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ON THE EFFICIENCY OF FISCAL COMPETITION FOR FDI WHEN  
INCUMBENT FIRMS ARE FOREIGN-OWNED

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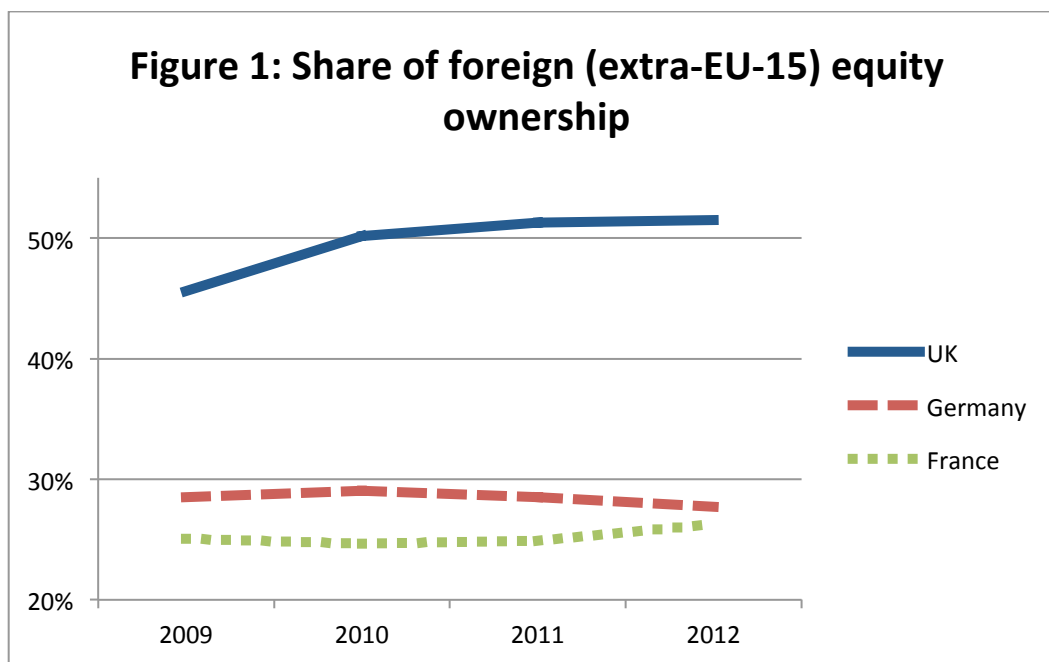
*Abstract*

We show that the international distribution of ownership of the incumbent firms within a host region matters for the efficiency of the fiscal competition between the region's constituent countries for a new FDI project. If incumbent firms are owned entirely within the host region, then the new plant's location will be efficient. However, when incumbent firms are owned outside the host region and the degree of such extra-regional ownership varies substantially across the competing host countries – as it does in the data – then inefficient locations might win contests for new plants.

## 1. Introduction

It is routine in formal models to analyse the tax/subsidy competition between potential host countries for a foreign direct investment (FDI) project as an auction. Haufler and Wooton (1999) is an important early example of this approach. A generic feature of such auction-based models is that, in equilibrium, the multinational enterprise (MNE) chooses the efficient location for its plant (where, as conventional, world welfare is the efficiency standard). Thus, popular concerns about the welfare economics of fiscal competition for FDI – e.g. the widespread fear that corporate tax rates and revenues would “race to the bottom” – are properly shown to be distributional rather than efficiency-related.<sup>1</sup>

The valuation that a host country places on an inward FDI project depends on several factors: in particular, the number of jobs that will be created (if there is existing involuntary unemployment) and the wage premium offered by the MNE; and the impact on existing (or incumbent) firms within the host country, which may be positive due to localised technological spillovers or negative due to intensified product-market competition.<sup>2</sup> For simplicity, the original Haufler/Wooton analysis assumed that the foreign MNE was the only firm in the industry, and thus overlooked the impact of inward FDI on incumbent firms’ profits.



