



**MINISTRY OF BUSINESS,  
INNOVATION & EMPLOYMENT**  
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**LABOUR,  
SCIENCE AND  
ENTERPRISE  
GROUP**



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# **Trade (Anti-dumping and Countervailing Duties) Act 1988: Applying the Public Interest Test**

## **Consultation Note**

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# Context

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## Trade remedies investigations

The Ministry of Business, Innovation and Employment (MBIE) is responsible for administering New Zealand's system of trade remedies.

This includes responsibility for investigating imported goods that are alleged to be dumped or subsidised. Dumping occurs when an exporter sells goods to another country at a price lower than in the exporter's own country. Subsidisation occurs when a country's government provides a benefit to the production or export of goods. Dumping and subsidisation are not illegal and in fact can be beneficial to both importing and exporting countries. However, where dumping or subsidies cause or threaten to cause material injury to a domestic industry, the New Zealand government can impose anti-dumping or countervailing duties.

MBIE conducts investigations under the Trade (Anti-dumping and Countervailing Duties) Act 1988 (the Act) into alleged dumping and subsidisation, as well as reviews of duties imposed by previous investigations. The Act reflects New Zealand's rights and obligations under the relevant World Trade Organization agreements.

The Minister of Commerce and Consumer Affairs (the Minister) may only impose anti-dumping or countervailing duties if an investigation finds that goods are dumped or subsidised and have caused, or threaten to cause, material injury to the New Zealand industry producing like goods. Anti-dumping and countervailing duties must not exceed the dumping margin or level of subsidy and may be less than the margin if that is sufficient to remove injury to the New Zealand industry.

## Public interest test

In 2017 the Act was amended to include an assessment of the public interest in trade remedies investigations as a second step in investigations. As stated in the Act, if the chief executive starts an investigation under section 10A, the chief executive must carry out investigation step 1 first and then, if directed to do so by the Minister under section 10D(2), carry out investigation step 2.

Step 1 is the dumping, subsidy and material injury investigation, where the chief executive must investigate whether goods imported into New Zealand are being dumped or subsidised; and material injury to an industry has been or is being caused or is threatened because of the dumping or subsidisation. If dumping or subsidisation is causing, or threatening to cause, material injury, the Minister must determine the rate or amount of duty and direct the chief executive to immediately start investigating step 2.

Step 2 is the public interest investigation, where the chief executive must investigate whether imposing an anti-dumping or countervailing duty at the rate or amount determined by the Minister is in the public interest. Imposing a duty is defined to be in the public interest unless the cost to downstream industries and consumers of imposing the duty is likely to **materially outweigh** the benefit to the domestic industry of imposing the duty.

*A duty is in the public interest unless the cost to downstream industries and consumers of imposing the duty is likely to materially outweigh the benefit to the domestic industry.*

Section 10F(3) of the Act specifies that in investigating whether imposing the duty is in the public interest, the matters the chief executive must investigate include the following:

- a) the effect of the duty on the prices of the dumped or subsidised goods;
- b) the effect of the duty on the prices of like goods produced in New Zealand;
- c) the effect of the duty on the choice or availability of like goods;

- d) the effect of the duty on product and service quality;
- e) the effect of the duty on the financial performance of the domestic industry;
- f) the effect of the duty on employment levels;
- g) whether there is an alternative supply (domestically or internationally) of like goods available;
- h) any factor that the chief executive considers essential to ensure the existence of competition in the market.

The Act allows these effects to be considered only in relation to the domestic industry, downstream industry and consumers. It does not therefore include consideration of the effects on upstream industry, importers, or any other parties.

*For the avoidance of doubt, this is a bounded public interest test. The terms of section 10F(3) constrain the analysis.*

## **MBIE's proposal**

To aid in an objective and robust analysis of the public interest, MBIE is exploring the particular factors to assess each of the matters specified in 10F(3) above.

This consultation document discusses the approach that MBIE is exploring and seeks comments on the methodology. Part 1 discusses how the considerations in 10F(3)(a)-(h) of the Act could be analysed. Part 2 discusses a proposed economic model to inform MBIE's analysis of some factors of the public interest test.

## **Questions for submitters**

This consultation note does not seek comments on the scope of the public interest analysis, or any other matter of the trade remedies system. For the scope of this consultation document, please only respond to the matters below:

1. What comments do you have on the proposed methodology?
2. To what extent do you consider the factors discussed in Part 1 of this paper are appropriate in addressing the requirements set out in the Act?
3. To what extent do you consider the PIPES model, discussed in Part 2 of this paper, is useful in informing the analysis of the public interest?

## **Making a submission**

You are invited to make a written submission on proposals in this document. Submissions should be received by MBIE by **5pm 13 September 2019**. Please also include your name, or the name of your organisation, and contact details.

Please be aware that submissions will be subject to the Official Information Act 1982. If your submission contains information that you consider should be treated as confidential, please clearly identify such information and provide justification for why you believe it should be withheld.

Submissions may be made electronically (preferred) or by post. Electronic submissions should be in Adobe Acrobat or Microsoft Word or compatible format and sent as an attachment to: [traderem@mbie.govt.nz](mailto:traderem@mbie.govt.nz).

## **Part 1: Considerations under 10(F)(3)(a)-(h) of the Act**

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MBIE is proposing to examine particular factors, where appropriate and practicable, to assess the considerations listed in the Act when determining whether the imposition of duties is in the public interest under s10F. This will be considered in light of the circumstances of each individual case and based on any sufficiently reliable information available.

The timeframe over which the public interest is to be considered will vary on a case-by-case basis, as different goods will be subject to different factors, such as seasonality, timing of relevant contracts, etc.

*For the avoidance of doubt, the factors considered for the bounded interest test will depend on each case in light of its own individual circumstances.*

### **(a) the effect of the duty on the prices of the dumped or subsidised goods;**

An assessment of consideration (a) may, to the extent appropriate, provide a discussion of any of the following matters:

- If duties have previously been imposed on the imported subject goods, an analysis of the extent to which the duty changed prices of the subject goods.
- If duties have previously been imposed on imported goods like the subject goods, but from a different origin, an analysis of the extent to which the duty changed prices of the like goods.
- The extent to which importers will likely pass on price increases from the duty to consumers and downstream industries.
- The extent to which downstream industries are likely to pass on price increases to their consumers.
- Whether prices are responding to normal price factors (such as input costs and currency fluctuations), or whether the market is partially monopolised, and pricing is therefore not adjusting.
- Any other matter considered to be relevant to the effect of the duty on the prices of the dumped or subsidised goods.

The assessment outlined above may be informed, to the extent practicable, by economic modelling using the Public Interest Partial Economic Simulation Model (PIPES Model), as discussed in Part 2 of this paper.

### **(b) The effect of the duty on the prices of like goods produced in New Zealand;**

An assessment of consideration (b) may, to the extent appropriate, provide a discussion of any of the following matters:

- If duties have been previously imposed on the imported subject goods, an analysis of the extent to which the prices of like goods produced in New Zealand changed as a result of the duty.

