

Export-Share Requirements vs. Production Taxes under Duopoly with Differentiated Products: A Conjecture Variational Approach

Ping-Yen Lai

Department of Translation and Interpretation, National Changhua University of Education, Changhua
Email: pingyenlai@gmail.com

How to cite this paper: Lai, P.-Y. (2022). Export-Share Requirements vs. Production Taxes under Duopoly with Differentiated Products: A Conjecture Variational Approach. *Theoretical Economics Letters*, 12, 1845-1856.

<https://doi.org/10.4236/tel.2022.126099>

Received: October 27, 2022

Accepted: December 27, 2022

Published: December 30, 2022

Copyright © 2022 by author(s) and Scientific Research Publishing Inc. This work is licensed under the Creative Commons Attribution International License (CC BY 4.0).

<http://creativecommons.org/licenses/by/4.0/>



Open Access

Abstract

One commonly held belief, as shared by some trade theorists, suggests that trade policy is inferior to domestic industrial policy as an interventionist device. This paper compares the output level on domestic market between production taxes and export-share requirements. Two firms, one domestic and one foreign/export firm, compete in a domestic market where products are imperfect substitutes of each other, while the foreign/export firm also supplies a portion of its output to foreign market. When tax rate is positive and conjecture variation is centered around Cournot, domestic output under export-share requirements will be higher than under production taxes. The values of conjecture variation that are centered around Cournot are bounded within an open interval, with its upper and lower bound determined by four factors: tax rate and export share, domestic output of firms under the tax regime, and the degree of product substitution.

Keywords

Conjecture Variation, Duopoly, Imperfect Substitutes

1. Introduction

Until the rise of protectionist disruption under the Trump administration, the globalization process has been largely marked by the emergence of China and India. Their integration toward the world supply chain has turned out to be one of the key growth drivers during the past decades. Among them, the rise of China as an export powerhouse through her reliance on export subsidies has drawn close attentions and generated some trade controversies. As noted in Defever & Riaño (2015: p. 137), “Despite undertaking wide-reaching trade liberalization

reforms such as expanding trading rights, lowering import tariffs, and eliminating non-tariff barriers in anticipation of joining the World Trade Organization (WTO) in 2001, the use of export subsidies in China, and those featuring export requirements in particular, was hardly curbed during this wave of reforms. This course of action has proven to be highly controversial...”

One commonly held belief in the literature of second-best suggests that trade policy is generally inferior to industrial policy in terms of its effectiveness in correcting domestic failure. Under market failure, tariffs could conceivably raise domestic output, even overall welfare, despite their negative impact on consumption and production. The same welfare enhancing effect, however, could be reached through production subsidies without incurring that much of the consumption distortion. To quote [Krugman & Obstfeld \(2005: p. 216\)](#): “Any proposed trade policy should always be compared with a purely domestic policy aimed at correcting the same problem. If the domestic policy appears too costly or has undesirable side effects, the trade policy is almost surely even less desirable, even though the costs are less apparent.”

While mainstream protective measures such as tariffs, quotas, and export subsidies have been extensively analyzed under the framework of imperfect competition since the late 80s, as surveyed by [Grossman \(1993\)](#), [Helpman & Krugman \(1994\)](#), other protective measures such as domestic content requirements and export-share requirements have received relatively scant discussions. During the late 20th and early 21st century, there were some theoretical papers that focused on export-share requirements, and most of them were cast under the general equilibrium framework, for example, [Rodrik \(1987\)](#), [Chao & Yu \(1994, 1996, 1998\)](#), [Ingene et al. \(2004\)](#), among others. The modelling of export-share requirements under partial equilibrium, however, has been largely missing, with few exceptions such as [Chiou & Jen \(2000\)](#).

