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Discussion paper

Investor State Dispute Settlement and Multinational Firm Behavior

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Investor State Dispute Settlement and Multinational Firm Behavior[*]

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Abstract

Investor-state dispute settlements (ISDS) were supposed to become an integral part of multilateral trade and investment agreements although the partner countries of these deals do not suffer from substantial institutional weakness. This paper shows why multinational firms lobby for ISDS also in this environment beyond the potential compensation an ISDS provision may offer. ISDS makes them more aggressive by increasing cost-reducing investment. Therefore, potential compensations to a foreign investor do not imply a zero-sum game, and competition with a domestic firm does not necessarily help but may imply even more excessive investment.

Keywords: Investor-State Dispute Settlement; Mulitnational Enterprises; Foreign Direct Investment; TTIP; TPP.

JEL Classification: F21; F23; F53, F55.

1 Introduction

Foreign investors who undertake foreign direct investments (FDI) in a sovereign host country potentially suffer from a hold-up problem. The reason is that a host country can use its sovereignty to appropriate parts of or all of the investment from the foreign investor. Investor State Dispute Settlements (ISDS) are supposed to protect foreign investors against such opportunistic behavior and thus prevent the hold-up problem. This opportunistic behavior by politicians is often linked to weak institutions and unstable democratic processes in a country. However, ISDS provisions are to an increasing extent being considered for countries with both a stable political environment and strong institutional quality. For example, the Comprehensive Economic and Trade Agreement (CETA) between Canada an the EU includes an ISDS provision, and both the Transatlantic Trade and Investment Partnership (TTIP) and the Trans-Pacific Partnership (TPP) were also supposed to include an ISDS provision.[1]

This paper provides a formal economic framework for analyzing why multinational firms lobby for an ISDS provision in countries that are well-functioning. We show that an ISDS under monopoly increases a multinational firm's cost-reducing investments, leading to overinvestment, and ISDS also leads to higher expected profits due to the value of expected compensations. Furthermore, an ISDS under monopoly may have a detrimental effect on the host country's welfare if the multinational firm sells a large part of its host country production abroad. Adding local competition to the analysis shows that an ISDS provision may even exacerbate the overinvestment problem by increasing the incentives for cost-reducing investment while the effect on welfare remains ambiguous. All our results extend if the multinational firm invests in product quality or better market reception of its products rather than in cost-reducing technology.

Conflicts between multinational firms and host governments about the legality of policy changes have risen in recent years, and the number of state-arbitration cases under ISDS

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[1]TTIP was negotiated between the US and the EU, and TPP includes several Pacific rim countries, among them the US, Canada, Australia and Japan, and was even supposed to be ratified, but both agreements will not come into effect under the Trump administration.

rose from 51 in 2000 to 608 cases in 2014 based on UNCTAD data. Alongside the increase in arbitrated disputes, there is growing concern over the nature of arbitration claims by multinational firms against host states. One example is Philip Morris International's (PIM) attempt to sue the Australian government for billions over the introduction of plain packing of cigarettes. After losing an initial battle in Australian courts, PIM initiated an ISDS claim in 2011 to reverse Australia's plain packaging laws, which ban all branding from cigarette packets. In 2015, a three-member arbitrate tribunal at the Permanent Court of Arbitration ruled that PIM had no jurisdiction to bring the case against Australia. This and similar cases have raised concerns over the democratic legitimacy of ISDS provisions (see von Bogdandy and Venzke, 2014), and has lead to a debate about national sovereignty in the presence of ISDS agreements. Frank and Wylie (2015) provide a survey of the literature of the darker sides of ISDS provisions. Some of the arguments they present are that ISDS courts are pro-investor biased, that they lack democratic legitimacy, and that their rulings are unpredictable.