- If duties have been previously imposed on imported goods like the subject goods, but from a different origin, an analysis of the extent to which prices of like goods produced in New Zealand changed as a result of the duty.
- The extent to which the domestic industry is likely to change the price of like goods in response to a change in the price of imported goods.
- Whether domestic prices are responding to normal price factors (such as input costs and currency fluctuations), or whether the market is partially monopolised, and pricing is therefore not adjusting accordingly.
- The extent to which the dumped or subsidised goods and the like goods produced in New Zealand are perfect substitutes.
- Any other matter considered to be relevant to the effect of the duty on the prices of like goods produced in New Zealand.

The assessment outlined above may be informed, to the extent practicable, by an economic analysis using the PIPES Model (Part 2).

### **(c) the effect of the duty on the choice or availability of like goods;**

An assessment of consideration (c) may, to the extent appropriate, provide a discussion of any of the following matters:

- The extent to which the non-imposition of duties is likely to result in a reduction in the availability of, or withdrawal of, like goods from the New Zealand market.
- The extent to which the non-imposition of duties is likely to result in the domestic industry reducing or ceasing its production of like goods for the New Zealand market.
- Likely market shares of imported and domestically produced goods before and after the imposition of duties.
- The extent to which like goods are likely to be able to be supplied from sources other than New Zealand.
- Any other matter considered to be relevant to the effect of the duty on choice or availability of like goods.

The assessment outlined above may be informed, to the extent practicable, by a price sensitivity analysis for each importer, assessing the extent to which the importers have in the past responded to price changes by modifying their imports. This would provide estimates of likely market shares should duties be imposed.

### **(d) the effect of the duty on product and service quality;**

An assessment of consideration (d) may, to the extent appropriate, provide a discussion of any of the following matters:

- Industry standards or international standards in place for the product or service.
- The extent to which market participants are consistently meeting the market standard.
- Whether market participants are consciously producing products or services above the standard.
- The extent to which the quality of goods or services in the market could be lowered upon the imposition of duties, or without duties in place.
- Consumer preferences in relation to quality.

- Any other matter considered to be relevant to the effect of the duty on product and service quality.

### **(e) the effect of the duty on the financial performance of the domestic industry;**

An assessment of consideration (e) may, to the extent appropriate, provide a discussion of any of the following matters:

- The extent to which the imposition of duties would affect the financial performance of domestic producers.
- The extent to which the non-imposition of duties could be likely to result in the exit from the market of domestic producers.
- Whether the domestic industry has made any significant capital expansion investments recently that may help financial performance in the future.
- Whether any other market effects could arise from the imposition of duties, such as financial market effects, other than those intended by the imposition of duties.
- Any other matter considered to be relevant to the effect of the duty on the financial performance of the domestic industry.

The assessment outlined above may be informed, to the extent practicable, by economic modelling. Where MBIE judges that sufficient reliable data is available, for consideration (e), MBIE may supplement the analysis by using the PIPES Model (Section 2).

### **(f) the effect of the duty on employment levels;**

An assessment of consideration (f) may, to the extent appropriate, provide a discussion of any of the following matters:

- The extent to which the imposition or non-imposition of duties would likely affect levels of employment in the domestic industry and in downstream industries.
- The extent to which labour is likely to be reallocated should there be any loss of employment.
- Any other matter considered to be relevant to the effect of the duty on employment levels.

The assessment outlined above may be informed by an analysis that reflects the change in total costs arising from a change in input costs for downstream industries, and an assessment of the price sensitivity of the final goods produced to a change in the price of inputs. MBIE may then carry out an analysis of the employment response to this change in production costs.

### **(g) whether there is an alternative supply (domestically or internationally) of like goods available;**

An assessment of consideration (g) may, to the extent appropriate, provide a discussion of any of the following matters:

- The extent to which the domestic industry is able to meet domestic demand.
- The extent to which the imported good is covering excess demand that the domestic industry is unable to supply.

- Whether there are alternative sources of supply, competitive in price and quality, capable of accommodating additional demand.
- Whether there are any technical specifications demanded by the domestic market that might restrict import possibilities.
- The extent to which there is a risk of monopolisation of the supply of goods to New Zealand.
- Whether there are non-price, non-supply factors to consider, such as contract terms, speed of delivery, etc.
- Any other matter considered to be relevant to whether there is an alternative supply (domestically or internationally) of goods available.

The assessment outlined above may be informed, to the extent practicable, by an assessment of the extent to which there is excess supply, or excess demand in the market.

**(h) any factor that the chief executive considers essential to ensure the existence of competition in the market.**

An assessment of consideration (h) may, to the extent appropriate, provide a discussion of any of the following matters:

- The extent to which the current market conditions reflect a “typical market” for the good. This will consider whether the market is prone to large fluctuations in price, demand, or supply.
- The extent to which duties could lead consumers to purchase substitute goods, thus shrinking the market for the subject goods.
- The extent to which there are any complementary goods whose markets might be affected by a price increase in the affected goods.
- The extent to which there is a risk of monopolisation of the supply of goods in the New Zealand market.
- The extent to which it is in the interest of competition to maintain domestic production of this good.
- An assessment of the accessibility of the market to new entrants.
- Any existing protection of the domestic industry
- Any other matter considered to be relevant to ensuring the existence of competition in the market.



## Part 2: PIPES Model

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Economic models are systems of equations that quantify changes in economic outcomes when a parameter of the model is shocked. The public interest partial economic simulation model (the PIPES model) analyses future economic impacts of a policy change that is yet to occur; a task for which a model-based simulation is best suited since all the information being dealt with is prospective.

### Partial Equilibrium Models

Partial equilibrium models (PEMs) offer simplicity in assessing economic impacts. They isolate the industry of interest and can simulate the effects of trade policy making use of certain parameters, which are calibrated to current or recent data. The economic impact is calculated as the difference between the baseline values obtained when the model is in equilibrium, and the predictions obtained after the policy change is implemented through a shock to the model.

In the context of the PIPES model, the equilibrium state is a snapshot of the markets when the investigation is initiated. In this state, the domestic industry is facing competition from dumped or subsidised imports and is either being materially injured, or faces a threat of material injury. The shock that the PIPES model is built to assess is the imposition of duties on the dumped or subsidised imported goods, and the shocked state of the model is the state reached once the duties have been passed on through the markets.

Equilibrium models range in complexity from smaller targeted industry-specific models, such as PEMs, where the policy changes are more narrowly focused on a single industry and require less data, to computable general equilibrium models which are more elaborate, require more data to run, and carry the economic impact through more agents.

PEMs make a range of simplifying assumptions regarding the markets and industries not being analysed, namely that there are no other variables at play. There are no economic shocks elsewhere in the economy that will carry through to the industry being considered, and the parameters in the model are only affected by others in the model. A further assumption is that the shock is not being passed on through the economy to strongly impact the welfare of other agents.