Subsequent auction models by Fumagalli (2003) and Bjorvatn and Eckel (2006) extended the Haufler/Wooton framework by including incumbent firms in one or both host countries. Under the assumption that incumbent firms are locally owned, these extensions confirmed that the MNE’s equilibrium location remains efficient.<sup>3</sup> In this paper, our purpose is to relax the assumption of local ownership of incumbents. In particular, we investigate whether the

<sup>1</sup> During the late 1990s, these public concerns were reflected at the policy level when both the European Union and the OECD launched initiatives to combat “harmful” tax competition (European Commission, 1997; OECD, 1998).

<sup>2</sup> UNCTAD (2003, p. 88) cites “crowding out of local firms” as a major host-country concern in relation to inward FDI.

<sup>3</sup> e.g. Bjorvatn and Eckel (2006), Proposition 5.

efficiency property of equilibrium survives this generalisation. We focus on the fiscal competition between two potential host countries, which together form a regional product market, for an MNE's production plant. Both host countries contain pre-established, incumbent firms, whose profits are affected by inward FDI, and we allow the ownership of any given incumbent firm to be spread throughout the two host countries and the rest of the world.

For the MNE to choose an inefficient location in the equilibrium of our fiscal competition game, it is necessary that some share of the incumbent stock of firms in the host region is owned in the rest of the world. (Thus, the assumption of local ownership of incumbents is crucial to previous efficiency results.) The data in Figure 1 show that this necessary condition is surely satisfied in the case of three large European countries, where, for example, around 50% of equity in UK companies was, in recent years, owned in countries outside the EU-15.<sup>4</sup> More generally, for an inefficient equilibrium location, it is necessary that the externality that inward FDI imposes on incumbent-firm owners in the rest of the world (through changes in their profit income) differs between the two host countries. Such a difference will tend to arise when the share of rest-of-world ownership of incumbents differs markedly, as between the UK and Germany/France in Figure 1.

While the efficient plant location is unaffected by changes in the international distribution of firm ownership, its equilibrium location does vary. If inward FDI harms incumbents by intensifying competition, then a rise in the share of a country's incumbent firms that is owned outside the host region makes that country more likely to win the competition for new FDI. (The negative effect of inward FDI on incumbent firms owned in third countries is given no weight by the competing countries.) Thus, the inefficient location might well win the MNE's plant in equilibrium if the bulk of its incumbent firms are owned in the rest of the world.

The paper that is closest to ours is Mittermaier (2009), who studies the fiscal competition for a new FDI project between two potential host countries, both of whom contain a single incumbent firm. Each incumbent firm is wholly owned either domestically or outside the host region, and product-market competition is Cournot. Our paper generalises Mittermaier's model and complements his exclusively positive analysis by considering the efficiency properties of equilibrium.<sup>5</sup> Our result in Proposition 2(i) on the influence of incumbent-firm ownership on the outcome of contests for new FDI is consistent with Mittermaier's findings.

## 2. A model of subsidy competition for FDI

For ease of comparison with existing results, we use a modelling structure that is familiar from the literature (e.g. Haufler and Wooton, 1999; Fumagalli, 2003; Bjorvatn and Eckel, 2006). Two potential host countries, *A* and *B*, are competing in lump-sum FDI subsidies for a

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<sup>4</sup> The data are taken from the IMF's Coordinated Direct Investment Survey (<http://cdi.imf.org>). Strictly speaking, for the purposes of our model below, we should distinguish between the profits of firms in the UK and the global profits of UK firms, but this is impossible in the data.

<sup>5</sup> Specifically, the generalisations we incorporate are: (i) no restrictions are placed on the total number of incumbent firms within the host region or on their distribution between the two bidding countries; (ii) "ownership" in our model is a continuous variable and we allow incumbent-firm ownership to be distributed in arbitrary proportions across the two bidding countries and the rest of the world; (iii) our model accommodates the possibility that inward FDI might affect incumbent firms through technological spillovers as well as through product-market competition; and (iv) we do not restrict the source of social benefits from inward FDI to consumer-surplus gains.

single MNE's production plant. We assume that the MNE is entirely owned in the rest of the world (RoW) and that it cannot export to the host region from its home plant in RoW due to prohibitive trade costs.<sup>6</sup> Together,  $A$  and  $B$  comprise the "host region", and we assume that the MNE will establish at most one plant in the region to serve the entire regional market, perhaps due to economies of scale. In both  $A$  and  $B$ , there are incumbent firms whose profits may be affected by inward FDI but who are immobile with respect to the subsidy competition under analysis. We denote the MNE's pre-subsidy profits following location in country  $i$  by  $\pi_i$ .