This paper compares domestic output, which also implies prices, under production taxes with that under export-share requirements as both measures appear to reduce available output on domestic market, aside from other unintended consequences. The domestic market is characterized by duopolistic competition under differentiated products, while one of the duopolistic firms also supplies its product to foreign market. A production tax will serve to reduce the output on domestic market, thereby reducing consumer welfare. Presumably, export-share requirements could end up decreasing output on domestic market as a portion of output is supplied to the foreign market. One central focus is: under what conditions will one policy instrument serve to reduce output further, therefore be more anti-competitive than the other?

In contrast to the limiting of foreign imports under tariffs and quotas, the reduction of output on domestic market as a policy rationale can be justified under consumption externality. External effect on consumption, if there is one, must then be balanced against the anti-competitive effect in a model that incorporates externality. When dealing with externality, the first thing that comes into play would normally be the Pigouvian taxes and in that case, production taxes would

essentially become measures of environmental policy.

The idea that industrial or environmental policy could conceivably be dominated by a trade policy is something of a surprise. This is different from the case of correcting domestic market failure as posited by Paul Krugman. In that case, trade policy appears to be ineffective because it is targeted toward a remote segment, as one would count on trade policy to improve on trade performance, instead of fixing market failure. At the end of the day, the going for extra loop is just not worth it. The same argument cannot be made to this case, however, as trade policy could fare better than industrial policy because it can turn out to be less anti-competitive, and this is on top of its original design as a tool for securing export revenue.

As suggested by [Varian \(1992: p. 303\)](#), conjecture variation is “a useful classification scheme for oligopoly models. However, it is not really satisfactory as a model of behavior. The problem is that it involves a kind of pseudo-dynamics pasted on top of inherently static models.” This is a fair assessment. Since its inception, conjecture variation has been subject to other types of criticism as well, and subsequently went through evolution and refinement, which have been well documented and assessed by [Giocoli \(2005\)](#). Most of these criticisms, however, are stemmed from a theoretical perspective. The idiosyncrasy of conjecture variation is that it is underpinned by various modes of market structure, ranging from perfect competition to monopoly. Theoretical criticism aside, conjecture variation could at least qualify as a rule, or a diagnostic. A rule or diagnostic, as opposed to a theory, is underpinned from bottom-up as it is vindicated by underlying cases or evidences. Such rule or diagnostic can be useful as a scanning device, or roadmap, because we would then be able to identify problems that might arise under each different mode of market structure.

Ultimately, whether domestic output under export-share requirements will be lower, or higher, than under production taxes will depend on the value of conjecture variation. When conjecture variation is close to the range of Cournot, i.e., neither too competitive nor too collusive as compared with Cournot, export-share requirements will be less anti-competitive as its output-reducing effect on domestic market is milder. Thus, trade policy could be less interventionist than industrial policy under a wide, and reasonable range of conjecture variation.

The values of conjecture variation that are centered around Cournot are bounded inside an open interval, and the breadth of that interval is determined by four factors: tax rate and export-share, domestic output of both firms under the tax regime, and the degree of product substitution. The major results thus hinge critically on the assumption of imperfect substitutes. As products between firms are becoming more differentiated, firms could afford to care less of its output decision on others. Similar situation would arise when the values of conjecture variation stay close to zero. Furthermore, when a lower portion of the export firm is supplied to the foreign market, other things equal, this model converges to a typical Cournot duopoly.

This framework bears some resemblances to the models of Hwang & Mai (1988), Chiou & Jen (2000), and Eaton & Grossman (1986). Hwang & Mai (1988) took a conjecture variational approach and investigate the different implications of tariffs and quotas, with market characterized by duopolistic competition and perfect substitutes between products. This paper deviates from their approach through assuming products that are imperfect substitutes, and focuses on the differences between trade and industrial policy, rather than two trade policies. Although the formulation of imperfect substitutes is of general function form, the linear formulation in Wang (2002) is used for illustration purpose. The comparison of trade and industrial policy under different conjectures and imperfect competition can be dated back to Eaton & Grossman (1986), under which the optimal intervention and national welfare were both investigated.