Although the range of simplifying assumptions could be argued to over-simplify the market situation, useful conclusions on complex matters can still be drawn. The assumptions, however, are to be kept in mind in when interpreting results.

### Brief Review of the Literature

Joseph Francois and Keith Hall (2003) outline a global simulation model (GSIM) for the analysis of global, regional, and unilateral trade policy changes.<sup>1</sup> They develop a partial equilibrium model which is industry focused but global in scope. The framework of this model is scalable, employs national product differentiation, and allows for the simultaneous assessment of trade policy changes. The model allows for the assessment of importer and exporter effects related to tariff revenues, and exporter and importer surplus. However, as recognized by the authors, modelling one trade policy under this approach yields thousands of potential bilateral trade flows.

A further model was developed by Joseph Francois (2007) to deal with these shortcomings.<sup>2</sup> This model provides simulated impacts of anti-dumping and countervailing duties on output, exports,

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<sup>1</sup> "Global Simulation Analysis of Industry-Level Trade Policy: the GSIM model". Paper available at: <http://wits.worldbank.org/data/public/GSIMMethodology.pdf>

<sup>2</sup> "An Extended Global Simulation Model: Analysis of Tariffs & Anti-Dumping Policy Impacts on Prices, Output, Incomes and Employment". Paper available at: [https://www.researchgate.net/publication/46450123\\_An\\_Extended\\_Global\\_Simulation\\_Model\\_Analysis\\_of\\_Tariffs\\_Anti-Dumping\\_Policy\\_Impacts\\_on\\_Prices\\_Output\\_Incomes\\_and\\_Employment](https://www.researchgate.net/publication/46450123_An_Extended_Global_Simulation_Model_Analysis_of_Tariffs_Anti-Dumping_Policy_Impacts_on_Prices_Output_Incomes_and_Employment).

prices, profits, producer welfare and consumer welfare, and can be calibrated to model national employment effects. This model works with a non-linear representation of import demand, combined with generic export-supply equations. This reduced-form system, which includes as many equations as there are exporters, is then solved for the set of world (exporter) prices. The model assumes national product differentiation, where imports are imperfect substitutes for each other.

A further model was developed by James M. Devault to compute the welfare effects of 30 U.S. antidumping duties.<sup>3</sup> The effects are computed using a Dixit-Stiglitz type model of preferences together with data from the International Trade Commission. The author constructed a partial equilibrium model in which domestic consumers purchase a product from domestic or foreign producers, and if they purchase an imported product, they must choose between dumped or fairly traded imports. The model assesses change in consumer welfare by measuring the change in consumer surplus, while the change in producer welfare is measured by the change in producer surplus. Although strong theoretically, adequate data were available for only 18 cases involving 30 antidumping duties, representing about 10 per cent of all the US antidumping duties in effect at the time.

Although these models have good theoretical foundations, they are very difficult to apply in practice. Data availability limits the level of sophistication possible when applying economic models to real life scenarios. The data requirements in these cases are substantial and not practicable for the test required in the Act. Because of this, MBIE has developed the PIPES model to assist in the considerations set out in the Act. The framework of the PIPES model is set out below.

## Framework

When government intervenes to change laissez-faire outcomes, different agents will be affected differently. The Act specifies in section 10F(2) that the agents to consider in assessing the public interest are (i) consumers, (ii) downstream industries, and (iii) the domestic industry. If the shock is felt by agents outside the scope of the Act, these are excluded from the analysis.

The approach taken in regards to consumers and downstream industries in the PIPES model is the same; consumers buy the good for final consumption and downstream industries buy the good for intermediate use, as an input in the production of other goods, but they all follow the economic behaviour of consumers. However, the process outlined below is carried out separately for consumers and downstream industries in order to isolate the effects. The total effect on the domestic industry is the sum of the effect derived from the consumer side modelling and the downstream industry side modelling.

There are two key parameters that must be determined to run the PIPES model;<sup>4</sup>

### 1. An estimate of the cross price elasticity of demand (XED)

The XED is an empirical parameter which represents the willingness of consumers and downstream industries to substitute the imported good for the domestically produced good. It assesses the change in demand for one good in response to a change in price of another good, and ranges in value from infinitely negative to infinitely positive. The negative extreme represents

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<sup>3</sup> "The Welfare Effects of U.S. Antidumping Duties". Paper available at: <https://link.springer.com/article/10.1007/BF01886127>

<sup>4</sup> As the calibration of these parameters is crucial to the outcome of the model, sensitivity testing will be carried out for each parameter.

goods that perfectly complement each other, and the positive extreme represents goods that perfectly substitute for each other. A XED of zero represents unrelated goods.<sup>5</sup>

**2. An estimate of the “pass-on rate”**

The pass-on rate is an endogenous parameter which represents the portion of the duty that importers choose to pass on to their consumers. This could take any value from zero, where the importer ‘absorbs’ the duty in its entirety and does not change the price charged to consumers, one, where the importer passes on the entire duty and increases the price of the good by the exact amount of the duty imposed, or a value larger than one if the importer chooses to pass on a rate higher than the duty imposed.<sup>6</sup>

In addition to the parameters specified above, data must be obtained on prices and quantity from the importers and the domestic producer to derive the market supply and demand curves for the import and domestic market, respectively.

The PIPES model is based on a two-step analysis. The first step consists of a *prediction of market outcomes*: when a duty is imposed, what is the likely effect on the markets being analysed? Once this has been estimated the analysis shifts to an *assessment of the market outcome*: how does the change in market outcomes affect agents? Steps I and II are outlined below<sup>7</sup>.

**Step I – Prediction of market outcome**

Supply and demand data for the domestic and import market determine the equilibrium state of the PIPES model, where the domestic industry is competing against dumped or subsidised imports. Step I of the PIPES model is to predict the market outcome when duties are imposed.

Economic theory suggests that when a duty is imposed on an imported good, supply in the import market is the first place where the effect will be felt, and the importer will pass-on the duty to other agents by increasing the price of the good sold by a portion of the duty. An increase in the price of the imported good is accompanied by a decrease in the quantity demanded.

The XED is included in the PIPES model to link the import market to the domestic market, as it mirrors the change in price for the imported good with a certain change in demand for the domestically produced good. This increase in demand for the domestic good could be accompanied by an increase in its price if the domestic industry chooses to respond in this manner to the increased demand.<sup>8</sup>

**Step I – Algebraic derivation of the prediction of market outcome**

Inverse demand in the import market is given by equation (1);

$$P_{Imp}^D = \alpha_{Imp}^D - \beta_{Imp}^D(Q_{Imp}^D), \tag{1}$$

where  $\alpha_{Imp}^D$  represents the import demand intercept and  $\beta_{Imp}^D$  is the slope parameter.