The fiscal competition game has two stages, and we solve it backwards to isolate its subgame perfect Nash equilibrium in pure strategies. In the first stage, both countries simultaneously announce their bids for the MNE's plant. Each country aims to maximise its social welfare and will thus bid at most its "valuation",  $V_i$ , where

$$\begin{aligned} V_A &\equiv S_A + e_{AA}\Pi_A - e_{BA}\Pi_B \\ V_B &\equiv S_B - e_{AB}\Pi_A + e_{BB}\Pi_B \end{aligned}$$

$V_i$  is the maximum subsidy that country  $i$  is prepared to pay to lure the MNE away from its regional partner.  $S_i$  measures the "social benefits" that country  $i$  enjoys from inward FDI over importing. For example, inward FDI might relieve involuntary unemployment or be associated with a wage premium for workers (relative to incumbent firms in the host country).<sup>7,8</sup>  $\Pi_i$  is the change in the total profits of pre-established, incumbent firms in country  $i$  if the MNE locates its plant in  $i$  rather than  $j$ . If inward FDI increases competitive pressure in the host country (perhaps because it allows the MNE to jump over an intra-regional trade cost), then we would expect  $\Pi_i < 0$ . Alternatively, if, for example, incumbent firms would feel little extra competitive pressure from inward FDI but would instead enjoy localised technology spillovers from the MNE, then  $\Pi_i > 0$ .  $e_{ij} \in [0,1]$  measures the share of profits from incumbent firms in country  $i$  that accrues to owners in country  $j$ .<sup>9</sup> Thus, when determining its valuation, a country takes account of how relocation (between  $A$  and  $B$ ) by the MNE would affect the profit income its citizens earn from incumbent firms in both countries.

We also define the following ownership shares that will be used below:

$$\begin{aligned} e_A &\equiv e_{AA} + e_{AB} \\ e_B &\equiv e_{BA} + e_{BB} \end{aligned}$$

<sup>6</sup> Following Ferrett and Wooton (2010), we do not expect the assumption on the MNE's ownership to be restrictive.

<sup>7</sup> Of course, it might be the case, as in Ireland during the 1990s when inward FDI boomed (Alfaro *et al.*, 2005), that MNE entry drives up the industry-wide wage. In this case, when accounting for social welfare, the loss to domestically-owned firms must be offset against the wage gain to workers. Our model, which explicitly accounts for changes in incumbent-firm profits, is well-equipped to handle this scenario.

<sup>8</sup> However, we could have  $S_A < 0$  if, for example, inward FDI were associated with severe localised pollution externalities.

<sup>9</sup> Typically, there will be a heterogeneous collection of incumbent firms in country  $A$ , and the citizens of country  $A$  will own different shares of each one. The aggregate approach to accounting for profit income that we adopt in our  $V_A$  expression can thus be justified either by assuming that the citizens of  $A$  collectively own the same share of each incumbent firm in  $A$  (which is then given by  $e_{AA}$ ) or by assuming that every incumbent firm in  $A$  experiences the same change in its profits following inward FDI (in this case,  $e_{AA}$  is the mean across incumbents).

$e_i$  is the share of profits from incumbent firms in country  $i$  that remains within the host region. Thus, a share  $1 - e_i$  flows to owners in RoW.

In the second stage of our game, the MNE chooses where to locate its plant, choosing between  $A$ ,  $B$ , and “stay out”. Under “stay out” the MNE earns zero, whereas in  $A$  or  $B$  the MNE earns  $\pi_i$  plus the bid of the country concerned. For both countries, we assume that the maximum level of post-subsidy profits that might be offered to the MNE ( $\pi_i + V_i \geq 0$ ) is positive, and that local production with a corporate tax of  $\pi_i$  is preferred to no FDI flows into the region. The former assumption means that  $A$  and  $B$  will be prepared to actively compete against each other for the inward FDI, while the latter assumption means that the equilibrium bids are unique.<sup>10</sup>

## 2.1. Equilibrium location

The equilibrium takes a form that is familiar, for example, from Haufler and Wooton (1999). The fiscal competition is a first-price auction with an important wrinkle: the firm’s location is not determined by the countries’ subsidy offers alone. Rather, the plant goes to the country that offers the higher level of post-subsidy profits. As Haufler and Wooton (1999) point out, this means that an inherently profitable (high  $\pi$ ) country, which offers higher pre-subsidy profits than the other location, can offer a lower FDI subsidy than its rivals, or perhaps even announce a corporate tax, and still win the plant.