This model is also different from Chiou & Jen (2000) because it adopts a general function throughout, as opposed to their mid-way linear function formulation. They discussed the regime under which the government imposes both policies on the same foreign firm, while the focus here is on different regimes and taxes are imposed on firms in a non-discriminatory manner. Their approach, however, is in line with Rodrik (1987) and Chao & Yu (1994), where the welfare effect of export-share requirements is evaluated with other coexistent policy measures, such as tariffs or quotas. In the following, section 2 discusses the model, and conclusions are taken up in section 3.

2. The Model

Two firms, one domestic and one foreign/export firm, each produces a good that is an imperfect substitute of its rival's product. The domestic firm can be interpreted as a local brand, while the export firm could stand for an established international brand that excels in the securing of world market share. As a portion of output of the export firm is supplied to the foreign market under export-share requirements, modelling their goods as imperfect rather than perfect substitutes is proper as it would normally be the case to have differentiated products for different markets. The production of domestic firm is denoted as q_h . The foreign/export firm produces q_f for its domestic market and supplies the same good, q_w to its target export market, taking export market prices p_w as given. Under the regime of production taxes, the inverse demand functions of duopolistic firms are given by:

$$p_h = p_h(q_h, q_f) \quad (1)$$

$$p_f = p_f(q_h, q_f) \quad (2)$$

Assuming that $\partial p_i / \partial q_i < 0$ and $\partial p_i / \partial q_j < 0$ and $|\partial p_i / \partial q_j| < |\partial p_i / \partial q_i|$ for $i \neq j$, under linear formulation, Equation (1) and (2) can be expressed as:

$$p_h = a - q_h - dq_f \quad (1a)$$

$$p_f = a - q_f - dq_h \quad (2a)$$

where d stands for the substitution coefficient that lies within the open interval $(0, 1)$. The closer to it is to 1, the higher would be the degree of substitution, as formulated in Equation (1) of Wang (2002). Overall, the domestic market is characterized by duopolistic firms that engage in quantity competition, while the export market is taken to be perfectly competitive. The government imposes production taxes on both firms in a non-discriminatory manner. The profit functions of domestic and foreign firm are specified as:

$$\pi_h = q_h p_h(q_h, q_f) - c_h(q_h) - tq_h \quad (3)$$

$$\pi_f = q_f p_f(q_h, q_f) + q_w p_w - c_f(q_f + q_w) - tq_f - tq_w \quad (4)$$

Differentiating with respect to output, the first order conditions are given by:

$$\frac{\partial \pi_h}{\partial q_h} = p_h + q_h^* (p_{hq_h} + \lambda_h p_{hq_f}) - c_{hq_h} - t = 0 \quad (5)$$

$$\frac{\partial \pi_f}{\partial q_f} = p_f + q_f^* (\lambda_f p_{fq_h} + p_{fq_f}) - c_{fq_f} - t = 0 \quad (6)$$

$$\frac{\partial \pi_f}{\partial q_w} = p_w - c_{fq_w} - t = 0 \quad (7)$$

where $\lambda_h = dq_f/dq_h$ denotes the conjecture variation, as held by the domestic firm, of the change in domestic supply of the export firm in response to a change in its output. Similarly, $\lambda_f = dq_h/dq_f$ denotes the conjecture variation, as held by the export firm, of the change in output of the domestic firm in response to a change in its domestic market supply. For simplicity, assume these conjecture variations are fixed and the same for both firms, so that $\lambda_h = \lambda_f = \lambda$.

This parameter appropriately denotes the degree of monopoly power. When $\lambda = 0$, we enter the case of Cournot equilibrium. When $\lambda > 0$, the equilibrium solution is more collusive than Cournot, and a collusive equilibrium is reached when $\lambda = 1$. Finally, when $\lambda < 0$, the equilibrium solution is more competitive than Cournot and $\lambda = -1$ stands for the case of quasi-competitive equilibrium.

