firm has a cost advantage then it exports more and is more apt to apply for the subsidy. As such,

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\(^5\) Thus, to the extent that one or both firms originate overseas, my paper contributes to the literature on the taxation of foreign direct investment. Davies (2004) provides a survey of this literature with respect to tax treaties where non-discrimination is a typically a central pillar of such agreements.

\(^6\) The World Bank (2008) estimates that there are over 3500 special economic zones in over 135 countries. Their combined economic activity accounts for 65 million jobs and over $500 billion of trade-related value added.
although implementing red tape is costly to the home government, it can benefit from doing so precisely because it stops foreigners from also taking advantage of the subsidy. This allows the government to induce at least some of the first mover advantage for its favoured firm. Whether or not this works the home government’s advantage depends on parameter values, including the extent of cross border ownership and the relative cost parameters.

This use of red tape is similar to achieving a separating equilibrium in mechanism design, with a restricted menu of choices offered to firms (accept the subsidy/red tape combination or do not). However, there are some differences between the current approach and the standard mechanism design approach. First, the goal of a separating equilibrium in mechanism design is to get different firms to behave in different ways according to a privately-known type. In my model, however, there is no private information. Second, the goal of the two part tariff under mechanism design is to allow the government to claw back surplus from the types that it does not want to subsidize as heavily. As such, the fixed cost is not lost to the economy but is instead surplus for the principal. In contrast, red tape is wasted effort and a genuine loss to society which is why, depending on the situation, the government may prefer to offer only one option – no subsidy at all – rather than achieve a separating equilibrium.

Although the model is not one of tax competition nor explicitly on foreign direct investment (FDI) since it is not necessary that either firm count as “foreign owned” according to standard definitions, there is a link between my results and the international taxation literature. Since subsidizing a firm increases its output in the home country, this then is akin to the use of tax policy to attract local production by multinational firms. In particular, as I allow for multiple policy instruments, this relates to the literature on the taxation of FDI with

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7 See Fudenberg and Tirole (1991) for a detailed discussion of mechanism design and separating equilibria.
8 An alternative interpretation would be that governments may know firm types, but are forbidden to use this information.
9 Surveys of the theory and empirical work on the taxation of multinationals are provided by Wilson (1999), Gresik (2001), and Fuest, Huber, and Mintz (2005).
multiple instruments, particularly that of Haufler and Wooton (1999) who consider a lump sum tax (akin to the profit tax here) and tariffs (in contrast to my export subsidy) demonstrating that a greater tariff permits a higher lump sum tax.\textsuperscript{10} In addition, because I use export subsidies as the setting for my model, the current paper builds on the large body of work following Brander and Spencer (1985) by incorporating cross-border ownership and red tape into their model. This literature, surveyed by Brander (2005), includes extensions of the baseline model by incorporating factors such as Bertrand competition (Eaton and Grossman, 1986), intermediate goods (Ishikawa and Spencer, 1999), differentiated goods (Gruenspecht, 1988), or political economy considerations (Cadot, Estevadeoral, and Eisenmann, 2005) into the model.

The remainder of the paper is as follows. Section 2 lays out the model and the equilibrium for given subsidies and red tape. Section 3 then describes the government’s objection function and derives its optimal policies as they depend on whether or not discrimination is permitted. In particular, I show conditions for which a positive level of red tape will be used. Section 4 discusses extensions of the model, including an endogenous tax rate and other benefits from firm activity to the local economy. Section 5 concludes.

2. Equilibrium Given Government Policies

In this section, I describe the equilibrium for given government policies. Consider a Brander and Spencer (1985) type model in which there are two firms that are designated home and foreign, with foreign variables denoted by *. These designations are based on ownership with a share $\alpha \in [0,1]$ of the home firm’s profits and a share $\beta \in [0,1]$ of the

\textsuperscript{10} Other papers include Bucovetsky and Wilson (1991), who theoretically consider capital and wage taxes, and Desai, Foley and Hines (2004), who empirically examine how different tax instruments affect FDI. Furthermore, there is a wealth of literature discussing the choice of tax rates and double tax rules (Mintz and Tsiropoulos, 1994), deferral regulations (Hines, 1994), tax base definitions (Janeba, 1996), and other transfer pricing policies (Becker and Fuest, 2009).
foreign firm’s profits accruing to home country citizens. Without loss of generality, let \( \alpha \geq \beta \), i.e. more of the home firm’s profits accrue to home citizens than do the foreign firm’s profits.\(^{11}\) These firms compete by simultaneously choosing outputs \( X \) and \( X' \) and whether or not to take apply for export subsidy. If a firm applies for its subsidy, it may incur a red tape cost by doing so. Output is exported from home to an overseas market where it is sold according to the inverse demand function \( P(X + X') \).\(^{12}\) This function is assumed decreasing and concave.\(^{13}\)

2.1 Firms

Firms choose output and whether or not to take the subsidy in order to maximize after-tax profits. After-tax profits for the home firm are given by:

\[
\pi = (1-t) \left( P(X + X')X - C(X; \gamma) + IsX - IR \right)
\]

where \( C(X; \gamma) \) is an increasing convex cost function that satisfies the Inada conditions (i.e. marginal cost is zero at zero output and infinite at infinite output) where both total and marginal cost are increasing in the parameter \( \gamma \), \( t \in [0,1] \) is the home tax rate, \( s \) is an export subsidy, \( R \geq 0 \) is the red tape cost of applying for the export subsidy, and \( I \) is an indicator function equal to one if the firm applies for the export subsidy and zero otherwise.\(^{14}\) Comparably, the foreign firm’s after-tax profits are

\[
\pi^* = (1-t) \left( P(X + X')X^* - C^*(X^*; \gamma^*) + Is^*X^* - IR^* \right)
\]

\(^{11}\) Note that as it is still possible for \( \beta > 1 \), the foreign firm need not count as “foreign owned” or foreign direct investment under the standard legal definitions.

\(^{12}\) Section 4.3 discusses how the results are modified if some or all of the output is sold in the home country.