Our analysis is related to a small but expanding literature on ISDS provisions and their effect on investment and welfare. Empirical findings are ambiguous on whether host countries of foreign direct investment (FDI) gain attractiveness by bilateral investment treaties and ISDS. Egger and Merlo (2012), for example, use data on German multinationals and find that bilateral investment treaties raise the number of multinational firms that are active in a particular host country, and they have a positive effect on the number of plants per firm, as well as on FDI stocks and fixed assets per firm. In contrast, Berger *et al* (2011) use three-year averages of FDI flows from 14 source countries to 83 (developing) host countries during the period 1978–2004. They find that the impact of ISDS provisions on FDI is unclear.

Theoretical contributions offer various insights. Papers by Aisbett *et al* (2000a) and Aisbett *et al* (2010b) discuss taking out some well-defined policies from any potential compensation claim and efficient compensation rules for domestic and foreign, respec-

tively.[2] Kohler and Stähler (2016) show that an ISDS provision may improve aggregate welfare in the host country if strategic ownership changes are ruled out. They show, however, that an ISDS provision can never achieve the first best, and that a strict national treatment provision may offer better investor protection. Stähler (2016) finds that an efficient investor protection mechanism requires a multilateral framework provided by a supranational institution, and that any ISDS compensation from the government to the investor must be based on the host country's benefits and not reductions in investor profits as is the normal practice. Horn and Tangerås (2016) show that specifying a threshold for a regulatory shock and a respective compensation rule that depends on this threshold can implement an optimal investment agreement. Perhaps closest to our study is Konrad (2016). He studies ISDS in markets with large investors and argues that 'ideal' ISDS provisions have both positive and negative effects. They can establish a level playing field between domestic and foreign investors, but they can also magnify a strategic overinvestment problem and thus lead to excessively permissive regulation.[3]

Our model sets itself apart from the literature by focusing on a national policy that is not opportunistic but evidence-based. Thus, we consider an environment in which institutions are strong, and we exemplify the effects of ISDS in this environment by discussing a tax that should correct a negative externality. Hence, our analysis considers an ISDS agreement that is embedded into an environment of evidence-based regulatory policy which is equivalent to Pigouvian taxation. The tax is set to correct for an externality whose size is known to all parties in period 1, but ex ante unknown and stochastic for period 2. The government can commit to well-defined rules, and this commitment can avoid ex post opportunistic behavior. Thus, it seems that ISDS should not play any role in this environment. However, given that ISDS was supposed to be a cornerstone in both the TTIP and the TPP agreement, we discuss its role for multinational behavior in an

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[2]This literature is also related to papers on land takings, for the seminal paper, see Blume *et al* (1984).

[3]A government that loses an ISDS case must reverse its policy and pay compensations. Fear of losing such cases may make a government reluctant to implement legislation often referred to as regulatory chill. Janeba (2016) shows that regulatory chill does not only occur under biased courts but may affect national courts as well.

environment of a host country featuring strong institutions. The multinational firm, after having set up a subsidiary in the host country, can make a case and bring the issue to an ISDS panel if the subsidiary's profits fall short of its previous period level due to a tax change. We show that the combination of taxation and ISDS leads to overinvestment and ambiguous welfare effects under different scenarios.

The remainder of the paper is organized as follows. Section 2 outlines the model, and section 3 studies the effects of ISDS under monopoly. Section 4 adds a local competitor to the analysis and section 5 concludes.

2   The basic model

We consider a two-period model in which the multinational firm enters and starts production in the first period after the host government has set a tax to correct for negative externalities. Before the multinational firm starts production, it has to make an entry investment that will determine its productivity in future periods. Let $k(x)$ with $k(0) > 0, k'(\cdot) > 0, k''(\cdot) \geq 0$ denote the entry cost where x is the size of the productivity-enhancing investment. In particular, the size of x will determine the marginal production cost $c(x), c'(\cdot) < 0, c''(\cdot) > 0$. Thus, the entry decision of the multinational firm has two dimensions: stay out or enter. If it enters, but does not invest in productivity, investment cost is $k(0)$, whereas the additional cost of productivity enhancing investment is $k(x) - k(0)$. Note carefully that we make the assumption of a productivity-enhancing investment for convenience; all our results do also hold if the multinational firm invests in product quality or a better market reception of its products.