Hwang & Mai (1988) followed Nikaido (1968) in assuming that both second order and stability conditions are satisfied. These conditions are taken as given here. Equation (5), (6) and (7) can be used to solve for the unique global equilibrium denoted by q_h^* , q_f^* and q_w^* , and consequently obtain policy implications. Optimal taxes or subsidies, however, will not be a focus here, as illustrated by some studies of the equivalence of tariffs and quotas, such as Hwang & Mai (1988) and Lai (2003), where quantities or prices under tariffs and quotas are compared through a prescribed benchmark.

On surface, production taxes and export-share requirements both serve to reduce output of the export firm, possibly stemming from some prior policy objectives. They are thus comparable based on the reduction in output under each of their specific goal. In addition, both production taxes and export-share requirements serve to bring in tax revenue and foreign revenue, respectively. Thus,

they can also be comparable in a model that incorporates contributions to government coffers and social welfare.

Next, consider the case of export-share requirements. Under the regime of export-share requirements, the inverse demand functions of duopolistic firms are given by:

$$\tilde{p}_h = \tilde{p}_h(\tilde{q}_h, \theta\tilde{q}_f) \tag{8}$$

$$\tilde{p}_f = \tilde{p}_f(\tilde{q}_h, \theta\tilde{q}_f) \tag{9}$$

where \tilde{q}_h denotes the output of domestic firm, while \tilde{q}_f denotes the output of foreign/export firm. The domestic government specifies that $1-\theta$ share of export firm's output is for export only. Thus, θ is a number that lies within the open interval $(0, 1)$ and the export firm takes θ as given. As θ approaches one, this model converges to a typical duopoly model without the imposition of taxes. The profit functions of domestic and export firm can be written as:

$$\tilde{\pi}_h = \tilde{q}_h \tilde{p}_h(\tilde{q}_h, \theta\tilde{q}_f) - c_h(\tilde{q}_h) \tag{10}$$

$$\tilde{\pi}_f = \theta\tilde{q}_f \tilde{p}_f(\tilde{q}_h, \theta\tilde{q}_f) + (1-\theta)\tilde{q}_f p_w - c_f(\tilde{q}_f) \tag{11}$$

Differentiating with respect to output, the first order conditions are given by:

$$\frac{\partial \tilde{\pi}_h}{\partial \tilde{q}_h} = \tilde{p}_h + \tilde{q}_h^* \left(\tilde{p}_{h\tilde{q}_h} + \lambda\theta\tilde{p}_{h\tilde{q}_f} \right) - c_{h\tilde{q}_h} = 0 \tag{12}$$

$$\frac{\partial \tilde{\pi}_f}{\partial \tilde{q}_f} = \theta\tilde{p}_f + \theta\tilde{q}_f^* \left(\lambda\tilde{p}_{f\tilde{q}_h} + \theta\tilde{p}_{f\tilde{q}_f} \right) + (1-\theta)p_w - c_{f\tilde{q}_f} = 0 \tag{13}$$

Following [Chiou & Jen \(2000\)](#), both second order and stability conditions are assumed to be satisfied. Under linear demand and perfect substitutes, however, the optimal export share could end up being a corner solution, according to their Proposition 5. In the case of China, as suggested by [Defever & Riaño \(2017\)](#), subsidies are available only when export shares are positive, so, in practice, there could be a behind-the-scene policy parameter that incentivizes firms, such that they find positive export shares profitable.

