Optimal discretion in asylum lawmaking

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Abstract

This paper uses a regulatory competition model to study whether and how refugee law should be centralized, and what are the consequences for refugees and for host countries. Varying refugee flows across countries lead some destinations to adopt strict measures. The resulting externality leads to a generalized "race to the bottom" of asylum law.

Neither fixed nor minimum standard harmonization are found to be in the interest of both host countries. Especially the most popular destinations like EU border countries would suffer from losing discretion. However, minimum standards would benefit refugees and less popular destinations.

Key-words: competition in law making, asylum law, European law, human rights

JEL Codes: K33, H11, D61, D62

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1 Introduction

The aim of this paper is to establish *whether* refugee law should be centralized, *how* it should be centralized, and what are the *consequences* for migrants seeking protection as well as for host countries in different geographical situations. Let us begin with some facts about refugee flows and refugee laws.[1]

The discussion about asylum concerns important contemporary questions on human rights, international migration and development. The right to asylum is the object of art. 14 of the Universal Declaration of Human Rights[2]. There has been a long term rise and variability in the number of asylum seekers, as well as a skewed distribution of asylum applications in host countries: for example, at the end of 2008, Europe hosted 12% (4.1 million) of the world-wide population of refugees[3], and the US hosted 0.35 million, or 1% (UNHCR 2009). Also, the number of asylum applications in the EU was multiplied by 7.3 between 1982 and 1992, when they peaked. The Dublin II Regulation stipulates that a refugee without a visa must apply for asylum in the first country entered on the EU territory.[4] This puts extensive pressure on border areas.[5]

Simultaneously, asylum legislation has been made less welcoming in all western countries. There has been much debate within and between countries as to which asylum laws should be adopted and who should decide on them[6].

In the US, refugee law is made at the federal level. In the European Union, it is in the process of being moved from the national to the EU level[7]. It was integrated into the European Union as part of the third, intergovernmental pillar, and is being moved to the

[1] We do not distinguish between "true" refugees and economic migrants. Rather, we apply a continuum of types (see model). We use "refugee" as a generic term for all migrants seeking protection.

[2] United Nations 1948.

[3] United Nations Refugee Agency UNHCR 2009, including among other categories recognized refugees, asylum claimants and people in refugee-like situations.

[4] Art. 10, Council of the European Union 2003.

[5] See for example http://www.ecre.org/topics/dublin_ii.

[6] See for example dpa (2006), European Parliament (2005), Zimmermann and Tumlin (1999).

[7] See European Commission 2007.

first, supranational pillar. A Common European Asylum system (CEAS) is in the process of being drafted to establish a common asylum procedure and uniform status valid in all EU countries.[8] Common minimum standards have already been agreed on. The EU has a subsidiarity principle, which requires that a centralized production of law should be preferred *only when* the law cannot be efficiently provided by Member States.[9] In this paper, we examine the efficiency of asylum law making regimes with different degrees of harmonization from the point of view of the countries, in the light of the subsidiarity principle, as well as from the human rights perspective.

The empirical literature on refugee destination country choices shows that toughening asylum laws of a country (i) negatively impacts on asylum applications, and (ii) that they have a positive effect on the number of applications in the other countries of the zone. Hatton (2004) finds an important reduction in asylum applications in the countries which toughened their asylum laws. Rotte *et al.* (1996) show that the reforms of the German asylum law in 1987 and 1993 led to a considerable fall in the number of applications in Germany, and to an increase in France. Zetter *et al.* (2003) find a correlation between the reduction in the generosity of asylum measures and asylum applications in Germany, Sweden and France, but not in the UK, Belgium and the Netherlands. Importantly, there are influences on the choice of destination country for refugees other than asylum law, such as the presence of family or cultural ties. Böcker and Havinga (1997) estimate that the size of the impact of the level of the asylum legislation on the choice of destination country depends on other characteristics of the country. Cox and Posner (2009), in their theory of the rights of migrants, discuss the interests of states in providing rights for migrants. They show that states incur both costs and benefits from migration.

The implications of an externality of legal rules on other countries is discussed in the literature under the heading of regulatory competition.[10] In 1956, Tiebout suggested a model in which governments compete to attract citizens through lawmaking. According to

[8] See European Commission 2007.

[9] Art. 5, Treaty Establishing the European Community.

[10] See for example Esty and Gerardin (2000) for a survey on the regulatory competition literature.

the literature, the externality effect limits the benefits of competition and induces a "race to the bottom" rationale (or "Delaware effect"[11]).