Ex ante, the intervention necessity to correct for the externality is unknown for the second period. The externality is linearly related to production and denoted by θ. Its size is known to both the investor and the host government in the first period and equal to θ_0. The second period realization is ex ante unknown and thus stochastic. Both the multinational firm and the government know that θ will be drawn from a distribution whose cdf is given by $F(\theta)$ such that $F(\underline{\theta}) = 0$, $F(\overline{\theta}) = 1$, and $0 < \underline{\theta} < \theta_0 < \overline{\theta} < \infty$.

The multinational firm produces in this country as to serve a specific market. Demand conditions do not change over time and can be given by the inverse demand function $p(Q)$ with $p'(Q) < 0$ in the relevant range. In the basic model, the multinational firm is a monopolist such that $y = Q$ holds, where y denotes the multinational firm output. The operating profit in each period is given by

$$\pi = p(y)y - c(x)y - ty, \tag{1}$$

where t denotes a unit tax. In each period, the division running the subsidiary will maximize operating profit w.r.t. output y, leading to the first-order condition

$$\pi_y = p(y^*(t,x)) - (c(x) + t) + p_y(y^*(t,x))y^*(t,x) = 0. \tag{2}$$

In order to save on notation, we will use $y^* = y^*(t, x)$. The second-order condition warrants $\pi_{yy} = 2p'(\cdot) + p''(\cdot)y^* < 0$. Since $\pi_{yt} = -1$ and $\pi_{yx} = -c'(\cdot) > 0$, we find that $y_t^* < 0$ and $y_x^* > 0$, as expected. Let $\pi^* = (p(y^*) - (c(x) + t))y^*$ denote the maximized profit of the multinational firm. We find that

$$\pi_x^* = \pi_x = -c'(\cdot)y^* > 0, \tag{3}$$
$$\pi_t^* = \pi_t = -y^* < 0$$

due to the Envelope theorem, showing that operating profits increase with the productivity-enhancing investment and decrease with the tax. In order to determine how the tax is set we have to distinguish between institutionally weak and institutionally strong countries. In the case of institutional weakness, the host government is not able to commit to well-defined regulatory rules, but may set the tax at its discretion. The government correctly anticipates the behavior of the multinational firm's subsidiary, and domestic welfare in each period is given by

$$W(\cdot) = \alpha \left[\int_0^{y^*} p(\xi)d\xi - p(y^*)y^* \right] + (t - \theta)y^* - Iq(\bar{\pi} - \pi^*). \tag{4}$$

Domestic welfare consists of three components: (i) consumer surplus, (ii) tax revenues corrected by the effect of the externality, and (iii) the potential ISDS compensation to be paid to the multinational firm. As for consumer surplus, it depends on whether the relevant market of the multinational firm is outside the host country or not. In the first case, $\alpha = 0$; if the multinational firm produces for the host country only, $\alpha = 1$. Assuming homogeneous consumers across countries, $0 < \alpha < 1$ if the multinational firm produces for an internationally integrated market, and α will measure the relative size of the host country compared to the size of the international market.[4]

An innovation here is the role of potential compensations: If the subsidiary's operation profit falls short of its previous period's level, denoted by $\bar{\pi}$, the multinational firm can make a case and take this issue to an ISDS panel. This panel will rule in favor of the multinational firm with probability q such that the expected compensation is equal to $q(\bar{\pi} - \pi^*)$. We let I denote an indicator variable that is equal to zero if the recent tax is below its past level and equal to one if its exceeds its previous level. Note very carefully that not being able to commit to pre-defined regulatory rules allows the government to set the tax in response to firm- and market-specific circumstances.