<sup>5</sup> The algebraic formulation for the XED is  $XED = \frac{\partial Q_X}{\partial P_Y} \times \frac{P_Y}{Q_X}$ , where  $\frac{\partial Q_X}{\partial P_Y}$  is the partial derivative of the quantity demanded for good X, taken with respect to the price of good Y,  $P_Y$  is a specific price for good Y, and  $Q_X$  is the quantity demanded of good X associated with the price P of good Y.

<sup>6</sup> This outcome is related to the elasticity of demand, and the level of competition in the market. If consumers are not responsive to a price change, the importer is more likely to pass on a larger portion of the duty to consumers since they are less likely to decrease their demand.

<sup>7</sup> All equations presented in this document are linear. In calibrating the model on a case-by-case basis, different functional forms may be explored.

<sup>8</sup> If the domestic industry chooses to maintain price and increase quantity further, a shift of the supply curve will be modelled.

Since supply in the import market is the first place where the impact of the duty is felt, the inverse import supply curve includes an intercept parameter to shift the curve by the magnitude of the duty ( $d$ ) that the importer chooses to pass on to consumers (the pass-on rate, modelled as  $por$ );

$$P_{Imp}^S = \alpha_{Imp}^S + (d * por) + \beta_{Imp}^S(Q_{Imp}^S). \quad (2)$$

Consumers are, to a degree assessed by the XED, willing to substitute between the imported good and the domestically produced good. The inverse domestic demand curve includes an intercept parameter to shift the curve by the portion of consumers that substitute when the imported good increases in price ( $XED$ ) by the magnitude of the duty ( $d$ ) that was passed on to consumers in the import market ( $por$ );

$$P_{Dom}^D = \alpha_{Dom}^D - \beta_{Dom}^D(Q_{Dom}^D) + (d * por * XED), \quad (3)$$

and inverse domestic supply is not responsive to the imposition of duties in the import market;

$$P_{Dom}^S = \alpha_{Dom}^S + \beta_{Dom}^S(Q_{Dom}^S). \quad (4)$$

Equilibrium in the import market is found when import demand and import supply are equivalent. Equating (1) and (2);

$$Q_{Imp}^* = \frac{\alpha_{Imp}^D - \alpha_{Imp}^S - (d * por)}{\beta_{Imp}^S + \beta_{Imp}^D}, \quad (5)$$

$$P_{Imp}^* = \frac{\beta_{Imp}^S(\alpha_{Imp}^D) + \beta_{Imp}^D[\alpha_{Imp}^S + (d * por)]}{\beta_{Imp}^D + \beta_{Imp}^S}. \quad (6)$$

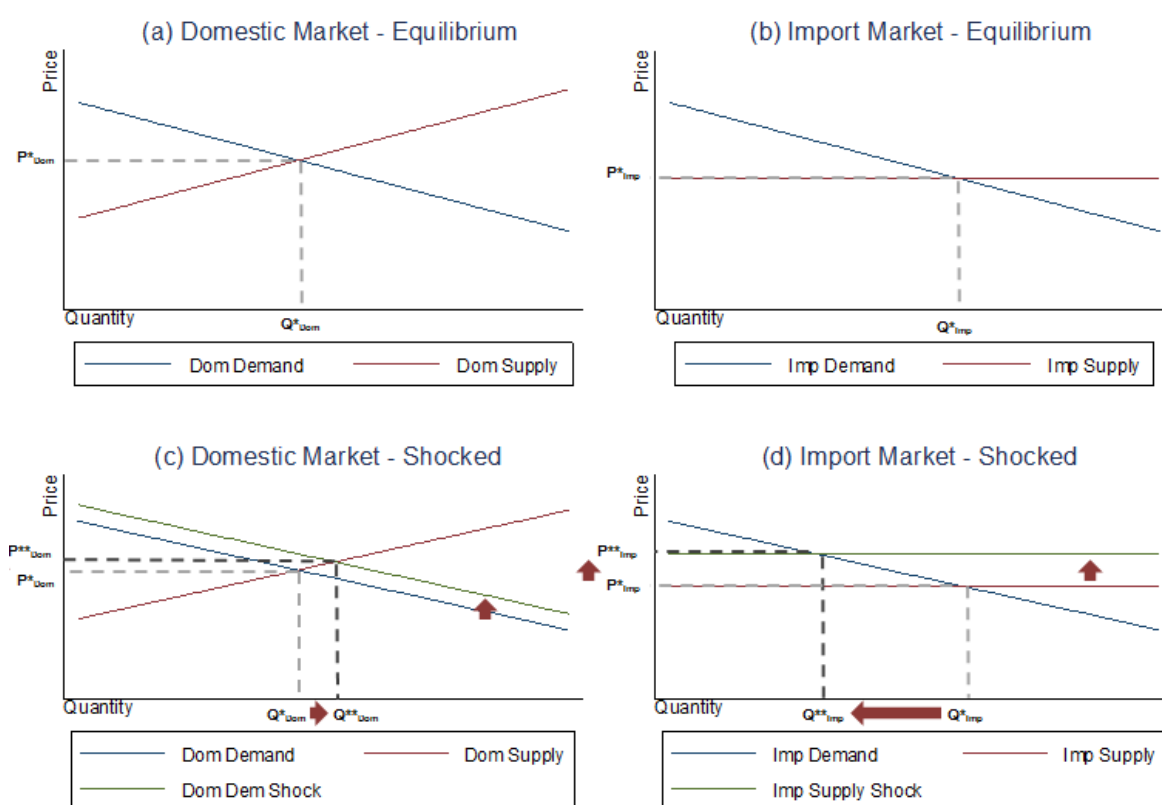
Equilibrium in the domestic market is found when domestic demand and domestic supply are equivalent. Equating (3) and (4);

$$Q_{Dom}^* = \frac{\alpha_{Dom}^D + (d * por * XED) - \alpha_{Dom}^S}{\beta_{Dom}^S + \beta_{Dom}^D}, \quad (7)$$

$$P_{Dom}^* = \frac{\alpha_{Dom}^S\beta_{Dom}^D + \beta_{Dom}^S[\alpha_{Dom}^D + (d * por * XED)]}{\beta_{Dom}^S + \beta_{Dom}^D}. \quad (8)$$

Step I of the PIPES model is presented in Graph 1. The domestic and import market are modelled in separate graphs to account for the possibility that domestic and imported goods may be slightly differentiated, and therefore imperfect substitutes. If the goods are perfect substitutes, the XED will be infinitely positive, and the panels will be identical. In that situation, the domestic and import markets could be graphed on the same panel.

**Graph 1: Step I – Prediction of market outcome**



Panels (a) and (b) represent the domestic and import market, respectively, when the imported goods are being dumped.  $P_{Dom}^*$  is the equilibrium price in the domestic market before the duties are imposed, and  $Q_{Dom}^*$  is the equilibrium quantity in the domestic market. Panel (b) represents the import market, where  $P_{Imp}^*$  is the equilibrium dumped price before duties are imposed, and  $Q_{Imp}^*$  is the equilibrium quantity.