To determine the MNE’s equilibrium location, we compare its post-subsidy profits in  $A$  and  $B$  when the countries offer their valuations as subsidies. Therefore, country  $A$  is the equilibrium location if and only if

$$\pi_A + V_A \geq \pi_B + V_B \quad (1)$$

In this equilibrium, country  $B$  offers its maximum subsidy of  $V_B$ , and  $A$  offers a subsidy of  $\pi_B + V_B - \pi_A + \varepsilon$ , where  $\varepsilon$  is vanishingly small, and wins the FDI.

Expanding the equilibrium condition (1), country  $A$  wins the FDI if and only if

$$\Delta_P \equiv \Delta_A + e_A \Pi_A - e_B \Pi_B \geq 0, \quad (2)$$

where  $\Delta_A \equiv S_A + \pi_A - (S_B + \pi_B)$  measures the “FDI advantage” of country  $A$  in terms of social benefits and MNE profits.<sup>11</sup>  $\Delta_P$  is the difference between the maximum levels of post-subsidy profits that the two host countries are willing to offer the MNE.

## 2.2. Efficient location

The efficient location for the MNE’s plant is the one that maximises world welfare. World welfare is higher when the MNE locates in  $A$  rather than  $B$  if and only if

<sup>10</sup> These two assumptions ensure that the countries’ reaction functions in bid space resemble those in figure 1 of Ferrett and Wooton (2010). (Two equilibria might arise if inward FDI were associated with severe region-wide pollution. In this case, country  $A$  might optimally choose to attract the plant if the MNE prefers  $B$  to “stay out”, while it might optimally choose not to do so if the MNE prefers “stay out” to  $B$ .)

<sup>11</sup> Without incumbent firms, the sign of  $\Delta_A$  determines the MNE’s equilibrium location.

$$\Delta_W \equiv \Delta_A + \Pi_A - \Pi_B \geq 0, \quad (3)$$

where  $\Delta_W$  measures the gain in world welfare if the MNE chooses  $A$  over  $B$ . Note that the efficient location is independent of how the ownership of the incumbent firms is distributed internationally because efficiency is based on aggregate world welfare.

### 2.3. Results

From (2) and (3), the MNE's equilibrium location is efficient if and only if  $\Delta_P$  and  $\Delta_W$  have the same sign.

**Proposition 1:** *Either of the following two conditions is sufficient for the MNE's equilibrium location to be efficient: (i)  $(1 - e_A)\Pi_A = (1 - e_B)\Pi_B$ , so the FDI-induced change in the flow of profit income from incumbent firms to owners in RoW is the same for both host countries; (ii)  $|\Delta_A|$  is "large", because the sum of wider social benefits from FDI ( $S_i$ ) and profits of the MNE ( $\pi_i$ ) differs significantly between the two host countries. Therefore, for the MNE's equilibrium location to be inefficient, it is necessary that (i) and (ii) both fail.*

**Proof:** Part (i) uses the fact that  $\Delta_P = \Delta_W$  is sufficient for  $\text{sgn}(\Delta_P) = \text{sgn}(\Delta_W)$ . Part (ii) is straightforward.

From Proposition 1(i) it follows immediately that the equilibrium location is always efficient if the incumbent firms are entirely owned within the host region, i.e. if  $e_A = e_B = 1$ . This is the case that dominates the existing literature (e.g. Fumagalli, 2003; Bjorvatn and Eckel, 2006). More generally, the condition in Proposition 1(i) requires that the externality from inward FDI on incumbent-firm owners in RoW be the same for both potential host countries.

