



Directorate G for Impact Assessment
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**Impact assessment on rules concerning third
countries' reciprocal access to EU public
procurement**

**Game theory considerations on third countries'
reciprocal access rules to EU public
procurement**

**Research paper
by**

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Abstract

Focusing on some main strategic themes, underlying the EU and third countries interaction in public procurement markets (PPM), within a very stylised game theory framework a main message of the paper suggests that open PPM may be more likely when, in the parties' negotiations, the perspective of contracting authorities prevails on that of the business firms. We then discuss conditions under which also a business firms' perspective may enhance reciprocated open PPM. Based on the analysis the paper ends with remarks on the likelihood of third countries retaliation, following the EU policy measures ruling access of external companies in its PPM.

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Executive summary

This paper aims to contribute to the discussion on the reasons for the possible difficulties in reciprocating open PPM, between the EU and third countries (TCs), and related policy measures the EU could adopt to enhance it. It does so focusing on some main strategic themes underlying the EU and TCs interaction in PPM. Within a very stylised game theory framework, a main message of the paper suggests that, under appropriate conditions, open PPM may be more likely when, in the parties' negotiations, the perspective of contracting authorities prevails on that of the business firms. Indeed, the framework seems to point out that when a business firms-related perspective prevails there may be an intrinsic strategic difficulty in opening PPM, that could lead to their closure, or protection. We then discuss that from a business firms' perspective open PPM could be enhanced when complete reciprocation has value *per se*, for both parties. Such value may originate from mutual economic, relational, advantages coming from other areas of collaborations.

Moreover, we argue that reciprocated open PPM can be the case when both the EU and a TC entertain different, favourable, views on the associated advantages.

Then we discuss how a dynamic perspective can enhance reciprocated open PPM. As an illustration we consider two examples where advantages are cyclical over time, and parties exhibit different attitudes towards future benefits and losses.

The final chapter focuses on the possibility of retaliation by TCs. Indeed TC retaliation could be a possible reaction to the new legal framework enacted by EU to strengthen its position in negotiations and, possibly, enhance reciprocated open PPM. Retaliation may take place also in areas other than public procurement, and could be a risk if the new EU legal framework would restrict access to non-EU companies in non-committed PPM. In particular, as for the question posed by the European Parliament

“Taking into account game-theory - what assumptions can be made about the risk of retaliation for each of the proposed options and possibilities to create leverage for negotiations through this instrument? “

if in negotiations parties would privilege their own business firms' interests, rather than the contracting authorities', the game theory analysis of the paper seems to suggest the following general observation, contained also in the EC impact assessment. Considering the risk of retaliation by TCs only in terms of further protection of their PPM, this is higher the lower the leverage of EU. Such leverage may vary depending upon the current payoff of TC and its final payoff, after the EU regulated access to its PPM is enacted and TC retaliates. More specifically, if the latter is sufficiently low as compared to what TC firms could obtain by reciprocating open markets, then retaliation may be less likely.

Moreover the analysis appears to suggest that if the new EU legal framework would restrict access by non-EU firms it is plausible that TC would indeed react, either by opening its non-committed PPM or retaliating and further protecting it. Therefore, among the policy options considered in the impact assessment by the EC those which, at least in principle, could have a higher potential to exclude non-EU firms may increase EU leverage and induce a lower risk of TC further protecting its domestic PPM.

However, since TC reactions may take place in areas other than public procurement, proper estimates of the overall risk of retaliation should consider broader scenarios than just PPM.

Chapter 1

Reciprocal access in EU and third countries PPM

I - Background

Public procurement contracts-markets (PPC-M) for goods, services and works, count for about 16%-18% of countries' GDP, a truly large share of national incomes. Therefore, access to such markets is extremely important for business companies throughout the world. With the 2004/17/EC and 2004/18/EC public procurement Directives the European Community harmonised national legislations and rules across EU countries, creating a single market for the EU business companies, as well as for non-EU firms interested in accessing public contracts in Europe.

While the EC Directives and GPA agreements generally allow non-EU firms to compete for European public procurement contracts, the contrary is not always guaranteed, at least under the same conditions that the EU is granting to non-EU firms in its domestic PPM.

The current asymmetric situation raised an issue within Europe, and the EU is presently concerned about this lack of reciprocated degree of access into third countries PPM. The main preoccupation stems from the negative impact on potential revenues and jobs, that EU companies can suffer when facing difficulties to enter non domestic PPM. Moreover, some non EU-firms, such as for instance few Russian and Chinese companies, may count on state subsidies (aid) (Haley and Haley, 2013) that EU firms obviously cannot rely upon. Therefore, they could be in the position to submit very aggressive price offers, which if not formally considered "abnormally low", and eliminated, can turn out to be unbeatable. Besides un-levelling playing field this could make the problem of asymmetric access even more acute, for appropriate contract execution and delivery, if the state aid would go to rather inefficient firms.

For these reasons the European Commission is now considering the introduction of a legal framework to rule the access of non-EU firms, in the EU public procurement market for goods, services and works. The main goal behind the EC proposal is twofold. First to strengthen the EU position when negotiating a more open access to EU firms, in third countries PPM, and then to clarify the rules under which TCs companies can compete for EU public procurement contracts (EC, 2012a)

As a result of a public consultation with the relevant stakeholders, the EC currently proposed a policy option, on how to rule access in the EU public procurement markets by TCs firms.

The European Parliament asked for a briefing paper on the potential impact of such proposal. One of the themes the European Parliament is interested in exploring is whether a game theory analysis of the strategic interaction, between the EU and third countries, can provide insights on the difficulties for reciprocated open access in PPM, and on which policy measure the EU may adopt to favor it in the new ruling framework.

The paper takes this point of view developing a simple game theory approach to the issue.