The first-order condition allows us to identify several tax incentives:

$$W_t(\cdot) = \underbrace{-\alpha p'(y^*)y_t^*}_{\text{I}} + \underbrace{y^*}_{\text{II}} + \underbrace{(t - \theta)y_t^*}_{\text{III}} + \underbrace{Iq\pi_t^*}_{\text{IV}} = 0 \tag{5}$$

The non-cooperative tax balances several incentives: first, the tax wants to correct for the monopolistic distortion in the consumer market (see I), second, the tax wants to shift profits from the multinational firm to the host country (see II), third, the tax aims at correcting the externality (see III) and, finally, taxation takes into account that an

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[4]An alternative explanation for $0 < \alpha < 1$ is that the host government is less interested in consumer surplus than in other welfare components.

increase in the tax rate may lead to a potentially successful compensation claim by the multinational firm. These effects, except for the ISDS effect IV, are well-known in the literature, and effect IV may lead to a regulatory chill (see Janeba, 2016).

The government sets a high or low tax depending on the relative strength these effects. If the profit-shifting incentive (II) is strong, the hold-up problem materializes: the government cannot commit to an evidence-based policy, and the multinational firm will anticipate this behavior and may not invest in the first place. If the government cannot commit to pre-defined rules of regulation, Kohler and Stähler (2016) have shown that an ISDS provision may increase aggregate welfare under certain conditions. This can be seen from $W_{tq} = I\pi_t^* < 0$: introducing ISDS, that is, changing from $q = 0$ to $q > 0$, or tightening ISDS, that is, increasing q, will reduce the tax rate. If the tax rate has been excessively large from a social perspective, an ISDS provision may work as a disciplinary device to mitigate the hold-up problem.[5]

However, the Comprehensive Economic and Trade Agreement (CETA) involves partner countries that are not supposed to suffer from institutional weaknesses and political uncertainty, and this is also true for both the Transatlantic Trade and Investment Partnership (TTIP) and the Trans-Pacific Partnership (TPP). In these agreements compensation is based on violation of certain identified conditions. An ISDS agreement is similar in structure, but must clarify the foundation for an evidence-based regulatory policy. First, we would expect it to be independent of market conduct and firm characteristics. Second, it should follow scientific evidence for the problem at hand. In our case, this is equivalent to Pigouvian taxation, that is, $t^*(\theta) = \theta$. In this case, only the externality is taken into account, and any other activity that causes this externality would be treated in the same way. We would expect that an evidence-based policy would solve the hold-up problem as regulation will follow strict rules that exclude opportunistic behavior. However, the recent design of ISDS provisions give multinational firms the chance to receive a compensation. Additionally, the subsequent section will show that multinational firms will also benefit

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[5]Kohler and Stähler (2016) also show that ISDS may improve aggregate welfare, but will never achieve the first best.

indirectly as the potential compensation allows them to increase their investment level strategically.

3   The effect of ISDS

We will now scrutinize the investment behavior of the multinational firm and the implications of ISDS on this behavior and domestic welfare. The government follows an evidence-based policy so that $t = \theta$. Consequently, the expected multinational firm profit is given by

$$
\begin{aligned}
\Omega \;=\; & \pi^*(\theta_0, x) + \delta \int_{\underline{\theta}}^{\overline{\theta}} \pi^*(\theta, x) dF(\theta) + \delta q \int_{\theta_0}^{\overline{\theta}} \left[\pi^*(\theta_0, x) - \pi^*(\theta, x) \right] dF(\theta) - k(x) \qquad (6) \\
\;=\; & \left[1 + \delta q (1 - F(\theta_0)) \right] \pi^*(\theta_0, x) + \delta \left(\int_{\underline{\theta}}^{\theta_0} \pi^*(\theta, x) dF(\theta) + (1 - q) \int_{\theta_0}^{\overline{\theta}} \pi^*(\theta, x) dF(\theta) \right) \\
& - \; k(x).
\end{aligned}
$$