The regulatory competition idea is mainly applied to taxes (Mintz and Tulkens 1986, Wildasin 1988, Kanbur and Keen 1993). Another area largely examined is competition on the level of environmental regulation (Oates and Schwab 1988, Markusen, Morey and Olewiler 1993, Revesz 1992, 1996 and 2000).

Barbou des Places and Deffains (2004) identify a race to the bottom in asylum policy making in Europe due to regulatory competition. They suggest collective action at a centralized level to escape harmful competition in asylum law making. Bubb, Kremer and Levine (2008) model regulatory competition of refugee protection between states in the presence of a screening problem. They point out the existence of a "race to the bottom" of asylum. The authors address burden sharing schemes, but not the impact of minimum standards and harmonization, which are the focus of this paper.

If harmonization is the optimal solution to avoid externalities and therefore a "race to the bottom", it is applied at some cost[12]. The law and economics literature has shown that with heterogeneous countries, harmonization creates inefficencies (Faure 1998, Ogus 1999, Van den Bergh 2000). Esty and Geradin (2000) and Van den Bergh (2000) also argue that, in order to have optimal governance, a flexible mix between cooperation and competition should be considered. Deakin (1999) notes that competition between countries may lead to a greater convergence of standards than "reflexive harmonization". The latter consists in a "dynamic regulatory competition" which, according to the author, would maintain some diversity while allowing innovation in the pool of legal solutions at the federal level.

Feasible political solutions to the problem of competition between countries in the context of the coordination of taxation are discussed by Peralta and van Ypersele (2006). Minimum

[11] See among others Barnard (2000).

[12] The conditions under which centralized versus decentralized educational standards raise welfare are examined in Costrell (1997). In the domain of environmental regulation, see Markusen, Morey and Olewiler (1993), Oates (1998) and Van Egteren, Smith and Mc Afee (2004). On fiscal harmonization, see among others Oates (1999). On competition policy, see Easterbrook (1993).

standards are found by Kanbur and Keen (1993) to be a favorable alternative to full centralization. They discuss the consequences on taxation of the heterogeneity in the size of countries using spatial models.

In our model, we assume that countries face heterogeneity in refugee flows. The optimal choices regarding the relative generosity of refugee law differ between the countries. This results in a variation in the criteria for eligibility to the refugee status, which can also be interpreted as the standard of proof. In a zone composed of at least two countries, or jurisdictions, this difference in asylum laws involves an externality, because a tightening of the eligibility standard in one country induces a number of refugees to apply for asylum in the other country. Therefore, the latter's hosting costs are increased. We show that this positive externality leads to a race to the bottom, i.e. to a toughening of asylum laws, or an increase in the standard of proof. The harmonization of asylum law at a central level "internalizes" the externality; however, it involves costs in terms of inefficiency because the member countries can no longer optimize their policies.

The Kaldor-Hicks decision rule is applied to the choice of the asylum law making regime: the benefit of the state that profits from the rule must outweigh the loss of the other state. In this light, we discuss the redistributionary effects of moving the asylum law making process to the supranational level. Two forms of harmonization are compared: fixed and minimum asylum laws. We choose to evaluate the implications of different law making mechanisms from the point of view of the member countries and of refugees. We find that the subsidiarity principle is not necessarily respected in the harmonization of asylum law, while a system of minimum standards is clearly best for refugees and the best harmonization model for host countries.

The next section introduces the model. Harmonization is discussed in section 3. The results are discussed, simulated and applied to the European context in section 4.

2 The model

2.1 Legal standard and refugee type

Assume there are two jurisdictions in the same geographical area, indexed by $i \in \{1, 2\}$. Each jurisdiction is interested in setting the refugee eligibility standard x_i that will balance the benefits against the costs of hosting refugees. This standard corresponds to the level of gravity of a refugee's personal situation that is required to be granted a protection status (asylum)[13]. In contrast with the usual use of the term "standard" in the law and economics literature, a low standard here corresponds to a high standard of proof, i.e. low generosity towards refugees. A high standard is more lenient in its eligibility criteria. This at first view counter-intuitive definition of the standard is chosen in order to reflect the view of a "race to the bottom": the lower the standard, the less generous it becomes.

The situation of each refugee is characterized by a certain level of gravity[14] that defines his type x. For simplicity, we assume that the population of refugees is uniformly distributed along $[0, 1]$. The gravity of the individual cases is common knowledge; it is observed by the state in the course of hearings that are part of the asylum procedure. The refugee knows the standard x_i of each jurisdiction and knows whether he is eligible or not in jurisdiction i, i.e. whether $x \leqslant x_i$. The higher the standard, the more refugees are eligible to the refugee status. Those who do not fulfil the criteria of the highest standard are categorized as illegal immigrants.