To understand Proposition 1(ii), note that a large asymmetry between the host countries in terms of combined social benefits from FDI and MNE profits is not, in itself, a source of inefficiency (Haufler and Wooton, 1999). Thus, such an asymmetry can, if large enough, outweigh any difference between the host countries in how inward FDI affects profit flows from incumbent firms to RoW. To interpret the condition on  $|\Delta_A|$ , note that if countries  $A$  and  $B$  are very similar, then  $|\Delta_A|$  will be small. Thus, some asymmetry between  $A$  and  $B$  is needed for "large"  $|\Delta_A|$ : e.g. one of the countries might have a large surplus supply of labour, making inward FDI both highly profitable and highly socially beneficial.

To focus on cases where the MNE's location might be inefficient, we now assume  $\Delta_A = 0$ , so that Proposition 1(ii) does not apply. We also assume that  $\Pi_i < 0$  for  $i \in \{A, B\}$  so that inward investment harms incumbent firms (e.g. the competition effect of inward FDI outweighs the spillover effect). This is consistent with the empirical evidence surveyed in Görg and Greenaway (2004). It is straightforward to modify our following arguments to cases where this simplifying assumption fails.<sup>12</sup> Finally, we assume that  $\Pi_B = k\Pi_A$ , where  $k \in (0,1)$  can be interpreted as a measure of the relative size of country  $B$ .<sup>13</sup> This assumption

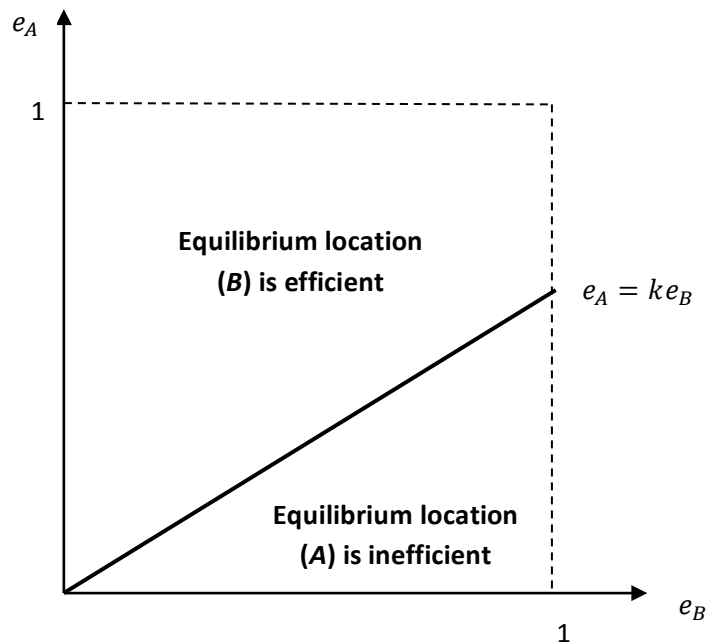
<sup>12</sup> E.g. if  $\Pi_i > 0$  for  $i \in \{A, B\}$ , then "falls" becomes "rises" in Proposition 2(i).

<sup>13</sup> This interpretation of  $k$  (as a measure of the relative size of country  $B$ ) can be micro-founded in the following canonical case: each country contains a fixed number of incumbent firms (aside from the MNE, there is no entry into, or exit from, the industry); the good is homogeneous and competition is Cournot; and all firms have zero unit cost. In a Technical Supplement to our paper (available from the authors on request), we explicitly solve this standard case, and we show that as the relative number of households in country  $B$  rises,  $\Pi_B/\Pi_A$  also rises.

can always be satisfied through suitable labelling of the two host countries and is thus not restrictive.

**Figure 2: Equilibrium versus efficient locations**

(The efficient location is  $B$  throughout the figure.)



Our assumptions  $\Delta_A = 0$  and  $0 > \Pi_B > \Pi_A$  together imply, from (3), that country  $B$  is the efficient location because the negative impact of inward FDI on incumbent firms is smaller there. Therefore, from (2), the MNE's equilibrium location is efficient if and only if  $\Delta_P < 0$  and  $e_A > k e_B$ , so that  $B$  wins the competition for FDI. In Figure 2 we explore the efficiency properties of the equilibrium in  $(e_A, e_B)$ -space.