Expression (6) takes into account that the investment is effective over two periods; δ denotes the discount factor for the second period. Without ISDS, that is, $q = 0$, the multinational firm profit will be equal to the first period operating profit and the discounted expected second period operating profit, minus the investment cost. ISDS now gives the multinational firm the chance to receive a compensation if regulation is tightened, that is, if $\theta > \theta_0$. The second line of (6) shows that this works like a partial insurance to secure the first period operating profit also in the second period. The multinational firm will correctly anticipate these effects when determining its optimal investment level. The first-order condition for x is given by

$$
\begin{aligned}
\Omega_x \;=\; & \left[1 + \delta q (1 - F(\theta_0)) \right] \pi_x^*(\theta_0, x^*) - k_x(x^*) \qquad (7) \\
& + \; \delta \left(\int_{\underline{\theta}}^{\theta_0} \pi_x^*(\theta, x^*) dF(\theta) + (1 - q) \int_{\theta_0}^{\overline{\theta}} \pi_x^*(\theta, x^*) dF(\theta) \right) = 0.
\end{aligned}
$$

We are now able to develop our first main results that is summarized by:

Proposition 1. *ISDS will increase both (i) the expected multinational firm profit and (ii) the productivity-enhancing investment.*

Proof. See Appendix A.1. □

We conclude that the benefits of ISDS for the multinational firm come from two sources, the direct effect of a potential compensation, and an indirect effect through investment that enhances the direct effect. Note carefully that ISDS leads to over-investment: for $q = 0$, the monopolist would just balance the benefit of production cost reduction and the cost of production cost-reducing investment. With an increase in q, investment increases and is thus excessive, even without the existence of any rival firm.

What about the effect on the domestic country of an ISDS? We find:

Proposition 2. *The effect of ISDS on domestic welfare is ambiguous. It is negative for a sufficiently small α.*

Proof. Differentiation yields

$$W_x(\cdot) = -\alpha p'(y^*)y_x^* - Iq\pi_x^*. \tag{8}$$

Since $\pi_x^* > 0$, the second effect is clearly negative. The first effect is positive as an increase in x increases output and reduces the monopoly distortion, but this effect is dominated if α is small. □

Recall that α measures the relative size of the host country compared to the size of the international market. If $\alpha = 0$, the multinational firm sells its host country production outside the host country. Proposition 2 shows that not only is welfare negative for $\alpha = 0$, but small values of α may also lead to a reduction in welfare because the increase in consumer surplus is not large enough to compensate the expected compensation from an ISDS provision.

4 Competition with a domestic firm

Now suppose that the multinational firm is not a monopolist but faces competition by a rival firm located in the host country. Both firms compete in the same market and face an inverse demand function $p(y + z)$ where y denotes the multinational output as before and z is the output of the domestic firm. The empirical literature has shown that multinational firms are larger and more productive (see for example Helpman *et al*, 2004, and Raff *et al*, 2012), and therefore we assume that the marginal production cost of the domestic firm is fixed and equal to γ such that $\gamma > c(0)$. The multinational profit, net of investment cost, is given by $\pi^y = (p(y + z) - c(x) - t)y$, and the domestic profit is given by $\pi^z = (p(y + z) - \gamma - t)z$. The first-order conditions are given by

$$p(y^{**}(t, x) + z^{**}(t, x)) - c(x) - t + p'(y^{**}(t, x) + z^{**}(t, x))y^{**}(t, x) = 0, \qquad (9)$$

$$p(y^{**}(t, x) + z^{**}(t, x)) - \gamma - t + p'(y^{**}(t, x) + z^{**}(t, x))z^{**}(t, x) = 0, \qquad (10)$$

where $y^{**}(t, x)$ and $z^{**}(t, x)$ denote the optimal production levels of the multinational and the domestic firm, respectively. As before, we save on notation by $y^{**} = y^{**}(t, x), z^{**} = z^{**}(t, x)$. Let π^{y**} and π^{z**} denote the maximized profit of the multinational firm and the domestic firm, respectively. We find that our results are similar as in the case of a monopolistic multinational firm, with π_x^{y**} replacing π_x^* such that Proposition 1 holds also for the duopoly case:

Lemma 1. $\pi_x^{y**} > 0, \pi_{xt}^{y**} < 0$.

Proof. See Appendix A.2. □

However, a crucial difference is that the investment level is already excessive without ISDS ($q = 0$) in case of duopoly. Since domestic output decreases with cost-reducing multinational investment, the multinational firm can gain market share and profit by excessive investment. While this effect is well known from the strategic trade policy lit-

erature, we show here that this effect is exacerbated by ISDS: an ISDS provision makes this investment even more strategic in nature and thus even more excessive.