Panels (c) and (d) model the imposition of a duty. The initial impact is felt in panel (d) with the shift of the import supply curve. This leads to a new equilibrium price which is no longer dumped, and a new equilibrium quantity in the import market which is lower than when the goods were being dumped ( $P_{Imp}^{**}$  and  $Q_{Imp}^{**}$ ). The domestic demand curve in panel (c) shifts next, yielding a new equilibrium price and quantity in the domestic market since the industry is now facing contingent protection ( $P_{Dom}^{**}$  and  $Q_{Dom}^{**}$ ).

## Step II – Assessment of market outcome

The price increase of the imported good decreases welfare of all agents consuming the imported good since they have to pay a higher price for the same quantity, but increases welfare of those that produce the domestic good since they are receiving contingent protection and no longer compete with injurious dumped or subsidised imports. The method for assessing costs and benefits relies on two microeconomic concepts: consumer and producer surplus.

*Consumer surplus* measures the amount consumers gain from a purchase by computing the difference between the market price they have to pay and the price they would have been willing to pay; if a consumer had to pay an equilibrium price of \$1 for a good, but actually valued the good at \$1.50, then this consumer would face a surplus of \$0.50. If 10 agents had the same preferences, their total surplus would be \$5. Consumer surplus is derived from the market demand curve.

*Producer surplus* is a similar concept; a producer may be willing to sell a good for \$1, but the equilibrium market price may be \$1.50. This producer would make a surplus of \$0.50 with every good sold. Producer surplus is derived from the market supply curve.

## Step II – Algebraic derivation of the assessment of market outcome

*CS Dom 1* in panel (a) of Graph 2 represents the surplus of consumers buying the domestic good when the imported good is being dumped or subsidised. *CS Imp 1* in panel (b) of Graph 2 is the surplus to consumers that are directly buying the dumped good;

$$CS\ Dom\ 1 = \frac{(\alpha_{Dom}^D - P_{Dom}^*) * Q_{Dom}^*}{2} \quad (9)$$

$$CS\ Imp\ 1 = \frac{(\alpha_{Imp}^D - P_{Imp}^*) * Q_{Imp}^*}{2} \quad (10)$$

The sum of equations (9) and (10) constitutes total consumer surplus before duties are imposed;

$$CS_1 = (CS\ Dom\ 1 + CS\ Imp\ 1) \quad (11)$$

*PS Dom 1* in panel (a) of Graph 2 represents producer surplus when the domestic market is facing dumped competition.

$$PS\ Dom\ 1 = \frac{(P_{Dom}^* - \alpha_{Dom}^S) * Q_{Dom}^*}{2} \quad (12)$$

The shock from the imposition of duties is first felt in the import market, where initial consumer surplus decreases from *CS Imp 1* in panel (b) to *CS Imp 2*, in panel (d). The new surplus for consumers in the market is thereby presented in equation (13);

$$CS\ Imp\ 2 = \frac{(\alpha_{Imp}^D - P_{Imp}^{**}) * Q_{Imp}^{**}}{2} \quad (13)$$

The shock carries through to the domestic market, where the domestic demand curve shifts by the magnitude determined by Equation (3). The new consumer surplus in the domestic market is *CS Dom 2* in panel (c) of Graph 2. This is not necessarily positive or negative, since it depends on the steepness of the curves and the shift of the demand curve, which in turn, depends on the level of substitutability between the goods. Consumer surplus in the domestic market upon the imposition of duties is;

$$CS\ Dom\ 2 = \frac{\left( (\alpha_{Dom}^D + (d * por * XED)) - P_{Dom}^{**} \right) * Q_{Dom}^{**}}{2} \quad (14)$$

The sum of equations (13) and (14) constitutes total consumer surplus once duties are imposed;

$$CS_2 = (CS\ Dom\ 2 + CS\ Imp\ 2) \quad (15)$$

Finally, producer surplus undoubtedly increases upon the imposition of duties since the domestic industry receives contingent protection. The new producer surplus is represented by *PS Dom 2* in panel (c) of Graph 2;

$$PS\ Dom\ 2 = \frac{(P_{Dom}^{**} - \alpha_{Dom}^S) * Q_{Dom}^{**}}{2} \quad (16)$$

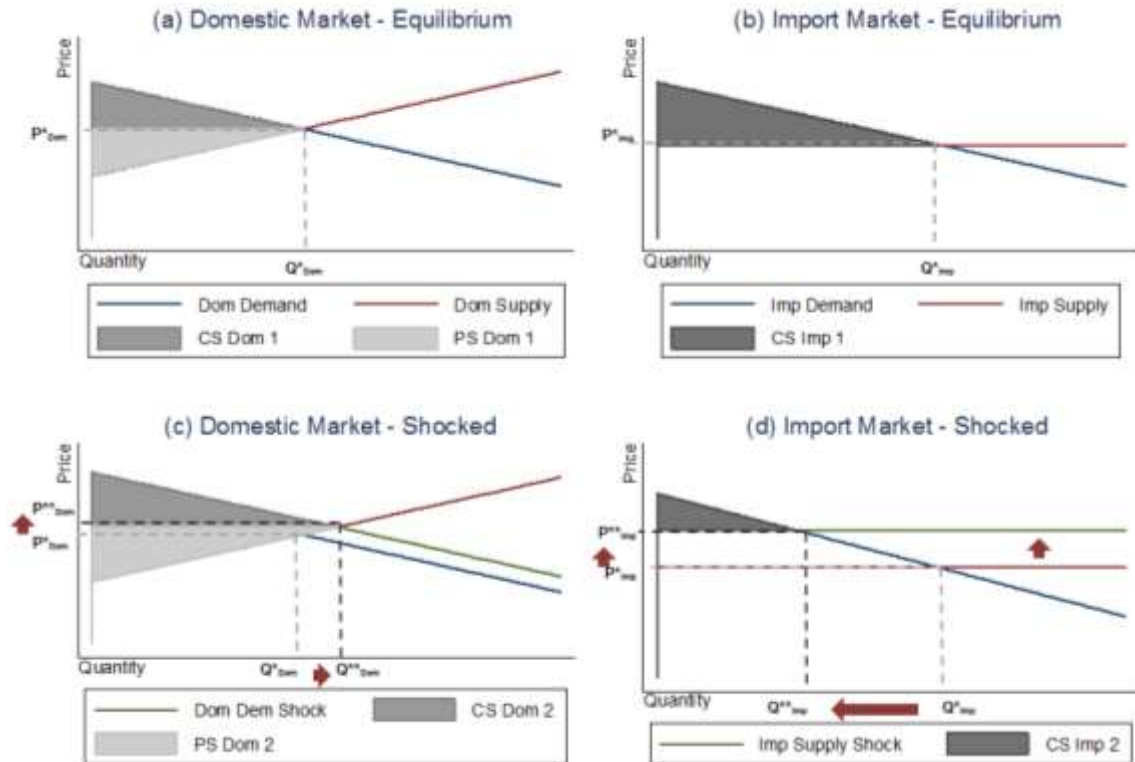
Total change in consumer surplus is represented by equation (17):

$$\Delta CS = CS_2 - CS_1, \tag{17}$$

and total change in surplus for the domestic industry is equivalent to the sum of the surplus change from the consumer side modelling (C) and the downstream industry modelling (DI), as represented in Equation (18);

$$\Delta PS = [(PS\ Dom\ 2) - (PS\ Dom\ 1)]^C + [(PS\ Dom2) - (PS\ Dom\ 1)]^{DI} \tag{18}$$