II - Objectives

The main goal of this briefing paper is to set and discuss a stylized non-cooperative game theory analysis to gain broad insights on the difficulties underlying reciprocated open PPM, and on the policy measures the EU can take to induce them. To do so we consider two alternative approaches to negotiations on PPM. One reflecting more a business firms' perspective, interests, while the other more a contracting authorities' point of view, within a static as well as a dynamic framework.

While the static framework should provide insights mostly on the difficulties parties have in opening their PPM, the dynamic framework could instead provide indications on the possible advantages of reciprocating open markets over time.

Chapter 2

Some game theory issues under alternative perspectives

Key findings

- Strategic considerations, based on a stylised game theory approach, can illustrate a fundamental difficulty for opening public procurement markets by the EU and third countries. Such difficulty arises when decisions to open the market are based on the monetary value of the available public procurement contracts, a position reflecting more the interest of business firms.
- An analogous position, and conclusions, arise if decisions are based on the estimated monetary sums that business firms effectively receive, from the contracting authorities, for the awarded contracts.
- Taking the point of view of the contracting authorities, aiming to deliver best value for money, as when savings are maximized for given quality level, the strategic scenario might change. The party with the most competitive firms may tend to take advantage of this position to keep its domestic market closed, or more protected, while the other party open. Indeed, the contracting authorities of the party with less efficient firms may find it profitable to allow external firms to enter their own PPM to enhance higher savings.
- Under certain conditions, also within a business firms' perspective a dynamic framework can favor reciprocated open PPM.
- If open trade is considered to be desirable by the EU, then based on the above considerations our findings seem to suggest that EU policy measures, and negotiation efforts, should try to leverage the value of open domestic PPM rather than further restricting entry.

I – A business firms' point of view

In this section we begin discussing how the difficulty experienced by the EU firms, in receiving reciprocal access to PPM by TCs, can be seen as intrinsic to the underlying structure of the strategic interaction with TCs, when decisions to open or not the internal PPM are based on the monetary value of the announced

public procurement contracts. Such perspective on decisions can be seen to reflect more the view of the EU and TC business companies, interested in the overall value of the available public procurement contracts, as summarized by the following simple, stylized, framework.

Suppose n is the number of public procurement contracts for goods, services and works publicly announced in the EU, in a single year. Moreover, let e be the average value, in euro, of such contracts. Then $E = ne$ is the total value, in euro, of the announced EU public procurement contracts, in a single year.

Similarly, suppose m is the number of public procurement contracts for goods, services and works announced by TC in a single year, and let t be their average value in euro. Therefore $T = mt$ would be the total value, in euro, of the PPC announced by TC in a single year. Interpreting E and T in a more restrictive way, as the value of PPC in non-committed sectors, would not meaningfully change the ensuing conclusions.

Before signing an agreement on reciprocal access to PPM, if the two parties' position mostly reflects the interest of their own business companies, then EU and TC may reason according to the following scenario. Let for simplicity, yet with no loss of generality, suppose that each party has only two possible actions: either fully open (O) or completely close (C) its domestic PPM. Of course openness-closure could be partial and concern only certain sectors (see Table 6 below), but the main argument would not change. Openness and closure determines which parties' firms can access the two markets.

Assume, as above, that the decision whether to open the domestic PPM, or keep it closed, is exclusively driven by the total monetary value of publicly announced contracts in one year. Then the following payoff table can provide basic insights on the strategic interaction taking place, and related difficulties to reciprocate open markets.

Assume $0 \leq \tau \leq 1$ to be the share of the n contracts, announced by the EU, that *both* EU and TC think TC companies can be awarded when the EU market is open. Moreover, suppose $0 \leq \varepsilon \leq 1$ to be the share of the m public procurement contracts announced by TC, that *both* EU and TC think can be awarded to EU companies when TC opens its own market. Then, considering the total available public procurement values that could potentially go to EU *vs* TC firms, the game in Table 1 illustrates some early strategic elements for the difficulties behind reciprocated open PPM.

Table 1¹

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$E - \tau E + \varepsilon T; T + \tau E - \varepsilon T$	$E - \tau E; T + \tau E$
	<i>C</i>	$E + \varepsilon T; T - \varepsilon T$	$E; T$

If EU and TC both decide to open their PPM then the overall value of public procurement contracts potentially available to EU firms is $E - \tau E + \varepsilon T$

That is, the announced EU contracts value minus the value of those contracts awarded to TC firms in the EU market, plus the value of contracts that EU firms can be awarded in the TC market. Analogously, the value of contracts potentially available to TC firms is $T + \tau E - \varepsilon T$.

However, if the EU decides to open its own PPM while TC keeps it closed then EU firms potentially can only have available $E - \tau E$ euro while TC firms $T + \tau E$ euro. Namely, the value of available contracts for EU firms would be lower than when both parties open their markets, while TC firms will have a higher value of potential contracts available, than when both parties have open markets.

As a consequence, if the EU would be willing to consider opening its domestic PPM then TC may have an incentive not to reciprocate, since in so doing its own companies could exploit a higher value of procurement contracts available. Symmetrically, the same reasoning applies if TC considers opening its own public procurement market; in this case EU would be tempted to close its domestic PPM.

As a result, unless parties commit not to do so, a likely outcome of the interaction could be that both parties may tend to close, protect, their own PPM.

Indeed, slightly more formally, in the above game *closing the domestic PPM is a strongly dominating strategy* for both parties, that is a strategy providing a strictly larger benefit than opening the market, regardless of the other party's decision (Osborne and Rubinstein, 1994; Maschler, Solan and Zamir, 2013).

The presence of such strictly dominating strategy signals a strong incentive, reason, for the two parties to try keeping their internal PPM closed, protected, and such strong element may explain some of the difficulties experienced by the EU in inducing TCs to open their markets.

It is interesting to notice that the scheme in Table 1 represents a *constant sum game*, that is a game where the sum of the payoffs obtained by the parties (players) is always the same and equal to $E + T$, that is the total available value of public procurement contracts.