\(^{13}\) Concavity of demand is not necessary, merely that it is not “too” convex so that an interior solution exists where the second order conditions are fulfilled in equilibrium.

\(^{14}\) The Inada conditions ensure an interior solution for any non-negative subsidy. Since a subsidy is only applied for if it is positive, this then ensures a positive output for each firm in equilibrium. If this is not the case, the government, depending on parameter values, the home government may find it beneficial to subsidize the home firm all the way to the monopoly output, i.e. driving foreign output to zero. Although this changes the equilibrium subsidy, it does not change the qualitative nature of the analysis as shown by the special case analyzed in Section 3.2.
where functions and variables are analogous to those of the home firm.\footnote{Note that in both (1) and (2), $t$ need not be the effective tax rate that the non-home profit recipients pay since, upon repatriation, they may be liable for taxes on this foreign earned income. However, such considerations are not germane to the present analysis and are therefore omitted.}

The first order condition for the home firm’s output is the familiar equality of marginal revenue and marginal cost:

\[
P_X \left( X + X^* \right) X + P \left( X + X^* \right) = C_X \left( X; \gamma \right) - Is.
\] (3)

Note that this only depends on the output of the foreign firm, not directly on whether the foreign firm takes the subsidy or not. This implicitly defines a best response for home firm output. Further, since red tape costs are non-negative, the home firm will only apply for a positive subsidy, i.e. it would never voluntarily apply for an export tax. Likewise, the best response output for foreign is can be obtained from its first order condition with respect to $X^*$ which is given by:

\[
P_X \left( X + X^* \right) X^* + P \left( X + X^* \right) = C_X^* \left( X^*; \gamma^* \right) - I^* s^*.
\] (4)

Using (3) and (4), one can then obtain implicit Nash output levels that depend on the level of the subsidy that a given firm receives (or zero if it does not take a subsidy). Define these as $X \left( Is, I^* s^* \right)$ and $X^* \left( Is, I^* s^* \right)$. Likewise, define equilibrium pre-tax equilibrium profits by $\pi \left( Is, I^* s^* \right)$ and $\pi^* \left( Is, I^* s^* \right)$. I can now describe how equilibrium outputs and profits change with home policies.

**Proposition 1:** If the home firm applies for its subsidy, then output and profits of the home (foreign) firm is increasing (falling) in the home firm’s subsidy. If the foreign firm applies for its subsidy, then output and profits of the foreign (home) firm is increasing (falling) in the foreign firm’s subsidy. If the subsidy is the same across firms and accepted by both, then output of both is increasing in the common subsidy.

**Proof:** Define
\[ \Delta = \left( 2P_x + P_{xx}X - C_{xx} \right) \left( 2P_x + P_{xx}X^* - C_{xx}^* \right) - \left( P_x + P_{xx}X \right) \left( P_x + P_{xx}X^* \right) > 0. \] (5)

Beginning with the home firm subsidy the following comparative statics (where the arguments of functions are suppressed) can be derived from (3) and (4):

\[ \frac{dX}{ds} \left( I_s, I^*s^* \right) = -I \Delta^{-1} \left( 2P_x + P_{xx}X^* - C_{xx}^* \right) \geq 0 \] (6)

and

\[ \frac{dX^*}{ds} \left( I_s, I^*s^* \right) = I \Delta^{-1} \left( P_x + P_{xx}X^* \right) \leq 0 \] (7)

with strict inequality as long as the home firm takes the subsidy (i.e. \( I = 1 \)). Note that the change in \( X \) exceeds that of \( X^* \) in absolute value. Taking the derivative of profits of the two firms and applying the appropriate envelope theorems:

\[ \frac{d\pi}{ds} \left( I_s, I^*s^* \right) = P_x X \frac{dX}{ds} \left( I_s, I^*s^* \right) + IX \geq 0 \] (8)

and

\[ \frac{d\pi^*}{ds} \left( I_s, I^*s^* \right) = P_x X^* \frac{dX}{ds} \left( I_s, I^*s^* \right) \leq 0 \] (9)

i.e. the domestic firm profits are increasing in any subsidy it takes which this results in lower foreign firm profits. This is the profit-shifting effect of export subsidies described by Brander (2005).

Similarly, the impacts of the foreign firm’s subsidy on outputs are:

\[ \frac{dX}{ds^*} \left( I_s, I^*s^* \right) = I^* \Delta^{-1} \left( P_x + P_{xx}X \right) \leq 0 \] (10)

and

\[ \frac{dX^*}{ds^*} \left( I_s, I^*s^* \right) = -I^* \Delta^{-1} \left( 2P_x + P_{xx}X - C_{xx} \right) \geq 0 \] (11)
with strict inequality as long as the foreign firm takes the subsidy (i.e. $I^*=1$). This in turn changes equilibrium profits:

$$\frac{d\pi(I_s, I^* s^*)}{ds^*} = P_x X \frac{dX^*(I_s, I^* s^*)}{ds^*} \leq 0$$

and

$$\frac{d\pi^*(I_s, I^* s^*)}{ds^*} = P_x X^+ \frac{dX(I_s, I^* s^*)}{ds^*} + I^* X^+ \geq 0$$

with strict inequality if the foreign firm accepts the subsidy.

Finally, if the firms both accept an identical subsidy, by adding (6) and (10), the impact of a change in the common subsidy on home output is:

$$\frac{dX(s, s)}{ds} = -\Delta^{-1}(P_x - C_x^*) > 0$$

while the effect on foreign output is:

$$\frac{dX^+(s, s)}{ds} = -\Delta^{-1}(P_x - C_x^*) > 0,$$

i.e. each firm’s output rises. $\text{Q.E.D.}$

The intuition for these results can be understood in two ways. First, when a given firm’s subsidy rises, this is akin to a decline in its costs. As such, it produces more. Since outputs are strategic substitutes for one another, this reduces the output of its competitor. The combination of these two effects increases the firm in question’s profits and reduces those of its competitor. Alternatively, one can view it through the lens provided by Brander and Spencer (1985) which is that by subsidizing one firm, the home government is encouraging it to produce more like a Stackelberg leader. Thus, beginning from an equilibrium where both subsidies are zero, the introduction of a subsidy to the home firm pushes the equilibrium from a Nash one towards a Stackelberg one in which the home firm is exploiting its first-mover advantage. It is important to note that, as is well known, the ranking of industry profits
between the Nash and Stackelberg equilibria is an ambiguous one. Here, if the home firm takes its subsidy, this is easily seen by:

\[
\frac{d\pi(I_s, I_s^*)}{ds} + \frac{d\pi(I_s, I_s^*)}{ds} = \Delta^{-1}P_x(P_x + P_{xx}X^*)(X - X^*) - \Delta^{-1}P_xX^*(P_x - C_{xx}) + X
\]

Dropping the last term, which is the direct impact of the subsidy on the home firm profits, the change in net-of-subsidy industry profits depends on the first term, which is positive whenever the home firm output is larger, and the second term, which is always negative.