**Graph 2: Assessment of market outcome**



### Interpretation

Step II of the PIPES model, the outcome assessment, yields likely monetary estimates of the impact that the imposition of duties has on different agents. The interpretation of surplus changes is simple: if  $\Delta CS < 0$ , consumers are worse off after the economic shock since they can no longer gain surplus from purchasing a dumped good, and the absolute value represents the impact in monetary terms. If  $\Delta DI < 0$ , downstream industries are also worse off after the economic shock. If  $\Delta PS > 0$ , domestic producers are better off, since they are receiving contingent protection.

$$\Delta CS + \Delta DI \stackrel{?}{\geq} \Delta PS \tag{19}$$

If the sum of the monetary impact on downstream industries and consumers materially outweighs the benefit to the domestic industry, this is a partial indicator that imposing duties will not be in the public interest (equation (19)). This will then be weighed against the other mandatory considerations in section 10F(3) for the final determination under the Act.

### Worked Example

Suppose the domestic market faces the prices, supply and demand presented in panel (a) of Table A, and the import market faces those presented in panel (b). Also assume, for simplicity, that there is no downstream industry that uses this good as an intermediate input.

**Table A – Domestic and import market supply and demand data**

(a) Domestic Market			(b) Import Market		
Price	Domestic Supply	Domestic Demand	Price	Import Supply	Import Demand
1	0	9	1	-	9
1.5	3	6	1.5	0	6
2	6	3	1.5	10	6
2.5	9	0	2	-	3
			2.5	-	0

A simple linear regression of import supply data yields the inverse import supply curve;

$$P_{Imp}^S = 1.5 + 0 * (Q_{Imp}^S). \quad (A.1)$$

Consistent with the model formulation, an intercept must be added to the inverse import supply curve for the imposition of duties, as in equation (2);

$$P_{Imp}^S = 1.5 + 0 * (Q_{Imp}^S) + (d * por), \quad (A.1.1)$$

and regressing import demand data yields the inverse import demand curve;

$$P_{Imp}^D = 2.5 - 0.167 * (Q_{Imp}^D). \quad (A.2)$$

Equilibrium in the import market is found where supply and demand intersect. Equating (A.1.1) and (A.2):

$$Q_{Imp}^* = 6 - 6 * (d * por), \quad (A.3)$$

$$P_{Imp}^* = 1.5 + (d * por). \quad (A.4)$$

When no duties are imposed, the equilibrium price in the import market is \$1.5 and the equilibrium quantity is 6, as modelled in panel (b) of Graph A.

Turning to the domestic industry, regressing supply data on price yields the inverse domestic supply curve;

$$P_{Dom}^S = 1 + 0.167 * (Q_{Dom}^S), \quad (A.5)$$

and the inverse domestic demand curve;

$$P_{Dom}^D = 2.5 - 0.167 * (Q_{Dom}^D), \quad (A.6)$$

where an intercept must be added to model the effect of the duty;

$$P_{Dom}^D = 2.5 - 0.167 * (Q_{Dom}^D) + (d * por * XED). \quad (A.6.1)$$

Equating equations (A.5) and (A.6.1) yields equilibrium price and quantity in the domestic market;

$$Q_{Dom}^* = 4.5 + 3 * (d * por * XED) \quad (A.7)$$

$$P_{Dom}^* = 1.76 + 0.5 * (d * por * XED). \quad (A.8)$$

When no duties are imposed, equilibrium quantity in the domestic market is 4.5 units and the equilibrium price is \$1.76, as modelled in panel (a) of Graph A.

### Step I – Prediction of market outcome upon the imposition of duties

Suppose a specific anti-dumping duty of \$0.625 is imposed on every unit sold ( $d = 0.625$ ), importers pass on 80% of the duty to customers ( $por = 0.80$ ), and consumers of the imported good are willing to increase their demand of the domestic good by 15% if the price of the



imported good goes up by 30% ( $XED = 0.50$ ). Equilibrium in the import market is found by solving equations (A.7) and (A.8);

$$Q_{Imp}^* = 6 - 6 * (0.625 * 0.8) = 3 \text{ units} \quad (A.9)$$

$$P_{Imp}^* = 1.5 + (0.625 * 0.8) = \$2 \quad (A.10)$$

In this scenario, quantity in the import market decreases to 3 units and price increases to \$2, as graphed in panel (d) of Graph A.

The domestic market is then computed as:

$$Q_{Dom}^* = 4.5 + 3 * (0.625 * 0.8 * 0.5) = 5.15 \text{ units} \quad (A.11)$$

$$P_{Dom}^* = 1.76 + 0.5 * (0.625 * 0.8 * 0.5) = \$1.88 \quad (A.12)$$

Upon the imposition of duties in the import market, quantity in the domestic market increases to 5.15 units, and price increases to \$1.88, as graphed in panel (c) of Graph A.

### Step II – Assessment of market outcome upon the imposition of duties

Initial surplus values are also presented in panels (a) and (b) of Graph A, where  $CS_{Dom 1}$  is initial consumer surplus in the domestic market,  $CS_{Imp 1}$  is initial consumer surplus in the import market, and  $PS_{Dom 1}$  is initial producer surplus in the domestic market. Consistent with equations (9) - (12);

$$CS_{Dom 1} = \frac{(2.5 - 1.76) * 4.5}{2} = \$1.66 \quad (A.13)$$

$$CS_{Imp 1} = \frac{(2.5 - 1.5) * 6}{2} = \$3 \quad (A.14)$$

The sum of total consumer surplus in equilibrium is represented by  $CS_1$ .

$$CS_1 = (\$1.66 + \$3) = \$4.66. \quad (A.15)$$

Initial producer surplus is equivalent to:

$$PS_{Dom 1} = \frac{(1.76 - 1) * 4.5}{2} = \$1.71. \quad (A.16)$$

When duties are imposed the areas under the curves are altered, as graphed in panels (c) and (d) of Graph A. The curve of interest becomes the shocked line in each panel.