¹ **Legenda.** In Table 1, as well as in the following tables, each pair in the cells represents the payoffs of EU and TC, when they choose the corresponding pair of actions (decisions, strategies). In particular, the left term represents the EU payoff while the right term the TC payoff.

The framework bears some similarities with the celebrated (non-constant sum) “Prisoner’s Dilemma” game. This is a game known for featuring a strictly dominating strategy which predicts an inefficient outcome, that is an outcome where both players obtain payoffs lower than those associated to another possible pair of decisions in the game, which however in a one shot game is not part of the prediction and, more formally, not self-sustaining.

Yet the dominating strategies in Table 1, suggesting the pair (E, T) as a likely outcome, do not provide an inefficient prediction, since being constant sum there is no alternative outcome in the game where both parties obtain at least as high a benefit as the pair (E, T) . In particular, the pair of payoffs associated to both parties opening their own PPM, $(E - \tau E + \varepsilon T; T + \tau E - \varepsilon T)$ would coincide with (E, T) if $\tau E = \varepsilon T$, that is if the value of the EU contracts awarded to TC firms equals the value of the contracts awarded to EU firms in the TC market. In this case parties would be indifferent between reciprocating open or closed PPM.

In general, $E - \tau E + \varepsilon T \neq T + \tau E - \varepsilon T$ and either EU or TC, but not both, would prefer the option of the two PPM being open to the option of both being closed. The party more favourable to completely open PPM is the one whose gain, in the external market, more than compensate losses in its own domestic market. In any case, because closure of the internal market remains a dominant strategy, even the party obtaining a higher benefit than the value of internal contracts may still have an incentive to close its domestic PPM if the other is considering keeping its own open. Later, in Chapter 3, we shall argue how the size of τE relative to εT could be an indicator of the parties’ leverage in negotiations concerning PPM.

In particular, the current situation of the EU with respect to some major third countries would seem to be broadly illustrated by the top right box of Table 1, the one in which EU is open and TC closed. Lack of reciprocation would make EU to lose εT euro and TC to gain τE euro, with respect to when both markets are open. Consistently with the above prediction, the EU is now also considering (threatening TC) to rule, restrict, access to its domestic PPM.

If we interpret the EC proposal as an effort to induce TC to open its PPM, such *threat* could be credible since in Table 1 scenario EU would indeed increase its payoff. However, if the final goal of the EC proposal is not really to close the own PPM but rather to induce TC to open its domestic PPM then, as we shall argue in Chapter 3, the proposal can succeed if $T + \tau E - \varepsilon T > T$ that is if $\tau E > \varepsilon T$, namely if EU has a higher leverage than TC.

To summarise, dominance of closure, protection, of internal PPM could be seen as a strong element behind some parties’ reluctance to open their own markets. Therefore, payoffs and/or approach to negotiations may have to change for parties to open their own domestic PPM. In particular, the fact that the EU has typically advocated the principle of *open markets* can be seen as a change in the above strategic, purely payoff-based, approach. Indeed, the adoption of such

principle would make it more difficult for the EU to choose to close its own PPM. This point will be further developed in Chapter 3 when discussing the risk of retaliation.

II –An alternative business firms’ perspective

In this section we still consider a business firms’ perspective, however from the point of view of the monetary amount that companies effectively receive from contracting authorities, for the awarded contracts. To do so let now p_e and p_t be the estimated average price with which, respectively, EU companies and TC firms win a competition-negotiation for a public procurement contract, in both domestic and external PPM. Hence in deciding whether and which public procurement market sectors to open, an alternative business firms’ perspective could be described by the following Table 2

Table 2

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$\epsilon mp_e + (1 - \tau)np_e; (1 - \epsilon)mp_t + \tau np_t$	$(1 - \tau)np_e; mp_t + \tau np_t$
	<i>C</i>	$\epsilon mp_e + np_e; (1 - \epsilon)mp_t$	$np_e; mp_t$

Although, unlike Table 1, the above game is not constant sum, the decision to close the domestic market, for both parties, remains a strictly dominating strategy. Yet, the predicted pair of payoffs $(np_e; mp_t)$ is still efficient as in Table 1. Indeed, the only possibility for it to be inefficient is that the outcome associated to open PPM, $(\epsilon mp_e + (1 - \tau)np_e; (1 - \epsilon)mp_t + \tau np_t)$, would be component-wise larger than $(np_e; mp_t)$. However, since $\epsilon mp_e + (1 - \tau)np_e > np_e$ implies $\epsilon m > \tau n$ and $(1 - \epsilon)mp_t + \tau np_t > mp_t$ entails the contrary, $\epsilon m < \tau n$, this cannot be.

III –A different business firms’ perspective

The strategic scenario depicted in Table 1 was based on the assumption that *both*, EU and TC, share the same view on the firms’ likelihood of success in PPM. Still within a business firms’ perspective, an alternative scenario that we may consider before agreements are finalized is where EU and TC have different views, on the likelihood with which business firms are awarded public procurement contracts. In particular, suppose τ_e and ϵ_e indicate the EU’s view, estimate, on the share of EU and TC public procurement contracts that, respectively, EU and TC firms can obtain. Then, from the EU perspective the game in Table 1 would now be

Table 3a

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$E - \tau_e E + \varepsilon_e T; T + \tau_e E - \varepsilon_e T$	$E - \tau_e E; T + \tau_e E$
	<i>C</i>	$E + \varepsilon_e T; T - \varepsilon_e T$	$E; T$

Similarly, if τ_t and ε_t instead represent the TC estimates of the same shares, from its perspective the game in Table 1 would become

Table 3b

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$E - \tau_t E + \varepsilon_t T; T + \tau_t E - \varepsilon_t T$	$E - \tau_t E; T + \tau_t E$
	<i>C</i>	$E + \varepsilon_t T; T - \varepsilon_t T$	$E; T$

That is, EU and TC may think of playing a different game. Alternatively, it is *as if* EU and TC would believe to face the following (Prisoner's Dilemma-like) game

Table 3c

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$E - \tau_e E + \varepsilon_e T; T + \tau_t E - \varepsilon_t T$	$E - \tau_e E; T + \tau_t E$
	<i>C</i>	$E + \varepsilon_e T; T - \varepsilon_t T$	$E; T$

Therefore, if conditions

$$E - \tau_e E + \varepsilon_e T > E$$

and

$$T + \tau_t E - \varepsilon_t T > T$$

that is

$$\varepsilon_t T < \tau_t E$$

and

$$\varepsilon_e T > \tau_e E$$

hold then reciprocated open markets might emerge.