Intuitively, there are two conflicting forces in play. If the home firm has greater output, it is more productive. As a result, subsidizing the home firm shifts output towards the more efficient producer, raising profits. However, total output also rises, lowering the price. Which of these effects dominates depends on the relative cost functions of the firms as well as the elasticity of demand. It will be useful to keep this ambiguity in mind when discussing the optimal subsidy.

Whether or not a firm accepts the subsidy depends on whether the benefit from doing so is at least as large as the red tape cost of doing so. For the home firm, this is when:

\[
(1-t)\pi(s,0) \geq (1-t)\pi(0,0)
\]

i.e. taking as given the level of foreign firm output, the profits evaluated at its best response level of output is greater with the subsidy than without. This allows me to define a maximal level of red tape \( R(s, X^*) \) where for values of \( R \leq R(s, X^*) \) the home firm finds it advantageous to apply. This is given by:

\[
R(s, X^*) = P\left(X(s,0) + X^*\right)X(s,0) - C\left(X(s,0)\right) + sX(s,0)
\]

\[
- P\left(X(0,0) + X^*\right)X(0,0) + C\left(X(0,0)\right).
\]

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16 See Tirole (1999) for a specific example that shows, even for a given functional form, that the profit ranking depends on parameter values. Colombo and Labrecciosa (2008) offer a discussion on situations in which the two equilibria coincide.
Alternatively, for a given level of red tape, whether or not the home firm applies for the subsidy will depend on its benefit from doing so (the right-hand side of (17)). Note that this confirms the result that the firm would never apply whenever \( s \leq 0 \) since that would require a red tape payment, i.e. \( R(s, X^+) \leq 0 \) with equality only when the subsidy is zero.

Similarly, for the foreign firm, they will only apply for a subsidy if their level of red tape is no more than:

\[
R^*(s^*, X) = P \left( X + X^* \left( \bullet, s^* \right) \right) X^* \left( \bullet, s^* \right) - C^* \left( X^* \left( \bullet, s^* \right) \right) + s^* X^* \left( \bullet, s^* \right) \\
- P \left( X + X^* \left( \bullet, 0 \right) \right) X^* \left( \bullet, 0 \right) + C^* \left( X^* \left( \bullet, 0 \right) \right).
\]

It is important to recognize that in (17) and (18), these are the perceived benefits of the subsidy in that each firm treats the others output as a given and invariant to its own decision on whether or not to apply for the subsidy. As such, these cut-offs are not directly dependent on the other firm’s subsidy.

When the firms differ only in their cost parameters \( \gamma \) and \( \gamma' \), it is straightforward to describe subsidy and red tape combinations for which only one firm applies.

**Lemma 1:** Assume that \( C^* \left( X; \gamma' \right) = C \left( X; \gamma' \right) \), i.e. cost functions differ only in the cost parameters. Then the home firm will apply for any subsidy that the foreign firm does if and only if \( \gamma' \geq \gamma \). If \( \gamma' > \gamma \), then there exist subsidy/red tape combinations for which only the home firm would apply.

**Proof:** Taking the derivative of (17) with respect to \( \gamma \) and applying the envelope theorem (and keeping in mind that the home firm takes the foreign output as a given), the change in the perceived benefit of the subsidy is:

\[
C_{\gamma} \left( X_0; \gamma \right) - C_{\gamma} \left( X(s); \gamma \right) < 0
\]
i.e. the benefit of the subsidy is decreasing in cost parameter (and the output of the firm). As such, if \( \gamma' \geq \gamma \) the perceived benefit of a given subsidy is greater for the home firm that the
foreign firm. Therefore, any subsidy that the foreign firm applies for, the home firm will as well. Furthermore, if the home firm applies for any subsidy that the foreign firm does, then it must be that the home firm benefit is at least as large as the foreign firm benefit, implying that \( \gamma' \geq \gamma \). By the same analysis, when \( \gamma' > \gamma \), there is a positive difference between the home and foreign benefits. If the red tape cost is greater than the foreign benefit but less than the home benefit, then this combination of subsidy and red tape is such that only the home firm would apply. \( \text{Q.E.D.} \)

Thus, for there to be a case in which only the home firm applies for the subsidy that the foreign firm does not, then the home firm must have a cost advantage.\(^{17}\) As the goal of the paper is to describe this situation, for the remainder of the analysis I assume this is the case although I describe the reverse in Section 4.4.

3. The Choice of Subsidies and Red Tape

In this section, I lay out the home government’s objective and derive its preferred policies when discrimination is and is not permitted.\(^{18}\) As in Brander and Spencer (1985), the home government chooses its policy to maximize a function \( G \) which is the profits that accrue to its citizens less net government expenditures:

\[
G = \alpha (1-t) \pi + \beta (1-t) \pi' - IsX - I's^*X^* + t (\pi + \pi^*) .
\] (19)

There are two differences in this function relative to the Brander and Spencer version, however. The first is that, due to potential cross-border ownership, not all home firm profits need accrue to home citizens while a portion of foreign profits may. Second, due to profit taxes, net government expenditures are the difference between subsidy expenditures and tax

\(^{17}\) In other settings, other home firm advantages can be found. For example, if the goods are imperfect substitutes for one another, if there is a bias towards the home firm’s product in consumption, its sales – and thus the benefit of the subsidy – will be greater than that of the home firm even if costs are the same.\(^{18}\) Since all production in the model occurs in home, I do not model the foreign government.
revenues. To arrive at the Brander and Spencer formulation, set $\alpha = 1$ and $\beta = t = 0$. I consider alternate objection functions (such as one that includes consumer surplus) below.