Let the exogenous parameter α be the proportion of refugees who opt for jurisdiction 1 if the standard of the two countries is the same. In other words, α characterizes the preference of refugees for jurisdiction 1, with $\alpha < \frac{1}{2}$, i.e. jurisdiction 2 is the preferred destination. All the factors that determine the preference α for country 1 as compared to country 2 are

[13] Asylum or a different protection status is granted when the gravity of the case is judged sufficiently high to fulfill the eligibility criteria required by the standard. For our purposes it is not necessary to differentiate between the statuses.

[14] The eligibility of the refugee is defined by the gravity of his individual need for protection, determined by his personal history of political, ethnic or religious persecution. This list is not exhaustive. We assume that the gravity of persecution is exogenous.

exogenous in that they cannot be influenced by state policy. α includes all reasons for finding a country attractive, with the exception of national asylum law: for example, the presence of family, the language, or the distance of jurisdiction 2 relatively to jurisdiction 1 to border of the area. The latter factor relates to the Dublin II supranational regulation which implies that the closer the destination country to the border of the area, the greater the chances of the country being responsible for the asylum application, and the more popular this country is for asylum applications. Note that refugees can apply for asylum only once in the European Union.[15]

If the standard is lower - i.e. stricter - in jurisdiction 2 compared to jurisdiction 1 - $x_2 < x_1$ -, the number of asylum applications $e_1(x_1)$ in jurisdiction 1 is given by $x_1 - (1 - \alpha)x_2$.

This number is defined by the share of those who have the choice of both jurisdictions (αx_2), plus those who can only apply for asylum in jurisdiction 1: $(x_1 - x_2)$. This setup assumes that, given the choice between an exogenously preferred country and a country in which a protection status can be obtained, a refugee would opt for the latter.

2.2 The maximization problem of the jurisdictions

To set a standard x_i, each jurisdiction faces a tradeoff between its benefits and its costs. We assume that both jurisdictions have the same benefit function $b(x_i)$ that depends on the announced standard. However, their cost function $c(.)$ depends on the effective number of eligible applicants.[16]

2.2.1 The benefit function

The benefit function $b(x_i)$ is assumed to be the same in all the jurisdictions for a same announced standard of asylum law. An increase in the standard (i) diminishes enforcement costs and (ii) raises the "moral" benefits derived from the valuation of the protection of a large number of refugees. The costs of enforcing the standard are due to the fact that

[15] There are exceptions to this rule, but they concern a negligible number of refugees.

[16] Assuming differing benefit functions would complicate the model without adding to the results, since the net benefit, i.e. benefit minus cost, is already differentiated.

some refugees will be refused, or prevented from accessing the territory. The higher the announced standard, the less this is the case, and the lower will be the costs of implementing the standard.

Parliamentary debates show the valuation of the protection of refugees. Adopting a generous and humanitarian standard is an objective that is particularly emphasized. There are thus benefits derived from having higher standards, as very low standards harm the reputation of the country.[17] The benefits increase with the announced standard: the higher the standard, the better the humanitarian reputation of the country. Benefits here depend on the standard, rather than on the actual numbers of refugees entering the country, because the reputation of a country depends on the treatment that it gives to refugees, rather than on the number of refugees that it hosts.

The benefit function $b(x_i)$ is strictly concave for all $x \in [0,1]$. We further assume that the benefits vary from $-\infty$ at an extremely strict standard (close to 0) to a positive upper limit B, such that:

$$\begin{aligned} \lim_{x \to 0} b(x) &= -\infty \\ \lim_{x \to 1} b(x) &= B \end{aligned}$$

The minimum legal standard is called x_0, which is such that $b(x_0) = 0$[18]. The jurisdictions have a positive benefit along the interval $[x_0, 1]$.

2.2.2 The hosting cost function

Hosting refugees implies a cost that depends on the number of eligible refugees. The cost functions are the same for both countries $c(.)$. However, the actual costs depend on the number of asylum claims, which in turn depend on the preference factors, respectiveley α and $(1-\alpha)$. $c(x)$ increases in x and is convex: $c'(x) > 0$, $c''(x) \geqslant 0$, with $c(0) = 0$ and $\lim_{x \to 1} c(.) = +\infty$. We further assume that the first derivative of c is homogeneous of degree

[17] See also the analysis of asylum law as a public good by Barbou des Places and Deffains (2004).