Indeed, although also in this case closing one's internal PPM remains a strictly dominant strategy for both parties, EU and TC would think that opening their domestic markets induces higher benefits than closing them. This could occur when each party believes that its own business firms sector is relatively more competitive than the other party's.

Though the main prediction (temptation), that EU and TC would tend to close their PPM remains, they may now have an incentive to commit entering into a formal agreement to open their PPM since, fearing that the final outcome could be closing both markets, they may perceive it as mutually beneficial to formalize a cooperative relation on opening their PPM. As we briefly elaborate also in Section VI below, such conclusion could be further reinforced when advantages coming from future interactions are explicitly taken into account.

IV –A contracting authorities' perspective

In deciding whether, and which, public procurement market sectors to open the preferences (interests) and views of the EU and TC contracting authorities may differ from those of the internal business sector, as the EC public consultation seems to confirm. Indeed, consider now Table 4 below where the payoffs are represented by the estimated savings, for the desired quality level, of the two parties' contracting authorities. It is important to point out that the analysis is conducted assuming that the desired quality is effectively delivered by the suppliers. Alternatively, different considerations should be contemplated.

Table 4

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$E - \tau n p_t - (1 - \tau) n p_e; T - \varepsilon m p_e - (1 - \varepsilon) m p_t$	$E - \tau n p_t - (1 - \tau) n p_e; T - m p_t$
	<i>C</i>	$E - n p_e; T - \varepsilon m p_e - (1 - \varepsilon) m p_t$	$E - n p_e; T - m p_t$

It is easy to see that $p_e > p_t$ would lead to the top right corner pair of payoffs ($E - \tau np_t - (1 - \tau)mp_e; T - mp_t$) as a plausible (Nash Equilibrium)² predicted outcome, while $p_e < p_t$ to the bottom left corner (Nash Equilibrium) prediction ($E - np_e; T - \varepsilon mp_e - (1 - \varepsilon)mp_t$).

Indeed when $p_e > p_t$, thus TC firms are more efficient than EU firms, then opening its domestic PPM becomes a strictly dominant strategy for EU, while closing its own PPM is dominant for TC. Analogously $p_e < p_t$, that is EU companies are more efficient than TC ones, would make closing the PPM dominant for EU and opening the PPM dominant for TC.

That is, if the savings maximisation perspective of the own contracting authorities prevails in negotiations this could change the outcome of the strategic interaction. Indeed public administrations may be interested in having their domestic market open to outside firms, even if the counterpart does not reciprocate, when external companies are more efficient than domestic firms, that is they could deliver the same or better quality at lower prices.

As a consequence, the party with more efficient firms would be in a *stronger strategic position*, possibly inducing the other party to tolerate lack of reciprocation in open markets, just because companies from outside deliver better value for money. Hence, the prediction would suggest that the *stronger* party may tend to keep a more protected domestic PPM while the other, weaker, party a more open one. To summarise, a contracting authority perspective in negotiations seems to favor more than a business firms point of view, (at least partial) PPM opening.

V –The value of reciprocated open PPM

Consider again the initial scenario, of Section I, where now full reciprocation of open PPM has a “value”. We introduce such value in the scheme simply *via* its monetary equivalent r_E and r_T , respectively for EU and TC, on the top left corner of Table 1, as in Table 5.

Table 5

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$E - \tau E + \varepsilon T + r_E; T + \tau E - \varepsilon T + r_T$	$E - \tau E; T + \tau E$
	<i>C</i>	$E + \varepsilon T; T - \varepsilon T$	$E; T$

² A Nash Equilibrium is defined as a pair of strategies such that each component of the pair is optimal, payoff maximiser, against the other component. For example, if $p_e > p_t$ the pair of strategies (*O*, *C*) is a Nash Equilibrium of the game because in this case *O* for EU is optimal when TC chooses *C*, as well as *C* for TC is optimal when EU chooses *O* (Osborne & Rubinstein, 1994; Maschler, Solan & Zamir, 2013)

The values r_E and r_T may be due to gains from cooperation, between EU and TC, in areas other than public procurement, and materialize only if “both parties reciprocate open PPM”.

Then, for EU, closing its domestic public procurement markets would cease being a strictly dominating strategy if

$$E - \tau E + \varepsilon T + r_E > E + \varepsilon T$$

that is if

$$r_E > \tau E \quad (1)$$

namely if the value of reciprocation for EU more than counterbalances the value of EU procurement contracts, potentially awarded to TC firms. Similarly, from the perspective of TC, closing the PPM would cease being a strictly dominating strategy if

$$r_T > \varepsilon T \quad (2)$$

i.e. if the value of complete reciprocation for TC is larger than the value of the contracts awarded in the TC market, to EU companies.

If both (1) and (2) are satisfied then the strategic scenario of Table 4 would change with respect to Table 1. Indeed, now the two pairs (O, O) and (C, C) would both be possible predictions (Nash Equilibria) of the game.

Therefore unlike the scenario of Table 1, where closing the internal markets is a dominating option, EU and TC would now have the opportunity to decide whether to open or close its own domestic PPM, depending upon the “attitude” of the opponent. This occurs because r_E and r_T would typically transform the strategic interaction in a *non-constant sum game*.