For the moment, assume that the tax rate is set exogenously (I discuss an endogenous tax in Section 4.1) so that the government is choosing a policy consisting of $\{s, R, s^*, R^*\}$. If the government is bound by non-discrimination, then it is constrained so that $s = s^*$ and $R = R^*$. When the government does not offer a subsidy for which either firm applies, output levels are $X(0,0)$ and $X^*(0,0)$, resulting in a government payoff of:

$$G(0,0) = (\alpha(1-t)+t)\pi(0,0) + (\beta(1-t)+t)\pi^*(0,0).$$  \hspace{1cm} (20)

### 3.1 Discrimination

In this subsection, I illustrate the desire of the government to treat the two firms differently when it comes to subsidization. If the government can discriminate, there is no need for red tape since the government can stop a firm from taking its firm-specific subsidy simply by reducing that subsidy to zero. Further, for any subsidy that the government wishes a firm to apply for, requiring it to incur red tape costs only reduces its profits and therefore the government payoff. Therefore, with discrimination, the maximization problem reduces to choosing the two firm-specific subsidies. This leads to the second proposition.

**Proposition 2:** When discrimination is possible, as the model moves towards one in which all home firm profits and no foreign firm profits accrue to home, the optimal home subsidy is positive and no foreign subsidy will be used.

**Proof:** The first order condition of (19) with respect to the home subsidy is:

$$\frac{dG}{ds} = (\alpha(1-t)+t)P_X \frac{dX^*}{ds} + (\beta(1-t)+t)P_X X^* \frac{dX}{ds}$$

$$- (1-\alpha)(1-t) X - s \frac{dX}{ds} - s^* \frac{dX^*}{ds}.$$

\hspace{1cm} (21)
This condition consists of two factors, one dealing with industry profits (the top line of (21)) and one dealing with the cost of the subsidy (the bottom line).

The first term of the profit aspect is positive and represents the result that an increase in the home firm subsidy reduces output by the foreign firm and increases $\pi$. This is the profit-shifting motivation for using export subsidies initially identified by Brander and Spencer (1985). The second term however, is negative, because by shifting profits to home this simultaneously erodes foreign firm profits. The net effect of these two is ambiguous. Because the change in $X$ exceeds that of $X^*$ in absolute value, the profit shifting effect depend on the shares of profits that accrue to home citizens (which are $\alpha(1-t)+t$ for the home firm and $\beta(1-t)+t$ for the foreign firm) and the relative size of home’s output. If $\alpha = \beta$, implying that equal shares of the firms’ profits accrue to home, then the impact depends on the change in industry profits which, as discussed above, is in general ambiguous and relies on the parameterization of the model. This is true even when there is no direct ownership of firms but the tax rate is positive since a subsidy for the home firm can increase the tax base ($\pi + \pi^*$) and therefore tax revenues, a benefit which must be balanced against the subsidy’s cost.\(^{19}\) As the share of home firm profits that accrue to home citizens increases, this increases the benefit of shifting profits to the home firm via the subsidy. Alternatively, as the home share of foreign firm profits rises, this reduces the desired home firm subsidy because it erodes foreign firm profits.

The second line in (21) captures marginal cost of providing the subsidy to the home firm. This includes both the added net cost of subsidizing home production as well as a reduction in the cost of subsidizing the foreign firm. Note that as either $\alpha$ or $i$ increases, the net cost of subsidizing the home firm declines since a greater part of the subsidy paid out to

\(^{19}\)This, insofar as one might choose to interpret output of firms as investment, draws a link between my results and those on the optimal taxation of foreign direct investment since the subsidy increases the “investment” of firms.
that firm is retained by home citizens as profits. However, as long as neither $\alpha$ nor $t$ equals unity, i.e. all home firm profits accrue to home, that first marginal cost term does not drop out of the first order condition.

Combining the profit and cost forces implies that, evaluated at $s = 0$, the desire to use a subsidy for the home firm is ambiguous. Nevertheless, as the model approaches that of Brander and Spencer (1985) where all home profits accrue to home ($\alpha = 1$) and no foreign profits do ($\beta = t = 0$), evaluating (21) at $s = 0$ yields an unambiguously positive result, i.e. the government desires to subsidize the home firm’s exports, just as in their model.

Turning to the choice of the foreign subsidy, the first order condition is:

$$
\frac{dG}{ds} = (\beta(1-t)+t)P_x X^* \frac{dX^*}{ds} + (\alpha(1-t)+t)P_x X \frac{dX}{ds} - (1-\beta)(1-t)X^* \frac{dX^*}{ds} - s \frac{dX}{ds} - s \frac{dX}{ds} \tag{22}
$$

where the various terms mirror those in (21). A key difference here, however, is that the second term of the profit aspect unambiguously outweighs the first, i.e. the profits accruing to home citizens declines in the foreign subsidy. Intuitively, subsidizing the foreign firm both shifts profits away from home citizens and lowers industry profit by encouraging production by the less productive firm. Thus, the profit aspect is strictly negative. As with the home firm subsidy, as long as $\beta$ and $t$ are less than one, the first two terms of the cost aspect are negative. Thus, the only positive aspect of subsidizing the foreign firm is the final term, i.e. the reduction in the subsidy payments to the home firm (if any). However, since this can be achieved at a lower cost simply by lowering $s$, this means that the government would not choose to offer foreign a positive subsidy. Since negative subsidies are not applied for, this results in the foreign firm being unsubsidized.\textsuperscript{20} Q.E.D.