$CS_{Dom 2}$  represents consumer surplus in the domestic market after the duty is imposed,  $CS_{Imp 2}$  is the decreased consumer surplus in the import market, and  $PS_{Dom 2}$  is the increased producer surplus in the domestic market.

$$CS_{Dom 2} = \frac{(2.75 - 1.88) * 5.15}{2} = \$2.24 \quad (A.17)$$

$$CS_{Imp 2} = \frac{(2.5 - 2) * 3}{2} = \$0.75 \quad (A.18)$$

The sum of total consumer surplus in the shocked markets is represented by  $CS_2$ .

$$CS_2 = (\$2.24 + \$0.75) = \$2.99 \quad (A.19)$$

Producer surplus changes to:

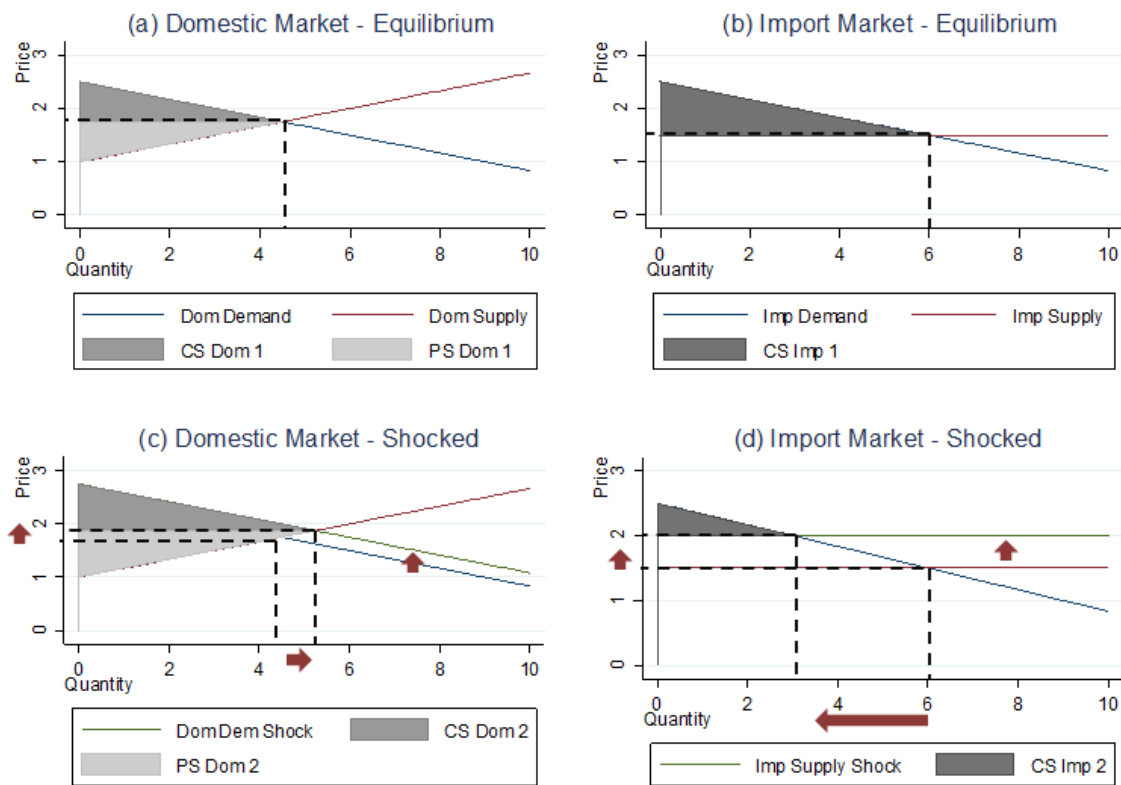
$$PS_{Dom 2} = \frac{(1.88 - 1) * 5.15}{2} = \$2.26 \quad (A.20)$$

**Public interest analysis:**

All agents are affected by the imposition of the specific anti-dumping duty of \$0.625 per unit.<sup>9</sup> Consumers faced an initial aggregate surplus of \$4.665 when the imported good was dumped, which decreased to \$2.99 once duties were imposed in the import market. The loss of consumer surplus of \$1.66 upon the imposition of duties was partially offset by an increase of \$0.55 in the surplus of the domestic industry.

In this simulation, for every \$1 that producers gained from the imposition of duties on the imported good; consumers lost \$3.02 dollars.

**Graph A – Worked simulation**



<sup>9</sup> Specific rates are being used for simplicity. Calculations will be done on a case by case basis where reference prices or *ad valorem* rates are used.

## Annex A

### PIPES Model – STATA Code

```
/// PUBLIC INTEREST TEST ///
```

```
//////////////////////////////////////  
//////////////////////////////////////THEORY//////////////////////////////////////  
//////////////////////////////////////
```

```
// Import Market
```

$$P_{d\_imp} = a_{d\_imp} - b_{d\_imp} * [Q_{d\_imp}]$$
$$P_{s\_imp} = a_{s\_imp} + b_{s\_imp} * [Q_{s\_imp}] + (d * por)$$
$$Q_{eq\_imp} = [a_{d\_imp} - a_{s\_imp} - (d * por)] / [b_{s\_imp} + b_{d\_imp}]$$
$$P_{eq\_imp} = [b_{s\_imp} * [a_{d\_imp}] + b_{d\_imp} * [a_{s\_imp} + (d * por)]] / [b_{s\_imp} + b_{d\_imp}]$$

```
// Domestic Market
```

$$P_{d\_dom} = a_{d\_dom} - b_{d\_dom} * [Q_{d\_dom}] + (d * por * XED)$$
$$P_{s\_dom} = a_{s\_dom} + b_{s\_dom} * [Q_{s\_dom}]$$
$$Q_{eq\_dom} = [a_{d\_dom} + (d * por * XED) - a_{s\_dom}] / [b_{s\_dom} + b_{d\_dom}]$$
$$P_{eq\_dom} = [a_{s\_dom} * [b_{d\_dom}] + b_{s\_dom} * [a_{d\_dom} + (d * por * XED)]] / [b_{s\_dom} + b_{d\_dom}]$$

```
// Surplus Calculations
```