The presence of two possible predicted outcomes (Nash Equilibrium), and the absence of a dominating strategy may introduce uncertainty on which pair of decisions EU and TC could eventually take.

More formally, considering Table 5, as far as EU is concerned, a way to quantify such uncertainty could be with reference to the so-called Mixed Strategy Nash Equilibrium (Osborne and Rubinstein, 1994; Maschler, Solan and Zamir, 2013), defined as the probability $p = p^*$ solving the following equality between the expected benefit of opening or closing its domestic PPM to TC

$$p^*(E - \tau E + \varepsilon T + r_E) + (1 - p^*)(E - \tau E) = p^*(E + \varepsilon T) + (1 - p^*)E$$

leading to

$$p^* = \frac{\tau E}{r_E} \quad (3)$$

which, being $r_E > \tau E$, is less than one and so a proper probability expression.

More explicitly, if EU thinks that in negotiations TC could open its domestic PPM with probability $p = p^*$, then EU would be indifferent between opening or closing the market, since both decisions provide the same expected benefit. In particular, replacing p^* into the expected profit expression it follows that such common expected benefit is equal to

$$\frac{\tau E}{r_E}(E + \varepsilon T) + \left(1 - \frac{\tau E}{r_E}\right)E = E + \frac{\tau E}{r_E}\varepsilon T$$

hence, obviously, higher than the value E of the EU public procurement contracts. As a consequence, if EU believes that TC may accept opening its internal PPM with probability $p > p^*$ then it would be optimal for EU to conduct the negotiation for opening its own internal PPM. However, if EU thinks that TC may opt with a relatively low probability, $p < p^*$, for opening its domestic PPM then it may prefer to keep it protected.

An interpretation of the above findings could be as follows. The closer τE is to r_E , the more EU must believe that TC is willing to open the domestic PPM, in order to conduct the negotiations towards opening its own PPM. Indeed, in this case its advantage from reciprocal opening tends to be counterbalanced by the value of EU contracts awarded to TC firms.

Following a similar reasoning for TC, $q = q^*$ would be the probability equalizing the expected benefit of opening and closing its domestic PPM to EU firms, solving the equation

$$q^*(T + \tau E - \varepsilon T + r_T) + (1 - q^*)(T - \varepsilon T) = q^*(T + \tau E) + (1 - q^*)T$$

leading to

$$q^* = \frac{\varepsilon T}{r_T} \quad (4)$$

which, since $\varepsilon T < r_T$, represents a proper probability expression. Analogously, if TC believes that EU may accept opening its internal PPM with probability $q > q^*$ then it would be optimal for TC to open its own internal PPM. However, if TC thinks that EU may opt with probability $q < q^*$ for opening the domestic PPM then it would prefer to close its own PPM.

Therefore, the closer εT is to r_T the more TC must believe that EU is willing to open the domestic PPM, in order to drive the negotiations towards opening its internal PPM. Again, as well as for the EU above, this is because the advantage of reciprocating open PPM tends to be counterbalanced by the value of the contracts awarded to EU companies.

To summarise this section, negotiations to foster the advantages, value, of reciprocal PPM opening can have an important strategic role in enhancing it.

VI –A business firms’ point of view in a dynamic context.

The discussion in previous sections appear to suggest that reciprocating open PPM could be more difficult when negotiations are mostly affected by the business sector interests. Such difficulty was illustrated within a static approach, that is from a perspective in which EU and TC were not explicitly taking into account benefits and losses of future interactions.

In this section we consider such dynamic framework to briefly discuss if, and under what circumstances, it could affect decisions. In particular, to illustrate the point we shall discuss two examples to see how a dynamic perspective could modify the conclusions of Section I, and reinforce those of Section III.

Start considering a very simple modification of the scenario in Section I, supposing that *both* EU and TC think that Table 1 rather than being constant could vary over time. In particular, still to keep things extremely simple, for the sake of illustration imagine that Table 1 changes periodically over two consecutive years, $y = 0, 2, 4, ..$ (even) and $y + 1 = 1, 3, 5, ..$ (odd), for example, according to the following pattern

Table 6a
Year y (even)

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$E - \tau_y E + \varepsilon_y T; T + \tau_y E - \varepsilon_y T$	$E - \tau_y E; T + \tau_y E$
	<i>C</i>	$E + \varepsilon_y T; T - \varepsilon_y T$	$E; T$

with

$$\tau_y E < \varepsilon_y T$$

and

Table 6b
Year $y + 1$ (odd)

		TC	
		O	C
EU	O	$E - \tau_{y+1}E + \varepsilon_{y+1}T; T + \tau_{y+1}E - \varepsilon_{y+1}T$	$E - \tau_{y+1}E; T + \tau_{y+1}E$
	C	$E + \varepsilon_{y+1}T; T - \varepsilon_{y+1}T$	$E; T$

with

$$\tau_{y+1}E > \varepsilon_{y+1}T$$

That is, EU and TC think that reciprocating open PPM brings advantages, over reciprocated closure, in alternating years. In particular, EU will have an advantage in even years while TC in odd years.

Suppose $0 < \delta < 1$ and $0 < \theta < 1$ are the discounting factors of, respectively, EU and TC. That is the weight which multiplied by a payoff available next year gives the current value of that payoff.

Then, by defining $\varepsilon_y T - \tau_y E = a > 0$ and $\tau_{y+1} E - \varepsilon_{y+1} T = b > 0$ it is immediate to see that EU will find it convenient to sign at time $y = 0$ an agreement reciprocating open PPM (rather than reciprocating closed PPM), valid for all years $y = 0, 1, 2, 3, \dots$, if

$$(E + a) + \delta(E - b) + \delta^2(E + a) + \delta^3(E - b) + \dots > E + \delta E + \delta^2 E + \dots$$

that is if

$$\frac{(E + a) + \delta(E - b)}{(1 - \delta^2)} > \frac{E}{(1 - \delta)}$$

namely if

$$\delta < \frac{a}{b} \quad (5)$$

hence if EU has a relatively low discount rate, or alternatively if it is sufficiently impatient.