Equation (12) and (13) can be used to derive policy implications. In order to compare the output of the domestic firm under both regimes, we can substitute Equation (5) into Equation (12) to obtain:

$$\left. \frac{\partial \tilde{\pi}_h}{\partial \tilde{q}_h} \right|_{\tilde{q}_h^* = \tilde{q}_h^*, \theta\tilde{q}_f^* = \tilde{q}_f^*} = \lambda(\theta-1)q_h^* p_{hq_f} + t \tag{14}$$

The production of domestic firm under the export-share requirements will be greater than (equivalent to, or less than) its production under the production taxes if Equation (14) is greater than (equal to, or less than) zero. Under the special case of Cournot equilibrium, $\lambda = 0$, the output of domestic firm under export-share requirements will be higher as long as tax rates are positive.

The terms on the RHS of Equation (14) can be rearranged to obtain:

$$\lambda \begin{matrix} \geq \\ \leq \end{matrix} \frac{-t}{(\theta-1)q_h^* p_{hq_f}} \quad (14a)$$

The RHS of this inequality is a negative number. The output of domestic firm under export-share requirements will be higher as long as λ is higher than this lower bound. That could cover a wide range of scenarios, from competition higher than Cournot to competition lower than Cournot, and that does not seem to be a tall order. For meaningful discussions, such lower bound ideally should not be lower than -1 , a condition that depends on the relationship between two policy parameters, t and θ , the output of domestic firm under production taxes, q_h^* and p_{hq_f} , i.e., the degree of product substitution. Notice, however, when production tax is equal to zero, the production of domestic firm will be equivalent to its production under the export-share requirements when conjecture is Cournot.

In order to compare domestic output of the export firm under different regimes, we can substitute Equation (6) and (7) into Equation (13), and after canceling out terms, plug in Equation (6) once again to obtain:

$$\left. \frac{\partial \tilde{\pi}_f}{\partial \tilde{q}_f} \right|_{\theta \tilde{q}_f^* = q_f^*, \tilde{q}_h^* = q_h^*} = -\lambda(\theta-1)q_f^* p_{fq_h} + t + (\theta-1)(c_{fq_f} - c_{fq_w}) \quad (15)$$

Since $c_{fq_f} = c_{fq_w}$, Equation (15) can be simplified as:

$$\left. \frac{\partial \tilde{\pi}_f}{\partial \tilde{q}_f} \right|_{\theta \tilde{q}_f^* = q_f^*, \tilde{q}_h^* = q_h^*} = -\lambda(\theta-1)q_f^* p_{fq_h} + t \quad (16)$$

The domestic supply of export firm under export-share requirements will be greater than (equivalent to, or less than) its supply under the production taxes if Equation (16) is greater than (equal to, or less than) zero. Alternatively, the terms on the RHS of Equation (16) can be rearranged to obtain:

$$\lambda \begin{matrix} \leq \\ \geq \end{matrix} \frac{t}{(\theta-1)q_f^* p_{fq_h}} \quad (16a)$$

The RHS of this inequality is a positive number. Thus, output of the export firm under export-share requirements will be higher as long as λ is lower than this upper bound. As long as collusion is not too extreme, domestic supply of the export firm will stay higher under export-share requirements, since output is not being taxed. Still, when production tax is equal to zero, domestic output of the export firm will be equivalent to that under export-share requirements, when conjecture is Cournot.

Higher domestic supply of the export firm, meanwhile, would also imply higher volume of exports (henceforth production or output of the export firm). For meaningful discussions, such an upper bound, which depends on tax rate, export-share, domestic output of the export firm under tax regime, and the degree of product substitution, would ideally be constrained by 1. Again, this does

not seem to be a tall order. Together Equation (14a) and (16a) can be written as:

$$\frac{-t}{(\theta-1)q_h^* p_{hq_f}} < \lambda < \frac{t}{(\theta-1)q_f^* p_{fq_h}} \quad (17)$$

This inequality is restricted to the case when tax rate and export-share are both positive. A case of production subsidies would just flip things over such that output under subsidies will be higher than under export-share requirements for mid-range λ .