A key observation from Figure 2 is that, for both  $i \in \{A, B\}$ , a rise in  $e_i$  makes it less likely that country  $i$  is the equilibrium location. For example,  $e_A$  might rise due to an increase in either  $e_{AA}$  or  $e_{AB}$ , both of which make it less likely that  $A$  wins the competition for the FDI. A rise in  $e_{AA}$  cuts  $V_A$ : country  $A$  becomes less willing to bid for the MNE because it takes greater account of the harm that inward FDI does to the incumbent firms already in  $A$ . On the other hand, a rise in  $e_{AB}$  increases  $V_B$ : country  $B$  becomes more willing to bid for the MNE, in order to reduce the harm to incumbents in  $A$ .<sup>14</sup>

If country  $B$  grows in relative size, i.e.  $k$  rises, then the area where  $A$  is the (inefficient) equilibrium grows. Intuitively, a rise in  $k$  has the same effect as a rise in  $e_B$ , because they enter the condition for the countries to tie in equilibrium ( $e_A = k e_B$ ) multiplicatively: country  $A$  becomes more willing to bid for the FDI and  $B$  less willing, thus making country  $A$  more likely to win the competition.

Proposition 2 summarises the analysis of Figure 2.

<sup>14</sup> It is worth noting that changes in the distribution of incumbent-firm ownership will typically affect governments' incentives to engage in other policies besides corporate taxes/subsidies. See, for example, Blanchard (2010), who examines the relationships between cross-border firm ownership and trade policy.



**Proposition 2:** *Assume that inward FDI harms incumbent firms. (i) A country becomes more likely to win the competition for new FDI as: the share of its incumbent stock of firms owned within the host region falls; and its relative size falls. (ii) Therefore, the efficient location is more likely to win the competition, the higher is the RoW ownership share of the efficient location's stock of incumbent firms.*

We developed Proposition 2 under the assumption that  $\Delta_A = 0$ . However, this condition can be relaxed. In general,  $B$  is the equilibrium location if and only if  $e_A > ke_B - (\Delta_A/\Pi_A)$ . Thus, given  $\Pi_A < 0$ ,  $\Delta_A < 0$  would shift the inter-regional boundary in Figure 2 downwards, making country  $B$  more likely to win the competition as its combined social benefits from FDI and MNE profits increase.<sup>15</sup> Moreover, the assumption in Proposition 2 that inward FDI harms incumbents can also be relaxed. If, on the contrary, inward FDI benefits incumbents (perhaps through strong localised technological spillovers), then a country will become more likely to win the competition for new FDI as the share of its incumbent stock of firms owned within the host region *rises*, in contrast to part (i) of Proposition 2. Thus, if FDI inflows are subject to fiscal competition, our analysis suggests that whether the industry-level relationship between a country's FDI inflow and the host region's incumbent-firm ownership share is positive or negative will depend crucially on how inward FDI affects incumbents.

### 3. Conclusion

In this paper, we show that the distribution of ownership of the existing (or incumbent) stock of firms within a host region matters for the efficiency of the fiscal competition for a new FDI project. This contrasts with the results in Ferrett and Wooton (2010), who show that the outcome of the fiscal competition is independent of the geographic distribution of the incoming MNE's ownership.

For the MNE to choose the inefficient location in equilibrium, it is necessary that the externality that inward FDI imposes on incumbent-firm owners in the rest of the world (RoW), through changes in their profit income, differs between the two host countries. Thus, the assumption that incumbent firms are locally owned is crucial to efficiency results in previous papers (e.g. Bjorvatn and Eckel, 2006).

Moreover, despite reported host-country concerns that inward FDI might lead to "crowding out of local firms" (UNCTAD, 2003, p. 88), we show that the distribution of incumbent-firm ownership is the more serious issue as far as efficiency (world welfare) is concerned. For example, if all incumbents are locally owned, then fiscal competition for new FDI will produce an efficient plant location – even if inward FDI harms incumbents through intensified competition. However, as the share of RoW ownership of incumbent firms in the losing country grows, it becomes more likely that the MNE's plant will be sited in that, inefficient, location.

We have assumed throughout that the incumbent firms in the two host countries are immobile with respect to the fiscal competition under analysis. Relaxing this assumption by endogenising the locations of firms other than the incoming MNE is a topic for future research.

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<sup>15</sup> Note that  $B$  remains the efficient location with  $\Delta_A < 0$ .

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