Analogously, TC would find it convenient to sign a reciprocating agreement with EU for opening PPM if

$$(T - a) + \theta(T + b) + \theta^2(T - a) + \theta^3(T + b) + \dots > T + \theta T + \theta^2 T + \dots$$

hence if

$$\frac{(T - a) + \theta(T + b)}{(1 - \theta^2)} > \frac{T}{(1 - \theta)}$$

entailing

$$\theta > \frac{a}{b} \quad (6)$$

that is if TC is sufficiently patient.

The two conditions, (4) and (5), can both be satisfied only if $a < b$, that is when the gains of the EU, which in our simple example is the party that will first enjoy a benefit. after the agreement is initially signed at $y = 0$, are lower than those of TC which will start to gain later.

Therefore, to summarise, consistently with the intuition the agreement on reciprocating open PPMs could take place if the more impatient party will gain sooner, though less than the other party, losing later, while the more patient party will start losing and then gain later, however enjoying a higher benefit than the other party.

A policy indication emerging from the example is that a different attitude, by the two parties, towards future gains and losses may be a driver to facilitate the implementation of a reciprocating agreement to open their domestic PPMs.

Similar conclusions could follow considering now Section III, where we discussed the possibility that different views by the EU and TC on the benefits obtained when both PPM are open can transform the game in Table 1, with equal views, in a Prisoner's Dilemma type-of-situation of Table 3c. That is, in a game where closing the market is still a dominant decision for both parties, however now inefficient. In Section III we argued that this change may induce EU and TC to enter into a formal agreement for reciprocating open markets. Such decision could actually be reinforced taking a dynamic perspective. Indeed, in this case the short run advantages from entering into such agreement, rather than keeping PPM closed, would increase with the possibility of enjoying the benefits for a sufficiently long period of time.

In a similar, though not completely the same, spirit as a second example consider again the original formulation of Table 1, to discuss the possibility that each party will not open its domestic PPM every year, but rather in alternating years.

Table 1

		TC	
		<i>O</i>	<i>C</i>
EU	<i>O</i>	$E - \tau E + \varepsilon T; T + \tau E - \varepsilon T$	$E - \tau E; T + \tau E$
	<i>C</i>	$E + \varepsilon T; T - \varepsilon T$	$E; T$

More specifically, suppose that EU and TC consider the following formal agreement. In even years $y = 0, 2, 4, ..$ EU will have its market closed and TC open while in odd years $y = 1, 3, 5, ...$ EU will open its PPM and TC will close it. Hence, the EU will prefer to formally enter into such an agreement (rather than reciprocating closed PPM) if

$$(E + \varepsilon T) + \delta(E - \tau E) + \delta^2(E + \varepsilon T) + \delta^3(E - \tau E) + \dots > E + \delta E + \delta^2 E + \dots$$

from which, as in (5) with $a = \varepsilon T$ and $b = \tau E$, it follows that

$$\delta < \frac{\varepsilon T}{\tau E} \quad (7)$$

Analogously, TC will prefer to enter into the agreement if

$$(T - \varepsilon T) + \theta(T + \tau E) + \theta^2(T - \varepsilon T) + \theta^3(T + \tau E) + \dots > \theta + \theta T + \theta^2 T + \dots$$

hence, as in (6), if

$$\theta > \frac{\varepsilon T}{\tau E} \quad (8)$$

In this case, a necessary condition for (7) and (8) to hold is that $\varepsilon T < \tau E$, that is if the value of contracts potentially obtainable by EU firms in the TC public procurement market is lower than the value of contracts potentially awarded to TC companies in the EU market. In the next Chapter we shall see a nice interpretation, in terms of EU leverage, of the ratio $\frac{\varepsilon T}{\tau E}$.

Chapter 3

Retaliation Risk

Based on the above analysis, and the EC impact assessment, with this chapter we conclude the paper discussing one of the issues specifically addressed by the European Parliament: the possibility that EU enacting new regulations for accessing its PPM may trigger forms of retaliation by TC.

Estimating the risk of retaliation is not an easy task, whether it refers to the probability of retaliation and/or the size of retaliation. Furthermore, retaliation can take place in areas other than PPM.

Borrowing from insights of Section V of the previous chapter, and consistently with the EC impact assessment based on leverage, it appears that the likelihood of retaliation should concern the economic advantages and disadvantages associated to the policy option that the EU will choose to adopt.

Therefore, a fundamental preliminary step to discuss this point are the gains and losses that EU and TC can have as a consequence of the new regulatory measure. Though EU is considering ruling the access of TC firms, because of an existing disadvantageous asymmetry, some EU firms already access the TC public procurement markets and may suffer economic losses in case of retaliation.

Further elaborating the Tables in the previous chapter, it is possible to consider explicitly the three potential scenarios of retaliation, depicted by the EC

- “(a) No retaliation - none of the trading partners takes measures restricting exports of EU goods and services to their procurement market.
- (b) Simple retaliation - the trading partners that have not enacted crosscutting retaliatory measures (like India and Australia) introduce such measures and Turkey reinforces its existing measures on the same scale as the EU.
- (c) Boycott (or 'massive retaliation') - trading partners completely close their PP open domestically but not committed internationally, to "boycott" EU goods and services.” (EC, 2012a)

In particular, below we articulate Table 1 to include the third option of *regulation*. Hence, the three actions, *O*(pen), *R*(egulate) and *C*(lose) appearing in the following Table 6, where $0 \leq \tau_R \leq \tau$ and $0 \leq \varepsilon_R \leq \varepsilon$, are the shares of available contracts in case EU and TC regulate the access to their domestic PPM, an intermediate situation between completely open and fully close PPM. In Table 6 the three options can be seen to represent the above scenarios (a), (b) and (c).