\textsuperscript{20} If the government can force a negative subsidy on the foreign firm, doing so generates additional benefits by both raising additional tax revenues beyond those captured by profit taxes and reducing foreign firm output. In some parameterizations of the model (available on request) this second aspect can so dominate the optimal $s^*$ that the government actually drives the foreign firm out of business, making the home firm a monopolist.
Combining the above highlights the desire to discriminate by the home government. In particular, when little of the foreign firm profits accrue to home due to low $\beta$ or low taxes, the home government benefits its citizens by subsidizing the home firm only, pushing it towards the Stackelberg leader output. This is the same motivation discussed for the (inherently discriminatory) export subsidy in Brander and Spencer (1985).

3.2 Non-discrimination

Now suppose that the government is constrained to non-discrimination so that $s = s^*$ and $R = R^*$. If the government sets a subsidy that neither firm takes, then its payoff is the same as in (20). This results in the third proposition.

**Proposition 3:** Suppose that discrimination is not possible. Then, if any subsidy is offered, it will be paired with a red tape cost sufficiently large so that only the home firm applies. Whether this is the case depends on the relative productivity of firms as well as the extent to which different firms’ profits accrue to home.

**Proof:** If the government intends to set a subsidy so that both firms apply, the optimal level of red tape is zero just as it was in the discriminatory case since a positive level of red tape only lowers profits without affecting production. The first order condition in this situation is found by summing (21) and (22) and restricting subsidies to be the same:

$$\frac{dG}{ds} = ((\alpha(1-t)+t)X - (\beta(1-t)+t)X^*)\Delta^{-1}P_xP_{xx}(X^*-X)$$
$$-((\beta(1-t)+t)P_xX^*-s)\Delta^{-1}(P_x-C_{xx}) -((\alpha(1-t)+t)P_x X - s)\Delta^{-1}(P_x - C_{xx})$$
$$-(1-\alpha)(1-t)X -(1-\beta)(1-t)X^*$$

(23)

which is strictly negative for any subsidy the firms would apply for (i.e. $s > 0$). Thus, in the event that both firms would apply for the same subsidy the government would rather offer no subsidy at all. Note that this is true even in the Brander and Spencer model, where (23) would reduce to:
\[
\frac{dG}{ds}\bigg|_{s=0} = \Delta^{-1}P_x P_{xx} X\left( X^* - X \right) - \Delta^{-1}P_x X \left( P_x - C_{xx} \right) - X^*.
\]

Since a rise in the common subsidy increases output by both firms, it erodes net-of-subsidy profits of each firm (and thus industry profits). This, combined with the cost of the subsidy implies that there is no desire to offer a common subsidy for which both firms apply.

When red tape is used, however, it is possible to get only one firm to apply for the subsidy. Since \( \gamma < \gamma^* \), if one firm applies, it will be the home firm. Further, by virtue of (22), if the home firm does not apply for a subsidy, there is no desire to subsidize the foreign firm. Thus, it is only necessary to consider the combination of red tape and subsidy for which only the home firm applies. Since red tape is a cost, the home government will utilize the smallest level of red tape that prevents the foreign firm from applying in equilibrium, \( R^*\left( s, X(s,0) \right) \).

This results in a first order condition of:

\[
\frac{dG}{ds} = (\alpha(1-t)+t)P_x X \frac{dX^*}{ds} + (\beta(1-t)+t)P_x X^* \frac{dX}{ds} - (1-\alpha)(1-t)X - s \frac{dX}{ds} - (\alpha(1-t)+t) \frac{dR^*(s, X(s,0))}{ds}
\]

i.e. the same as in the discriminatory case with the addition of the final term which captures the change in the losses due to red tape. From (18), where the value of home output the foreign red tape cutoff is evaluated at is \( X(s,0) \) (i.e. where only the home firm applies):

\[
\frac{dR^*(s, X)}{ds} = X^*(s,s)
\]

\[
+ \left( P_x \left( X(s,0) + X^*(s,s) \right) X^*(s,s) - P_x \left( X(s,0) + X^*(s,0) \right) X^*(s,0) \right) \frac{dX(s,0)}{ds}
\]

\( (25) \)
which at \( s = 0 \) reduces to \( \frac{dR^*}{ds}(s, X)\bigg|_{s=0} = X^*(0, 0) > 0. \) Since \( R^*(0, 0) = 0 \), implying that if no subsidy is offered the government obtains \( G(0, 0) \), to determine whether a subsidy/red tape combinations will be implemented, one need only evaluate the sign of (24) at \( s = 0 \). This is:

\[
\left. \frac{dG}{ds}\right|_{s=0} = \left( \alpha (1-t)+t \right) P_X X(0, 0) \frac{dX^*}{ds}(0, 0) + \left( \beta (1-t)+t \right) P_X X^*(0, 0) \frac{dX}{ds}(0, 0) - \left( 1 - \alpha \right) (1-t) X(0, 0) - \left( \alpha (1-t)+t \right) X^*(0, 0).
\]

As before, since outputs are invariant to profit shares, (26) is increasing in \( \alpha \) and decreasing in \( \beta \). Thus, the greater the share of home (foreign) firm profits retained by home citizens, the more (less) like a subsidy. Nevertheless, the added cost of red tape (the final term) puts additional limits on the situations where the subsidy is desirable since it is no longer enough for (21) evaluated at \( s = s^* = 0 \) to be positive, it must instead be sufficiently so. For example, in the Brander and Spencer model, (26) is:

\[
\left. \frac{dG}{ds}\right|_{s=0} = P_X X^*(0, 0) - X^*(0, 0) = \Delta^1 P_X \left( P_X + P_{XX} X^* \right) X(0, 0) - X^*(0, 0)
\]

which depends on how the relative productivity of the home firm (i.e. on \( X(0, 0) \) versus \( X^*(0, 0) \)) as well as the responsiveness of the price to the subsidy-induced change in the foreign firm’s output \( \left( \Delta^1 P_X \left( P_X + P_{XX} X^* \right) \right) \). If foreign firm output is small (implying a small increase in red tape costs) and/or there is a large increase in the price, then it is more likely that (27) is positive and a combination of a subsidy and red tape will be used in the Brander and Spencer (1985) model.

Q.E.D.