$$CS_{dom} = [(a_{d\_dom} + (d * por * XED) - P_{eq\_dom}) * Q_{eq\_dom}] / 2$$
$$CS_{imp} = [(a_{d\_imp} - P_{eq\_imp}) * Q_{eq\_imp}] / 2$$
$$PS_{dom} = [(P_{eq\_dom} - a_{s\_dom}) * Q_{eq\_dom}] / 2$$

```
//////////////////////////////////////  
//////////////////////////////////////MODEL//////////////////////////////////////  
//////////////////////////////////////
```

```
// Model Calibration
```

```
set obs 1
```

```
gen a_d_imp = 2.5
```

```
gen b_d_imp = 0.167
```

```
gen a_s_imp = 1.5
```

```
gen b_s_imp = 0
```

```
gen a_d_dom = 2.5
```

```
gen b_d_dom = 0.167
```

```
gen a_s_dom = 1
```

```

gen b_s_dom = 0.167
gen d = 0
gen por = 0.80
gen XED = 0.50

////////////////////////////////////
////////////////////////////////////STEP I PIPES MODEL////////////////////////////////////
////////////////////////////////////

// Equilibrium State
gen Q_eq_imp = [a_d_imp - a_s_imp - (d * por)] / [b_s_imp + b_d_imp]
gen P_eq_imp = [b_s_imp * [a_d_imp] + b_d_imp * [a_s_imp + (d * por)]] / [b_s_imp+b_d_imp]
gen Q_eq_dom = [a_d_dom + (d * por * XED) - a_s_dom] / [b_s_dom+b_d_dom]
gen P_eq_dom = [a_s_dom * [b_d_dom] + b_s_dom * [a_d_dom + (d * por * XED)]] / [b_s_dom + b_d_dom]

// Imposition of duties
replace d=0.625 if d==0

// Shocked state of model
gen Q_sh_imp = [a_d_imp - a_s_imp - (d * por)] / [b_s_imp + b_d_imp]
gen P_sh_imp = [b_s_imp * [a_d_imp] + b_d_imp * [a_s_imp + (d * por)]] / [b_s_imp+b_d_imp]
gen Q_sh_dom = [a_d_dom + (d * por * XED) - a_s_dom] / [b_s_dom + b_d_dom]
gen P_sh_dom = [a_s_dom * [b_d_dom] + b_s_dom * [a_d_dom + (d * por * XED)]] / [b_s_dom+b_d_dom]

////////////////////////////////////
////////////////////////////////////STEP II PIPES MODEL////////////////////////////////////
////////////////////////////////////

// Reset model
replace d=0 if d==0.625

// Initial surplus calculations
gen CS_1_dom = [(a_d_dom + (d * por * XED) - P_eq_dom) * Q_eq_dom] / 2
gen CS_1_imp = [(a_d_imp - P_eq_imp) * Q_eq_imp] / 2
gen CS_1_tot = CS_1_dom + CS_1_imp
gen PS_1_tot = [(P_eq_dom - a_s_dom) * Q_eq_dom] / 2

// Imposition of duties

```

```

replace d=0.625 if d==0

// Shocked surplus calculations
gen CS_2_dom = [(a_d_dom + (d * por * XED) - P_sh_dom) * Q_sh_dom] / 2
gen CS_2_imp = [(a_d_imp - P_sh_imp) * Q_sh_imp] / 2
gen CS_2_tot = CS_2_dom + CS_2_imp
gen PS_2_tot = [(P_sh_dom - a_s_dom) * Q_sh_dom] / 2

// Overall Welfare Impact
gen CS_Impact = CS_2_tot - CS_1_tot
gen PS_Impact = PS_2_tot - PS_1_tot

```

```

/////////////////////////////////////////////////////////////////
///////////////////////////////////////////////////////////////////
// SUMMARY STATS ///////////////////////////////////////////////////////////////////
///////////////////////////////////////////////////////////////////

```

```

list Q_eq_imp P_eq_imp Q_sh_imp P_sh_imp
list Q_eq_dom P_eq_dom Q_sh_dom P_sh_dom
list CS_1_dom CS_1_imp CS_1_tot PS_1_tot
list CS_2_dom CS_2_imp CS_2_tot PS_2_tot
list CS_Impact PS_Impact

```

```

/////////////////////////////////////////////////////////////////
///////////////////////////////////////////////////////////////////
// GRAPH ///////////////////////////////////////////////////////////////////
///////////////////////////////////////////////////////////////////

```

**// Domestic market in equilibrium - EDIT**

```

twoway ///
    (function y = 2.5 - 0.167 * x , range(0 10) ///
    yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
    xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
    (function y = 1 + 0.167 * x , range(0 10) ///
    yscale(range(0 3)) ylabel(0 1 2 3, labsize(small)) ///
    xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
    (scatteri 1.75 0 1.75 4.49 2.5 0 , recast(area) color(gs8)) ///
    (scatteri 1.75 0 1.75 4.49 1 0 , recast(area) color(gs12)) , ///
    name(DomMarketEq) graphregion(color(white)) ///
    xtitle("Quantity", size(small)) ///
    ytitle("Price", size(small)) title("(a) Domestic Market -
Equilibrium", size(medium)) ///

```

```

legend( size(small) forcesize label(1 "Dom Demand") ///
label(2 "Dom Supply") label(3 "CS Dom 1") label(4 "PS Dom 1"))
// Import market in equilibrium
twoway ///
  (function y = 2.5 - 0.167 * x , range(0 10) ///
yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
  (function y = 1.5 , range(0 10) ///
yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
  (scatteri 1.5 0 1.5 5.98 2.5 0 , recast(area) color(gs5)), ///
name(ImportMarketEq) graphregion(color(white)) ///
xtitle("Quantity", size(small)) ///
ytitle("Price", size(small)) title("(b) Import Market -
Equilibrium", size(medium)) ///
legend( size(small) forcesize label(1 "Imp Demand") ///
label(2 "Imp Supply") label(3 "CS Imp 1"))
// Domestic market shocked
twoway ///
  (function y = 2.5 - 0.167 * x , range(0 10) ///
yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
  (function y = 1 + 0.167 * x , range(0 10) ///
yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
  (function y = 2.5 + (0.8 * 0.625 * 0.5) - 0.167 * x , range(0 10)
///
yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
  (scatteri 1.875 0 1.875 5.239 2.75 0 , recast(area) color(gs8))
///
  (scatteri 1.875 0 1.875 5.239 1 0 , recast(area) color(gs12)) , ///
name(DomMarketShock) graphregion(color(white)) ///
xtitle("Quantity", size(small)) ///
ytitle("Price", size(small)) title("(c) Domestic Market - Shocked",
size(medium)) ///
legend( size(small) forcesize rows(2) order (3 4 5) label(1 "Dom
Demand") ///
label(2 "Dom Supply") label(3 "Dom Dem Shock") label(4 "CS Dom 2")
///

```

```

label(5 "PS Dom 2"))

// Import market shocked

twoway ///
  (function y = 2.5 - 0.167 * x , range(0 10) ///
  yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
  xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
  (function y = 1.5 , range(0 10) ///
  yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
  xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
  (function y = 1.5 + (0.625 * 0.8) , range(0 10) ///
  yscale(range(0 3)) ylabel(0 1 2 3,labsize(small)) ///
  xscale(range(0 10)) xlabel(0 2 4 6 8 10, labsize(small))) ///
  (scatteri 2 0 2 3 2.5 0 , recast(area) color(gs5)) , ///
  name(ImpMarketShock) graphregion(color(white)) ///
  xtitle("Quantity", size(small)) ///
  ytitle("Price", size(small)) title("(d) Import Market - Shocked",
size(medium)) ///

  legend( size(small) forcesize order (3 4) label(1 "Imp Demand") ///
  label(2 "Imp Supply") label(3 "Imp Supply Shock") label(4 "CS Imp
2"))

// All in one graph

graph combine DomMarketEq ImpMarketEq DomMarketShock ImpMarketShock,
graphregion(color(white))

```