Table 6

		TC		
		<i>O</i>	<i>R</i>	<i>C</i>
EU	<i>O</i>	$E - \tau E + \varepsilon T; T + \tau E - \varepsilon T$	$E - \tau E + \varepsilon_R T; T + \tau E - \varepsilon_R T$	$E - \tau E; T + \tau E$
	<i>R</i>	$E - \tau_R E + \varepsilon T; T + \tau_R E - \varepsilon T$	$E - \tau_R E + \varepsilon_R T; T + \tau_R E - \varepsilon_R T$	$E - \tau_R E; T + \tau_R E$
	<i>C</i>	$E + \varepsilon T; T - \varepsilon T$	$E + \varepsilon_R T; T - \varepsilon_R T$	$E; T$

It is immediate to check that even in this more articulated scenario the dominant decision, by both parties, would still be to close PPM. Yet, in Table 6 it may be easier to argue on the possibility of retaliation. Indeed, retaliation can be a credible, real, possibility when its advantages more than compensate

disadvantages. Hence if the current, asymmetric, situation could be represented by EU being open and choosing O , with TC being protected and choosing R , then if EU should decide to regulate it would still be a strong temptation for TC to close completely and retaliate, however as well as it would have been if the EU domestic PPM was open, just because closing the domestic PPM is a dominant option.

As a consequence, the risk of retaliation of TC given by the EU restricted access to TC firms, could be meaningful if Table 6 is a good representation of the current scenario. Indeed in this case once the policy option R is enacted by EU, retaliating, that is increasing protection of the domestic PPM, has no losses but only advantages. Any position, different from complete closure by both parties, could be in principle a very fragile equilibrium and susceptible to retaliation at any time.

Therefore, the risk of retaliation can be mitigated in scenarios other than Sections I and II of Chapter 2. In particular by extending considerations stemming from expressions (3) and (4) in Section V. Indeed, that simpler scenario suggests that the risk of retaliation can be lower if the value that parties obtain, by reciprocating open PPM, is sufficiently higher than what internal firms can potentially lose by opening their domestic markets.

This is overall consistent with the impact assessment methodology and the outcome of the EC public consultation. That is in negotiations with TC the EU leverage is very important. More specifically, in the impact assessment the EU leverage is defined as the ratio l_E between the percentage of potentially unfulfilled exports of TC companies in the EU procurement market over the percentage of potentially unfulfilled exports of EU firms in the TC market (EC, 2012a).

Strictly within the simplified set up of Table 1, where for simplicity we introduced no distinction between committed and non-committed PPM, such ratio would correspond to $l_E = \frac{\tau E}{\varepsilon T}$. If $l_E > 1$ then EU has higher leverage than TC, and the opposite if $l_E < 1$.

Therefore if in Table 1 the current, initial, position before negotiations is with EU open and TC closed, (O, C) , then if $l_E > 1$ under the EU's threat to close the market TC would rather prefer the position (O, O) to (C, C) . Indeed, with fully open markets the TC payoff $T + \tau E - \varepsilon T$ would be larger than its payoff with fully closed markets T . As for timing, in reality what could occur is that the new EU rule is enacted, and then reciprocated open markets are agreed upon afterwards or else TC may anticipate, before the new rule is approved, that agreeing on (O, O) is more convenient. Hence if TC has higher leverage, $l_E < 1$, then starting from (O, C) then it is likely that the final outcome would be (C, C) .

The introduction of the leverage ratio l_E provides us with an interesting interpretation of conditions (7) and (8). In fact the former can now be rewritten as

$$\delta < \frac{1}{l_E} \quad (7')$$

while the latter as

$$\theta > \frac{1}{l_E} \quad (8')$$

which, being $l_E > 1$, can potentially be both satisfied. Hence, it is *only if* the EU has higher leverage and it is more impatient than TC that the dynamic agreement depicted in Section VI of Chapter 2, where EU is the first to gain, may take place.

In what follows, based on the above considerations, we address some questions specifically raised by the European Parliament.

- (a) “Is there evidence of the Commission's assumption that the more an option limits access to foreign goods and services the higher the risk of retaliation is?”

Clearly such evidence cannot be provided by EU public procurement markets as the proposal for ruling access of TC's firms is a new initiative. Therefore, empirical evidence should, in case, be extracted from past trade agreements. Yet Table 6 can provide some insights on the likelihood of TC retaliation, in case EU regulates access into its PPM. In what follows the analysis of retaliation will be conducted *strictly* within the scenario of Table 6, hence excluding areas other than PPM.

Indeed, if currently EU is open and T is regulated, that is the initial position before EU would regulate access of TC firms is the pair of strategies (O, R) , then TC payoff is $T + \tau E - \varepsilon_R T$. Suppose that in order to enhance reciprocated open markets EU considers to regulate access to its domestic PPM, moving to the position (R, R) . Then retaliation by TC, that is movement to (R, C) may be undesirable for TC if its payoff in the (O, O) position is higher than what it could obtain in the (R, C) position.

More explicitly, if $T + \tau E - \varepsilon T > T + \tau_R E$ hence

$$\frac{E(\tau - \tau_R)}{\varepsilon T} > 1 \quad (9)$$

that is, if the share τ_R of EU contracts potentially available to TC firms, when EU regulates access to its PPM and TC retaliates (closes), is sufficiently low. From the above consideration it also follows that a necessary, though not sufficient, condition to prevent retaliation is that $\frac{E\tau}{\varepsilon T} > 1$ namely the EU, globally, has higher leverage than TC. Obviously, if (9) is satisfied then TC would also prefer position (O, O) to position (R, R) . Indeed, for this to occur it must be $T + \tau E - \varepsilon T > T + \tau_R E - \varepsilon_R T$ and so

$$\frac{(\tau - \tau_R)E}{(\varepsilon - \varepsilon_R)T} > 1 \quad (10)$$

But since $\frac{(\tau - \tau_R)E}{(\varepsilon - \varepsilon_R)T} > \frac{(\tau - \tau_R)E}{\varepsilon T}$ then if (9) holds also (10) does.