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\(^{21}\) To see this, note that since this subsidy is common, there are two effects. First, there is a direct effect from a change in the subsidy offered to the foreign firm which is taking the home output as given. Applying the envelope theorem, this results in the first term of (25). Second, because there is a change in the home firm’s subsidy, this changes its equilibrium output and changes the value of \( X \) foreign takes as given in the equilibrium. This is the second term. When \( s = 0 \), this second term reduces to zero.
To further explore the conditions for when (27) is positive, consider the following parameterization \( P = A - B(X + X^*) \), \( C(X) = \gamma X \), and \( C'(X^*) = \gamma' X^* \) where \( \gamma' \geq 1 \). In this parameterization, (26) becomes:

\[
\frac{dG}{ds}
\bigg|_{s=0}
= \left( \frac{1}{9B} \right)
\left[
(4\alpha - 3)(1-t) + t \right]
\left[
(A - 2\gamma + \gamma') - (2(\beta(1-t) + t) + 3(\alpha(1-t) + t))\right]
\left[
(A - 2\gamma' + \gamma)\right]
\]

It is easily verifiable from this that, as in the general case, \( \frac{dG}{ds} \bigg|_{s=0} \) is increasing in \( \alpha \) and declining in \( \beta \). The impact of other parameters, however, is less clear cut. Starting with \( \gamma \):

\[
\frac{d}{ds} \left. \frac{dG}{d\gamma} \right|_{s=0} = \left( \frac{1}{9B} \right)
\left[
6(1-\alpha)(1-t) - (2(\beta(1-t) + t) + 5(\alpha(1-t) + t))\right]
\]

which is negative for large values of \( \alpha \) or \( t \) but positive for small values of these variables. Conversely,

\[
\frac{d}{ds} \left. \frac{dG}{d\gamma'} \right|_{s=0} = \left( \frac{1}{9B} \right)
\left[
4(\beta(1-t) + t) + 7(\alpha(1-t) + t) - 3(1-\alpha)(1-t)\right]
\]

is positive for large values of \( \alpha \) or \( t \) but negative for small values of these variables.

Intuitively, a fall in \( \gamma \) or a rise in \( \gamma' \), implying an increase in the home firm’s productivity advantage, means that it is more likely that shifting output from the foreign to the home firm increases the net-of-subsidy home firm profits. When the government values this relative to the subsidy’s cost, which it does with a high \( \alpha \), this increases its desire to use a subsidy. In the Brander and Spencer version of the model, this is very clear-cut since:

\[
\left. \frac{dG}{ds} \right|_{s=0} = \frac{1}{9B}
\left[
5(\gamma' - \gamma) - 2A\right]
\]

indicating that for marginal cost differences larger than \( 2A/5 \) the government will implement a subsidy along with a sufficiently high red tape cost to prevent the foreign firm from applying.
Comparable to the cost parameters the impact of the tax rate is also ambiguous:

\[
\frac{d}{ds}\left.\frac{dG}{dt}\right|_{s=0} = \left(\frac{1}{9B}\right)(4(1-\alpha)(A-2\gamma')-(2(1-\beta)+3(1-\alpha))(A-2\gamma' +\gamma))
\]

which is itself decreasing in \( \alpha \) and increasing in \( \beta \). As \( \alpha \) approaches one, this becomes unambiguously negative. The intuition for this is that when \( \alpha \) is large, the government views a tax increase akin to a rise in \( \beta \), increasing its sensitivity to the decline in foreign firm profits that the subsidy creates and decreasing the likelihood that it decides to implement a subsidy. This interaction between instruments relates to the findings of Haufler and Wooton (1999), who consider find that higher tariffs go along with higher lump sum taxes in the presence of a single, mobile firm. There, since a higher tariff by home encourages the single firm to locate there, home can extract greater rents through the lump sum tax. However, since there is no firm location choice in my model, it is impossible to draw direct comparisons.

Thus, in general, whether or not the home government would choose to use a subsidy and red tape depends on variables governing the amount of firm profits that accrue to home (\( \alpha \), \( \beta \), and \( t \)), the relative cost functions, and the elasticity of demand. Finally, since higher subsidy levels require higher red tape costs, any positive subsidy under non-discrimination will be less than that found when discrimination is possible.

4. Extensions

The above results demonstrate that the desire to use red tape to achieve discrimination is possible but need not hold in every case. In this section, explore how the conditions for the use of red tape depend on an endogenous tax rate, benefits from output, and domestic consumption.

4.1 The Profit Tax
In the above analysis, the tax rate was treated as given (particularly for comparisons to the Brander and Spencer (1985) model where it was constrained to zero). Alternatively, it can be endogenized. Since the profit tax does not affect output, the first order condition of (19) with respect to $t$ is:

$$\frac{dG}{dt} = (1-\alpha)\pi + (1-\beta)\pi^* \geq 0$$

i.e. the government will increase the non-distortionary tax as much as possible as this prevents the profit leakage due to cross-border ownership. One way to limit this is to assume that if after-tax profits fall below a certain level firms relocate elsewhere, eliminating tax receipts and potentially lowering profit shares. In this way, taxes would be limited by the mobility of firms. Alternatively, an interior solution can be obtained by introducing a cost $D(t)$ of implementing a tax that becomes large as the tax rate approaches 100%. Such costs could arise from administration, collection, and enforcement costs. In both of these cases, this would result in an interior solution for the tax rate that, since it depends on profits, depends on subsidies and red tape. However, this does not change the above analysis except that, when evaluating key conditions such as (21) or (26) at $s = 0$ it would be necessary to use this optimal tax. Thus, similar results to those above would be obtained.

A second extension regarding taxes would be to impose a non-negative budget constraint on the government, i.e. that tax receipts must be at least as large as any subsidies paid out. This constraint, when binding, would limit the subsidies given to firms. However, as long as there are positive tax revenues when subsidies are zero, this constraint would be non-binding at $s = 0$, again implying that the above discussion on when a subsidy and/or red tape will be offered remains fundamentally unchanged.