Based on Equation (17), and without loss of generality by concentrating on the case of production taxes, conjecture variation is bounded by a positive and a negative number. The results from Equation (14), (16) and (17) can be concluded with the following proposition:

Proposition 1: When tax rate under production taxes regime and export share under export-share requirements regime are both positive, and conjecture is sufficiently close to Cournot, output of each duopolistic firm under export-share requirements will be higher than under production taxes.

Aside from positive export-share, output of each firm under the tax regime, and the degree of product substitution, this proposition depends critically on the interplay between two crucial parameters, conjecture variation and the tax/subsidy rate, as summarized through the following two corollaries.

Corollary 1: When production tax is equal to zero, the output of each duopolistic firm will be equivalent to those under export-share requirements. The output of domestic firm will be higher under export-share requirements when conjecture is higher than Cournot, while the output of export firm will be higher under export-share requirements when conjecture is lower than Cournot.

When tax rate is equal to zero, the band around Cournot converges to a single point of Cournot. The fact that Cournot competition stands out as a benchmark is on par with [Hwang & Mai \(1988\)](#), under which tariffs and quotas are equivalent under Cournot. Thus, there is a case to be made for comparing production taxes and export-share requirements, which do not seem to be closely related at first glance, as taxes or subsidies represent a deviation of firms' outputs from those under export-share requirements. From an alternative perspective, we could summarize the case of Cournot with the following corollary:

Corollary 2: Under Cournot conjecture, the output of each duopolistic firm under export-share requirements will both be higher than under production taxes, and will both be lower than under subsidies.

The implication of these two corollaries can be illustrated through **Figure 1**. On the x-coordinate, the output of domestic firm under export-share requirements will be higher as long as λ is positive, while output of the export firm under export-share requirements will stay higher when λ is negative. On the y-coordinate, output of the domestic and export firm will both be higher under export-share regime when tax rates, t , are positive, and both will be lower when tax rates are negative, i.e., when there are subsidies.

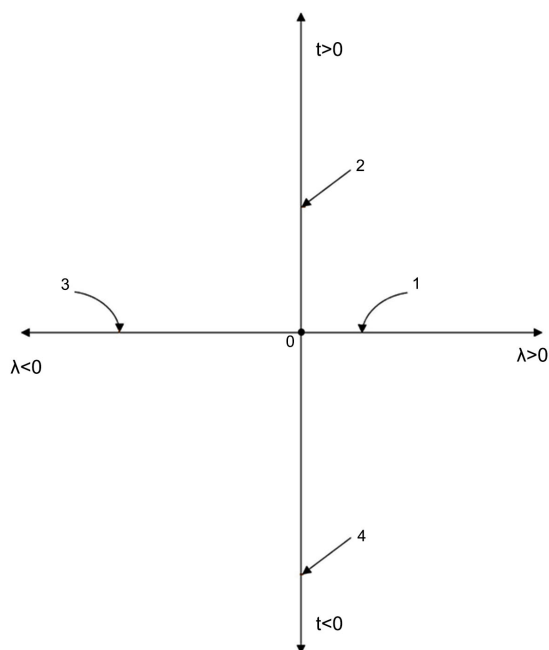


Figure 1. Under export-share requirements, output of domestic firm is higher on 1), while output of export firm is higher on 3); outputs of both firms are higher on 2) and lower on 4).

From an alternative perspective, there are a few factors that could affect the breadth of the open interval in Equation (17). First, the upper and lower bound will both converge toward zero when p_{hq_f} and p_{fq_h} are higher, i.e., when products are closer to perfect substitutes. The expansion or contraction of this interval thus hinges on the assumption of imperfect substitutes. A lower degree of substitution, as represented by a substitution coefficient under linear formulation that stays closer to zero, serves to increase the breadth of this interval.

Second, this interval will be symmetrically centered around zero only when output of the domestic firm under production taxes equals to domestic output of the foreign firm, and the substitution coefficients are the same for both firms as formulated in Equation (1a) and (2a). The upper bound will converge to zero as the domestic output of the foreign firm increases, while the lower bound will converge to zero as the output of the domestic firm increases.