Note carefully that this result does not say anything on investment *levels* under monopoly versus duopoly: investment is not excessive if it balances the benefit of cost reduction and the cost of investment. When the multinational firm is a duopolist, the benefit of cost reduction is smaller compared to the case of a monopolist. Another interesting question is therefore whether a multinational firm's investment level will be smaller or larger when the multinational firm faces a domestic rival. We observe two opposing effects: (i) Due to competition, multinational output and profit are smaller with a domestic rival, and this effect makes cost-reducing investment less profitable and smaller. (ii) In a duopoly, the multinational firm is able to take market share away from a domestic rival by increasing cost-reducing investment. We find:

Proposition 3. *If inverse demand is linear, that is, $p = a - b(y + z)$, the cost-reducing investment is larger under duopoly if*

$$\gamma \geq \frac{a + 7c(0) - \overline{\theta}}{8}.$$

Proof. See Appendix A.3. □

Note that Proposition 3 develops only a sufficient condition; it may well be that cost-reducing investment is larger with a domestic rival even if γ is sufficiently large only for some range of θ. In that case, the result will also depend on the cdf $F(\theta)$. In any case, we observe that the condition is not too demanding given that the empirical literature emphasizes the strong productivity differences between domestic and multinational firms.

With a domestic rival present, domestic welfare is now given by

$$W(\cdot) = \alpha \left[\int_0^{y^* + z^*} p(\xi)d\xi - p(y^* + z^*)(y^* + z^*) \right] + \pi^{z**} + (t - \theta)(y^* + z^*) - Iq(\bar{\pi} - \pi^*) \quad (11)$$

where the difference to (4) is that also domestic firm profit is taken into account. We find

that Proposition 2 carries over qualitatively to the duopoly case because

$$W_x(\cdot) = -\alpha p'(y^*)(y_x^* + z_x^*) + \pi_x^{y**} - Iq\pi_x^*. \tag{12}$$

The sign is ambiguous as $y_x^* + z_x^*$ is clearly positive and π_x^{y**} is clearly negative,[6] as is the last ISDS-induced term. The ISDS-induced increase in investment will increase domestic consumer surplus, but also erode domestic profits, and it may lead to a larger compensation claim. The effect of ISDS on domestic welfare, therefore, is ambiguous also in the presence of a local competitor.

5   Concluding remarks

This paper has studied ISDS provisions in the context of host countries featuring a strong institutional environment. The production activity gives rise to an externality that is internalized by Pigouvian taxation. A multinational firm can invest in cost-reducing technology in a host country and pays a unit tax. Why then have multinational firms an interest in an ISDS provision? First, ISDS may imply a compensation payment if the tax rises. If the subsidiary's profits fall short of its previous period level, the multinational firm can make a case and bring the issue to an ISDS panel. A second effect is that the ISDS provision makes the multinational firm more aggressive in the market place. We have shown that an ISDS provision leads to overinvestment both under monopoly and duopoly and that the welfare effects of ISDS provisions are ambiguous. Competition can even lead to more excessive investment as the multinational firm has an additional incentive to take market share away from a local rival.

Already in October 2014, the Economist wrote: "If you wanted to convince the public that international trade agreements are a way to let multinational companies get rich at the expense of ordinary people, this is what you would do: give foreign firms a special right to apply to a secretive tribunal of highly paid corporate lawyers for compensation

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[6]See (A.3) and (A.5), respectively, in Appendix A.2.

whenever a government passes a law to, say, discourage smoking, protect the environment or prevent a nuclear catastrophe (The Economist, Investor-state dispute settlement. The arbitration game, Oct 11th 2014)." Our model has shown why multinational firms have an interest in ISDS provisions beyond the expected compensation, as ISDS allows them to change the market game in their favor. We conclude that the public should be wary of any agreement that includes ISDS provisions in agreements that affect countries featuring strong institutions.