Finally, if, as in Becker (2010) the tax rate is distortionary, then it too can potentially be used as a method of manipulating firm output levels. In his model, he considers a setting in which the firms undertakes vertical foreign direct investment in which each an input in its
parent country (home for one firm, foreign for the other) which is converted into a final good and then sold in a third country. He shows that by choosing its double tax rules appropriately, the home country can achieve the profit-shifting effect by encouraging production by its firm. Which tax system achieves this depends on parameters including the cost of transfer pricing and relative tax rates which, similar to the results here, govern the shift in equilibrium output in response to changes in home policies. As such, if taxes altered output levels in the current model, they could be used to achieve similar effects here. However, unless such a distortionary tax rate succeeds in implementing the home government’s preferred equilibrium at lower cost than the subsidy, there can still be a role for subsidizing the home firm relative to the foreign one.

4.2 Benefits of Output

In the above model, the only benefit that production presented to the home government was through the profits that accrued to home citizens. Alternatively, I can modify the government’s objective function by adding a benefit function \( B(X, X^*) \) that is increasing in the output of firms. This function can represent many things including the wages paid to domestic production factors (in which case the formulation of the benefit function would be \( B(X, X^*) = C(X) + C'(X^*) \)) or spillovers from the foreign firm to the local economy (where \( B(X, X^*) = B(X^*) \)). This addition brings the model closer to that on the taxation of foreign direct investment where governments often seek to attract production because of these non-tax benefits.\(^{22}\)

Since firms do not internalize these benefits, this modification does not affect the equilibrium outputs for a given subsidy/red tape combination. This addition does, however,

\(^{22}\) Evidence of such spillovers is provided by Javorcik (2004), Girma, Görg, and Pisu (2008), and many others. Crespo and Fontoura (2007) provide a recent survey.
alter the first order conditions for the subsidies. When discrimination is possible, the first order condition for the home firm subsidy (21) becomes:

\[
\frac{dG}{ds} = (\alpha (1-t) + t) P_X \frac{dX}{ds} + (\beta (1-t) + t) P_X X^* \frac{dX}{ds} \\
-(1-\alpha)(1-t) X - s \frac{dX}{ds} - s^* \frac{dX^*}{ds} + B_x \frac{dX}{ds} + B_x^* \frac{dX^*}{ds}
\]

which includes two additional terms. The first of these, \( B_x \frac{dX}{ds} \) is positive and represents the additional benefits that come from expanding home firm output. This is at least partially countered by the final term \( B_x^* \frac{dX^*}{ds} \) which represents the reduction in benefits as foreign output shrinks. Whether the net effect on the benefit function is positive or negative, and thus induces a higher or lower home firm subsidy, depends on the precise nature of these additional benefits. Similarly, the first order condition for the foreign firm subsidy would now include \( B_x \frac{dX}{ds} + B_x^* \frac{dX^*}{ds} \) implying that there may now be a rationale for subsidizing the foreign firm when discrimination is possible. This is akin to the desire to attract FDI by providing tax reductions (for example) However, since \( \alpha > \beta \), implying that more home firm profits are retained by home citizens, there is still a tendency to subsidize the home firm more than the foreign one.

When discrimination is not possible and both firms take the subsidy, the first order condition is again modified to include the change in benefits from the subsidy. Since an increase in a common subsidy increases output of both firms, the benefit function rises from an increase in the common subsidy. As such, unlike the baseline model, the government might find it advantageous to subsidize both firms with zero red tape as opposed to no subsidy if this increase in the benefit function is sufficiently large. Finally, similar to when discrimination is possible, these additional benefits would affect the desirability of using a subsidy that is targeted at the home firm via red tape. Furthermore, even if the equivalent of
(26) is positive indicating the desirability of using a subsidy/red tape combination as compared to $G(0,0)$, this is no longer sufficient for such a policy to be preferred to a common subsidy without red tape as the equilibrium in that case may involve a subsidy for both. Instead, it is necessary to compare the maximum payoff with red tape to the maximum payoff without it. Since this comparison is ambiguous even in the absence of such benefits, it will be so in this more general version. However, there will still exist situations where red tape is beneficial and used in equilibrium. For example, when $B(X, X^*)$ is small compared to the profit aspect of government payoffs and is relatively invariant to foreign output, then the solution is close to that in the above model, i.e. no subsidy will be used without red tape and a subsidy with red tape is more likely when $\alpha$ is high and $\beta$ is low.

4.3 Home Consumption

One can also modify the above model so that not all firm output is exported to the overseas market, but that a portion of it is consumed at home. This would then introduce consumer surplus, which depends on domestic sales by the firms, into the government objective function. In this case, when a firm receives an export subsidy it both increases total output and reduces home sales as it takes advantage of the subsidy. As discussed in detail in Brander and Spencer (1985), this reduces the desirability of subsidizing exports because, although there is still the profit-shifting motivation for doing so, it is tempered by the loss to domestic consumer surplus as home sales falls. Nevertheless, they demonstrate that this does not negate their finding that some positive subsidy will be used. Here, however, since not every case results in a subsidy even in the Brander and Spencer setting, the desirability of a subsidy will depend on parameter values.

Alternatively, suppose that the government is unable to distinguish between output destined for the domestic market and the overseas market, i.e. the subsidy is a production subsidy rather than an export subsidy. In this case, sales both at home and abroad would
increase in the subsidy (since a rise in the subsidy reduces the cost of supplying either market). Now, as in Section 4.2, there is an additional reason to subsidize production, namely to increase the inefficiently low duopoly level of domestic sales. This has the same implications for the use of a subsidy and red tape as discussed there.

4.4 Foreign Firm Cost Advantage

In the above analysis, as per Lemma 1, the assumption that the home firm had a cost advantage meant that there were subsidy/red tape combinations for which only the home firm – the firm for which a greater share of profits accrue to home citizens – would apply. Alternatively, suppose that the foreign firm has a cost advantage and $\gamma' < \gamma$. In this case, two key changes occur. First, when discrimination is possible, the first line of (22) at zero subsidies becomes ambiguous with equal subsidies since $X'(0,0) > X(0,0)$. In essence, when the foreign firm is more productive, there is a welfare gain from subsidizing that firm and shifting output to it. This must be balanced against the relative income share since it remains the case that $\beta < \alpha$. In the Brander and Spencer (1985) version, this second effect dominates, however, as with the discussion of the home firm subsidy with discrimination, when income shares are similar, the net effect depends on the parameterization of the model. Thus, with discrimination, it may be that the government desires to subsidize both firms.