To summarise, again assuming Table 6 to be a reasonable description of the current situation, when EU regulates access to its domestic PPM it is more likely for TC to either retaliate and further protect, or else open, its domestic PPM than not react remaining in the original position

- (b) “ Is the Commission's estimate of the risk of retaliation consistent and based on evidence and a proper methodology?

As I was arguing above the data and methodology, based on leverage, adopted by the Commission to estimate the risk of retaliation, overall seem consistent and proper. If EU's leverage is perceived as being too low, because of the (already taken) EU position advocating open markets, then a way for increasing it could be as suggested in Section V of the previous chapter. That is to enhance the value of open PPM by referring to areas other than public procurement, such as lowering trade barriers conditional upon opening PPM etc.

- (c) “Has the potential of leverage for market opening in third countries being properly assessed? “

Overall I think the definition of leverage proposed by the EC is a satisfactory indicator to quantify the EU negotiation strength. Indeed it is a good measure for embodying gains and losses related to the proposed regulation framework.

Yet, perhaps, we could make the following observation. Let $\tau E = \tau_C E + \tau_{NC} E$ where τ_C and τ_{NC} are, respectively, the estimated share of EU contracts that TC firms obtain in, respectively, committed and non-committed PPM sectors. Similarly let $\varepsilon T = \varepsilon_C T + \varepsilon_{NC} T$ where ε_C and ε_{NC} are, respectively, the estimated shares of TC contracts that EU firms obtain in, respectively, committed and non-committed PPM sectors. Then, formally, the EU leverage indicator proposed by EC is

$$\frac{\tau_{NC} E}{\tau E} / \frac{\varepsilon_{NC} T}{\varepsilon T}$$

that is a ratio of %. Therefore since such ratio is not based on absolute values, but on proportions, it could not convey information on the relative size of the non-committed sectors for the two parties. For example, suppose $\frac{\tau_{NC} E}{\tau E} = \frac{1bln\text{€}}{1bln\text{€}} = 1$ and $\frac{\varepsilon_{NC} T}{\varepsilon T} = \frac{1mln\text{€}}{1mln\text{€}} = 1$. Therefore the EU indicator for leverage would be 1, meaning that EU and TC have the same leverage. However, while the absolute value of non-committed contracts in EU is $1bln\text{€}$ in TC is much lower, that is $1mln\text{€}$. Can we claim that despite this massive difference EU and TC have the same leverage? Perhaps it would be tempting to say that EU has much higher leverage, since the potential non-committed market that TC firms can reach is much larger than what EU could obtain. An indicator of the type considered above $\frac{\tau_{NC} E}{\varepsilon_{NC} T}$ could take this difference into a better account. To summarise, though the leverage indicator adopted in the impact assessment is a satisfactory measure, it may fail to properly capture meaningful discrepancies in the value of non-committed markets, which could signal an important difference in the leverage of the two parties.

- (d) “Taking into account game-theory - what assumptions can be made about the risk of retaliation for each of the proposed options and possibilities to create leverage for negotiations through this instrument? “

As already discussed until now, for each of the proposed options the above game theory analysis seems to suggest the following general principle. The risk of retaliation of TC is higher the lower the leverage of EU, where the leverage may vary depending upon the initial, current, payoff of TC and its final payoff, after EU regulated access is enacted and TC retaliates. Indeed, if this is sufficiently low as compared to what TC firms could obtain by reciprocating

open markets, then retaliation may be less likely. Again, this consideration is mostly conditional to retaliation being within PPM.

For a more elaborate discussion of the issue, below we consider some selected policy options in the impact assessment (EC,2012a)

(1) “Baseline scenario: "Nothing happens"” (Option 1)

For obvious reasons, this option should induce the lowest risk of retaliation since no new regulatory measures for access of non-EU firms would be enacted.

(2) “Approach based on an overall access restriction for not covered procurement at the EU level” (Option 3A)

Under this option exclusion by Member States of TC firms from non-committed markets would be somehow systematic, except for emergencies and specific goods-services unavailable in the EU. Therefore the option may embody a high potential leverage for the EU to induce TC to open its non-committed PPM. Yet, just because of its high potential as a threat, once enacted it may trigger high retaliatory measures as a defensive action if EU leverage, is still not high enough, when TC faces the EU decision.

(3) “At the level of MS: individual procuring entities' decisions under the supervision of the European Commission” (Option 3B1)

This would be a milder option than (2) in terms of potentially excluding non-EU firms. As a consequence, it should have a lower leverage as a threat to induce open PPM, but also a lower retaliation effect.

(4) “At the EU level: the Commission-driven mechanism” (3B2)

A potentially interesting option, since exclusion of non-EU firms would not be automatic but possibly negotiated case by case, leaving the TC with the possibility of opening access to its PPM. Just because of this flexibility in applying restricted access, in principle the option should not induce higher retaliation than options (3A) and (3B1)

(5) “ Option for contracting entities to accept companies, goods and services not covered by the EU's international commitments, subject to notification of the Commission and Commission option to impose access to the EU's public procurement market” (Option 3C)

This option bears some similarities with (4) however with a meaningful distinction. That is, the EU would take a final decision on accepting a non-EU company, provided substantial reciprocity with the TC is granted. Therefore, with respect to (4) the possibility to negotiate before, possibly, excluding a non-EU firm would not seem to be possible. Because of this, in principle the option would appear to have a higher retaliation potential than (4)

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