Appendix

A.1   Proof of Proposition 1

Due to the envelope theorem, $d\Omega/dq = \Omega_q$, and differentiation yields

$$\Omega_q = \delta \left((1 - F(\theta_0))\pi^*(\theta_0, x^*) - \int_{\theta_0}^{\bar{\theta}} \pi^*(\theta, x^*)dF(\theta) \right) > 0, \tag{A.1}$$

because $\pi_t^* = \pi_\theta^* < 0$, and thus π^* is strictly decreasing in θ, making the second term in (A.1) smaller than the first term. Further differentiation yields

$$\Omega_{xq} = \delta \left((1 - F(\theta_0))\pi_x^*(\theta_0, x^*) - \int_{\theta_0}^{\bar{\theta}} \pi_x^*(\theta, x^*)dF(\theta) \right) > 0, \tag{A.2}$$

because

$$\pi_{xt}^*(\cdot) = \pi_{yx}(\cdot)y_t^* + \pi_{xt}(\cdot) = -c_x(\cdot)y_t^*(\cdot) - y_x^*(\cdot) < 0,$$

so π_x^* is strictly decreasing in θ, making the second term in (A.2) smaller than the first term.

A.2   Proof of Lemma 1

Differentiation yields

$$\pi_{yy}^y = 2p'(\cdot) + p''(\cdot)y < 0, \pi_{zz}^z = 2p'(\cdot) + p''(\cdot)z < 0,$$

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$$\pi_{yz}^{y} = p'(\cdot) + p''(\cdot)y < 0, \pi_{zy}^{z} = p'(\cdot) + p''(\cdot)z < 0,$$

where the sign of the last two derivatives assumes that both firms compete with strategic substitutes. The (strictly positive) Jacobian is given by

$$\det(J) = \pi_{yy}^{y}\pi_{zz}^{z} - \pi_{yz}^{y}\pi_{zy}^{z} = p'(\cdot)\left(3p'(\cdot) + p''(\cdot)(y+z)\right) > 0.$$

The output changes with x and t are respectively given by

$$y_{x}^{**} = \frac{c'(\cdot)\pi_{zz}^{z}}{\det(J)} > 0, z_{x}^{**} = -\frac{c'(\cdot)\pi_{zy}^{z}}{\det(J)} < 0, y_{t}^{**} = z_{t}^{**} = \frac{p'(\cdot)}{\det(J)} < 0.$$

The aggregate output change with x is clearly positive:

$$y_{x}^{**} + z_{x}^{**} = \frac{p'(\cdot)c'(\cdot)}{\det(J)} > 0. \tag{A.3}$$

Due to the Envelope theorem:

$$\pi_{x}^{y**} = \pi_{z}^{y}z_{x}^{**} + \pi_{x}^{y} = p'(\cdot)y^{**}z_{x}^{**} - c'(\cdot)y = -c'(\cdot)y^{**}\frac{4p'(\cdot) + p''(\cdot)(y^{**} + 2z^{**})}{3p'(\cdot) + p''(\cdot)(y^{**} + z^{**})} > 0 \tag{A.4}$$

where we have used

$$p'(\cdot)z_{x}^{**} = -p'(\cdot)\frac{c'(\cdot)\pi_{zy}^{z}}{\det(J)} = -c'(\cdot)\frac{p'(\cdot) + p''(\cdot)z^{**}}{3p'(\cdot) + p''(\cdot)(y^{**} + z^{**})}.$$

Furthermore,

$$\pi_{x}^{z**} = \pi_{y}^{z}y_{x}^{**} = p'(\cdot)z^{**}y_{x}^{**} < 0. \tag{A.5}$$

As $z_{xt}^{**} = 0$:

$$\pi_{xt}^{y**} = \pi_{yt}^{y}y_{t}^{**} + \pi_{zt}^{y}z_{x}^{**} + \pi_{xt}^{y} = -y_{x}^{*} + p'(\cdot)y_{t}^{*}z_{x}^{*} - c'(\cdot)y_{t}^{*} < 0.$$