This difference is also reflected in the second change, which is that the first order condition without discrimination or red tape ((23)) is also ambiguous since the first term, $(\alpha(1-t) + t)X - (\beta(1-t) + t)X'$, depends on relative ownership shares as well as outputs. Note that this ambiguity persists in the Brander and Spencer (1985) version since it is now the case that $X'(0,0) > X(0,0)$. Thus, there may be a benefit to subsidizing both firms. Nevertheless, red tape may still be used. When ownership shares are close to one another and are sufficiently large (so that most subsidy costs are recovered), when industry profits rise
when subsidizing the productive foreign firm, there may well be a rational for subsidizing the foreign firm only via red tape.

4.5 Additional Firms

Finally, the model can be extended to include additional firms. Clearly, this affects the equilibrium level of output across firms and alters the impact of a subsidy on industry profits. Nevertheless, when it is possible to increase the profits of firms with sufficiently large home income shares via a subsidy that is targeted to them, there will exist a role for subsidies and red tape when discrimination is possible. The primary change is that the home government may choose to target the subsidy towards groups of firms rather than a single change. The existence of such a result, however, depends on parameter value including ownership shares and productivities just as it did in the two firm case.

5. Conclusion

The purpose of this paper has been to illustrate how wasteful red tape can be used as a de-facto method of achieving discrimination for a government offering an export subsidy. Because a greater share of the home firm’s profits accrue to home citizens that is the case for the foreign firm, the government has a greater desire to subsidize the home firm’s exports and create the profit-shifting effect identified by Brander and Spencer (1985). When outright discrimination is not permitted, this can still be achieved by implementing an appropriate level of red tape that stops the foreign firm from applying for the subsidy but does not do so for the home firm. To achieve this requires heterogeneity, and in particular, that the home firm receives a larger benefit from the subsidy than the foreign firm does (as would occur with a cost advantage). This in and of itself is insufficient for red tape to be used since the benefit of profit-shifting must be weighed against the erosion of foreign firm profits and the costs of the subsidy and red tape. Nevertheless, there certainly exist situations in which red
tape is used. Thus, although governments may pay lip service to “non-discrimination”, the outcome of their policies can be very different.

Note that red tape is not the only way of targeting the subsidy. An alternative would be for governments to implement a “filing fee”, that is, a fee to apply for the subsidy. This would achieve the same discrimination result with the added bonus that it would cancel out the red tape cost of domestic applicants and capture surplus from foreign ones. One argument against the use of such a fee would be that the obviousness of such a surplus extraction would draw the ire of the foreign participants in the agreement requiring non-discrimination.

Recognizing the role of red tape is important for two reasons. First, given the current economic downturn, one might expect that policy makers are particularly sensitive to the desire to benefit their own citizens even if this beggars their neighbours. Second, as public finances become strained due to the downturn and increasing tax competition for FDI, this might increase the benefit of limiting overall subsidy expenditures. Since red tape is wasteful and detrimental to world welfare as a whole, this suggests the potential need to coordinate across nations to limit its use. On this second point, since developing countries are those for whom the cost of raising funds is perhaps the greatest, one might expect them to use the most red tape in order to limit payments. Although there is no obvious measure of red tape (particularly that for the policy instrument modelled here), the World Bank’s Doing Business project does provide some information for 180 countries on the time and effort it takes for firms to comply with government regulations. Figure 1 plots the time (in days) firms in a given country must wait on paperwork before exporting against that nation’s 2007 per capita GDP. Figure 2 repeats this exercise but uses the cost of exporting as measure by the US dollar cost of exporting a 20 foot container excluding tariffs, duties, or ocean transport.

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23 Evidence of growing international tax competition is given by Redoano (2007) and Davies and Voget (2009).
24 The red tape data are 2010 values and can be found at http://www.doingbusiness.org/. These measures have been used as proxies for red tape by Gillanders and Whelan (2010) and Lawless (2009). GDP per capita data are from the Penn-World Tables which are at http://pwt.econ.upenn.edu/php_site/pwt63/pwt63_form.php. These data were graciously provided to me by Robert Gillanders and Karl Whelan.
costs. Note that as the mean export time is 24 days and the mean export cost is $1386, these suggest that such red tape barriers are economically significant.\textsuperscript{25} Finally, Figure 3 uses the World Bank’s overall Doing Business Rank, which includes information on these two measures as well as others covering the time and cost of setting up a firm, dealing with taxation, getting credit, and other legal hoops firms must navigate when doing business. As can be seen, in each case there is indeed a negative correlation between the measure of red tape and GDP.\textsuperscript{26} Thus, an international agreement seeking to limit red tape may need to be cognizant of differences between the needs of developed and developing countries in this regard.

Finally, this paper represents but one type of policy that the government may wish to target. There can exist many other policies such as R&D subsidies, employment incentives, procurement contracts that a government may wish to target towards its firms as opposed to foreign-owned ones. As such, there may be a role for red tape in those settings as well. In any case, it is my hope that by recognizing the use of non-tax instruments to target tax policy that this work adds to the already active debate on international taxation.

\textsuperscript{25} Rigorous work discussing the magnitude and impact of red tape on entry decisions includes that of Ciccone and Papaionnou (2007) and Djankov, et al (2002).

\textsuperscript{26} This negative correlation is also statistically significant in each case, with the estimates available on request. Gillanders and Whelan (2010) suggest that the causality may also run the other way, with business-friendly policies promoting growth.
References


**Figure 1:** Export Time

![Graph showing the relationship between Export Time and GDP per Capita.](image)

**Figure 2:** Export Cost

![Graph showing the relationship between Export Cost and GDP per Capita.](image)
Figure 3: Doing Business Rank