Third, the whole interval will contract toward the origin when domestic output of each duopolistic firm is sufficiently large. A large amount of output could mean that the reduction of output effect due to taxes is relatively mild, and in that case, the two regimes, with or without taxes, could be quite similar. Such effect can be enhanced or countered by two other factors: the degree of product substitution and the proportion of output being supplied to the world market.

When a value of conjecture variation stays sufficiently close to zero, both firms opt to disregard the impact of their output decision on that of their rival firm. Similar case would arise when products are sufficiently imperfect substi-

tutes of each other. Under that scenario, a duopolistic firm could afford to care less about its output decision on its rival firm. In addition, when a lower portion of output is supplied to the export market, other things equal, this model would converge to a typical Cournot duopoly, without the imposition of taxes.

It follows that this inequality holds when conjecture variation stays somehow close to Cournot, and the breadth of that band is ultimately determined by the degree of product substitution between duopolistic firms, domestic output of both firms under the tax regime, the export share and tax rate, as summarized through the following proposition.

Proposition 2: The neighborhood where conjecture variation stays sufficiently close to Cournot is defined by an open interval, which will expand when the degree of product substitution is lower and contract when products are closer to perfect substitutes of each other. It would also expand when domestic output of duopolistic firms under the tax regime are lower, or when a lower portion of output is supplied to the foreign market under export-share requirements.

Overall, export-share requirements could be less anti-competitive than production taxes, and such results can be generalized to cover quite a number of scenarios, from competition higher than Cournot to competition lower than Cournot. Such results agree with intuition as outputs are expected to be lower under tax regime. However, when conjecture variation lies outside the lower and upper bound as suggested by Equation (17), and is still bounded by -1 and 1 , things would just flip over.

3. Conclusion

This paper seeks to compare the output level under production taxes and export-share requirements, when domestic market is characterized by duopolistic competition with differentiated products. It discovers that output on domestic market will stay higher under export-share requirements when competition does not deviate much away from Cournot. Export-share requirements could thus be less anti-competitive than production taxes. Such a result hinges critically on the assumption of product differentiation. This is different from a commonly held belief by some trade theorists that trade policy is generally inferior to industrial policy as an interventional device. Thus, our discussions vindicate the exception, rather than the rule.

That trade policy could conceivably serve as a better interventionist device than industrial policy is underpinned by market imperfection alone, without relying on additional imperfection such as externality, asymmetric information, among others. The introduction and spelled out of an additional imperfection could serve to justify why there might be policy objective to reduce the domestic output in the first place. In the future, one might take a further step to examine policy implication under double imperfections in order to examine the robustness of such results.

Conjecture variation as a device has been subject to a few criticisms. It could,

however, still serve as a useful diagnostic in scanning policy regime that is worthy of attention. A diagnostic approach in the context of development economics has been advocated by Rodrik (2007), although the diagnostic there is underpinned by evidences, as opposed to various forms of collusion. Both diagnostics and rules, are classification schemes that are based on either evidences or cases. That being said, the arbitrariness of conjecture variation still needs to be refined through sensible refinements.

The comparison between production taxes/subsidies and export-share requirements bears certain resemblance toward the discussions of tariffs vs. quotas as one policy measure focuses on price, while the other is fixated on quantity. One would naturally contemplate if similar technical issues would also emerge under another context and thus shed light on the equivalence of price measures versus quantity measures more broadly. This would be especially relevant in a world order that has been marked by military incursions and ensuring economic sanctions from time to time, as most sanctions are targeted toward quantities instead of prices.

Conflicts of Interest

The author declares no conflicts of interest regarding the publication of this paper.