A.3   Proof of Proposition 3

From (3), $\pi_{x}^{*} = -c'(\cdot)y^{*}$, and (A.4) shows that $\pi_{x}^{y**} = -c'(\cdot)y^{**}\frac{4}{3}$ for $p''(\cdot) = 0$. For a given investment level $\overline{x}$, $\pi_{x}^{y**} \geq \pi_{x}^{*}$ if

$$-c'(\overline{x})y^{**}\frac{4}{3} \geq -c'(\overline{x})y^* \Leftrightarrow y^{**}\frac{4}{3} \geq y^*.$$

For $p = a - b(y + z)$ and $t = \theta$,

$$y^* = \frac{a - c(\overline{x}) - \theta}{2b}, y^{**} = \frac{a - 2c(\overline{x}) - \theta}{3b},$$

so that

$$y^{**}\frac{4}{3} \geq y^* \Rightarrow \gamma \geq \tilde{\gamma}(\overline{x}, \theta) = \frac{a + 7c(\overline{x}) - \theta}{8}.$$

Since $\tilde{\gamma}(\overline{x}, \theta) \leq \tilde{\gamma}(0, \overline{\theta})$, $\pi_x^{y^{**}} \geq \pi_x^*$ for any $\overline{x}$ if $\gamma \geq (a + 7c(0) - \overline{\theta})/8$, and thus the marginal benefit from cost-reducing investment is larger for any given $\overline{x}$ under duopoly, leading to a larger investment level.

References

[1] Aisbett, E., Karp, L., McAusland, C. (2010a), Compensations for Indirect Expropriation in International Investment Agreements: Implications for National Treatment ad Rights to Invest, *Journal of Globalization and Development*, 1 (2), Article 6.

[2] Aisbett, E., Karp, L., McAusland, C. (2010b), Police Powers, Regulatory Takings and the Efficient Compensation of Domestic and Foreign Investors, *Economic Record*, 86, 367-383.

[3] Berger, A., Busse, M., Nunnenkamp, P., Roy, M. (2011). More stringent BITs, less ambiguous effects on FDI? Not a bit! *Economics Letters*, 112, 270-272.

[4] Bergstrand, J.H., Egger, P. (2013). What determines BITs? *Journal of International Economics*, 90, 107-122.

[5] Blume, L., Rubinfeld, D. L. , Shapiro, P. (1984), The Taking of Land: When Should Compensation be Paid? *Quarterly Journal of Economics*, 99, 71-92.

[6] Bogdady, A. von, Venzke, I. (2014). In wessen Namen? Internationale Gerichte in Zeiten globalen Regierens, Suhrkamp Verlag, Berlin.

[7] Egger, P., Merlo, V. (2012). BITs Bite: An Anatomy of the Impact of Bilateral Investment Treaties on Multinational Firms. *Scandinavian Journal of Economics*, 114, 1240-1266.

[8] Franck, S.D., Gersovitz, M. (1983). Country risk: economic aspects. In R.J. Herring, ed., Managing International Risk, Cambridge University Press, Cambridge, 75- 108.

[9] Janeba, E. (2016), Regulatory Chill and the Effect of Investor State Dispute Settlements, mimeo.

[10] Helpman, E., Melitz, M.J., Yeaple, S.R. 2004. Export versus FDI with heterogeneous firms. *American Economic Review*, 94, 300–316.

[11] Horn, H., Tangerås, T. (2016), Economics and Politics of International Investment Agreements, IFN Working Paper No. 1140, Research Institute of Industrial Economics.

[12] Konrad, K.A., (2016). Large investors and permissive regulation: Why environmentalists may dislike investor state dispute settlement, mimeo

[13] Kohler, W., Stähler, F. (2016), The Economics of Investor Protection: ISDS versus National Treatment, CESifo Working Paper No. 5766.

[14] Raff, H., Ryan M., Stähler, F. 2012. Firm productivity and the foreign-market entry decision. *Journal of Economics & Management Strategy*, 21, 849–871.

[15] Stähler, F. (2016), An optimal investor state dispute settlement mechanism, mimeo.