References

- Chao, C. C., & Yu, E. S. H. (1996). Are Wholly Foreign-Owned Enterprises Better than Joint Ventures? *Journal of International Economics*, 40, 225-237. [https://doi.org/10.1016/0022-1996\(95\)01382-2](https://doi.org/10.1016/0022-1996(95)01382-2)
- Chao, C. C., & Yu, E. S. H. (1998). Export-Share Requirements, Trade Balances and Welfare: A Two Period Analysis. *Journal of Development Economics*, 56, 217-228. [https://doi.org/10.1016/S0304-3878\(98\)00060-1](https://doi.org/10.1016/S0304-3878(98)00060-1)
- Chao, C. C., & Yu, E. S. H. (1994). Should Export-Share Requirements Be Implemented under Quotas Protection? *Canadian Journal of Economics*, 27, 568-579. <https://doi.org/10.2307/135784>
- Chiou, J. R., & Jan, U. H. (2000). The Optimal Export-Share Requirements and the Optimal Tax Rates under Imperfect Competition. *Academic Economic Papers*, 28, 205-229.
- Defever, F., & Riaño, A. (2015). Gone for Good? Subsidies with Export Share Requirements in China: 2002-2013. *The World Bank Economic Review*, 29, 135-144. <https://doi.org/10.1093/wber/lhv020>
- Defever, F., & Riaño, A. (2017). Subsidies with Export Share Requirements in China. *Journal of Development Economics*, 126, 33-51. <https://doi.org/10.1016/j.jdeveco.2016.12.003>
- Eaton, J., & Grossman, J. M. (1986). Optimal Trade and Industrial Policy under Oligopoly. *The Quarterly Journal of Economics*, 101, 383-406. <https://doi.org/10.2307/1891121>
- Giocoli, N. (2005). The Escape from Conjecture Variation: The Consistency Condition in Duopoly Theory from Bowley to Fellner. *Cambridge Journal of Economics*, 29, 601-618. <https://doi.org/10.1093/cje/bei007>

- Grossman, G. M. (1993). *Imperfect Competition and International Trade*. MIT Press.
- Helpman, H., & Krugman, P. R. (1994). *Trade Policy and Market Structure*. MIT Press.
- Hwang, H., & Mai, C. C. (1988). On the Equivalence of Tariffs and Quotas under Duopoly: A Conjecture Variational Approach. *Journal of International Economics*, 24, 373-380. [https://doi.org/10.1016/0022-1996\(88\)90044-X](https://doi.org/10.1016/0022-1996(88)90044-X)
- Ingene, C. A., Yu, E. S. H., & Chao, C. C. (2004). The Impact of Export Share Requirement under Production Uncertainty. *International Review of Economics and Finance*, 13, 201-215. [https://doi.org/10.1016/S1059-0560\(03\)00027-3](https://doi.org/10.1016/S1059-0560(03)00027-3)
- Krugman, P., & Obstfeld, M. (2005). *International Economics: Theory and Policy* (7th ed.). Addison Wesley.
- Lai, P. Y. (2003). On the Equivalence of Tariffs and Quotas under Incomplete Information. *Hitotsubashi Journal of Economics*, 44, 15-22.
- Nikaido, H. (1968). *Convex Structure and Economic Theo*. Academic Press.
- Rodrik, D. (1987). The Economics of Export-performance Requirements. *Quarterly Journal of Economics*, 102, 633-665. <https://doi.org/10.2307/1884221>
- Rodrik, D. (2007). *One Economics, Many Recipes: Globalization, Institutions, and Economic Growth*. Princeton University. <https://doi.org/10.1515/9781400829354>
- Varian, H. V. (1992). *Microeconomic Analysis* (3rd ed.). W. W. Norton.
- Wang, X. H. (2002). Free vs. Royalty Licensing in a Differentiated Cournot Duopoly. *Journal of Economics and Business*, 54, 253-266. [https://doi.org/10.1016/S0148-6195\(01\)00065-0](https://doi.org/10.1016/S0148-6195(01)00065-0)