[18] $b_c(.)$ is strictly increasing over $[0,1]$. However, the lower limit is negative and the higher limit is positive ($B > 0$). We will see that there therefore exists an x_0 such that $b(x_0) = c(x_0)$ and $x_0 < 1$.

one.[19]

Economic effects of illegal immigration are not included in the payoff function of each jurisdiction, as there is no consensus about the economic effects of illegal immigration in the litterature. OECD (1999) suggest that the macro economic effect of illegal immigration may be positive. We abstain from taking a position on this issue and limit the analysis to pure asylum considerations. Indeed, according to Hanson (2007), the net impact on both legal and illegal immigration on US economy is small.

2.3 The optimal level of the asylum law standards of the jurisdictions

The asylum law standards are assumed to be chosen independently by each jurisdiction. The benefits function $b(x_i)$ depends on the standard x_i of asylum law announced by the government, while the hosting costs are not directly function of the standard, but of the effective number of refugees e_i which in turns depends on x_1 and x_2. The level of utility that a jurisdiction derives from a level of standard is equivalent to the benefits net of the implementation and hosting costs.

2.3.1 The benchmark case: Refugee destination is chosen independently of eligibility

Assume first that refugees, when immigrating, do not choose their destination country according to where they are eligible for a protection status. Rather, they choose their destination country according to their other preferences and apply for asylum if they happen to fulfil the criteria. Therefore, the effective number of asylum applications in jurisdiction 1 depends only on its own standard. Consequently, jurisdiction 1 chooses a standard x_1^* which maximizes the following problem:

$$\max_{x_1} b(x_1) - c[e_1(x_1)]$$

[19]These assumptions are analogous to those made in Bubb, Kramer and Levine (2008).

with $e_1(x_1) = \alpha x_1$. The optimal standard x_1^* is implicitly defined[20] by (1):

$$b'(x_1^*) = \alpha c'[e_1(x_1^*)] \tag{1}$$

Similarly, jurisdiction 2 chooses the optimal standard x_2^* defined[21] by:

$$b'(x_2^*) = (1-\alpha)c'[e_2(x_2^*)]$$

with $e_2(x_2) = (1-\alpha)x_2$.

Given that the marginal hosting costs of jurisdiction 1 are lower than those of jurisdiction 2 due to the greater preference for country 2, the optimal standard x_2^* of jurisdiction 2 is inferior to that of jurisdiction 1, x_1^*.[22]

2.3.2 Externality case: Refugee destination choice is made according to their eligibility

Assume now that refugees always prefer to go to the jurisdiction where they are eligible, and that refugees are allowed to apply for asylum in any jurisdiction as illustrated in figure 1.

The two jurisdictions simultaneously choose the level of the standard. They have complete information. Each jurisdiction must solve the following optimization problem:

$$\max_{x_i} b(x_i) - c[e_i(x_i, \tilde{x}_j)] \quad \text{with } i, j \epsilon \{1, 2\}$$

[20] The second order condition is respected, since $b''(x) < 0$ and $c''[x] > 0 \quad \forall\, x \,\epsilon\, [0,1]$:

$$b''(x_1) - \alpha^2 c''[\alpha x] < 0.$$

[21] Similarly, the second order condition is respected.

[22] Indeed, suppose that $x_1 = x_2$, then

$$b'(x_1) = b'(x_2)$$

However, $\alpha < \frac{1}{2}$ and therefore $e_1'(x_1)c'[e_1(x_1)] < e_2'(x_1)c'[e_1(x_1)]$. Necessarily, since $b''(.) < 0$, we have :

$$x_2^* < x_1^*.$$

with

$$e_1(x_1, x_2) = \begin{cases} x_1 - (1-\alpha)x_2 \text{ if } x_1 > x_2 \\ \alpha x_1 \text{ if } x_1 \leqslant x_2 \end{cases}$$

$$e_2(x_1, x_2) = \begin{cases} x_2 - \alpha x_1 \text{ if } x_2 > x_1 \\ (1-\alpha)x_2 \text{ if } x_2 \leqslant x_1 \end{cases}$$

The response function of jurisdiction i to j is such that:

$$\tilde{x}_i(x_j) = \begin{cases} \tilde{x}_i(x_j) \text{ if } x_i > x_j \\ x_i \text{ if } x_i \leqslant x_j \end{cases}$$

We denote $\tilde{x}_i(x_j)$ the standard which maximizes the objective function of jurisdiction i if the other jurisdiction chooses x_j.

Both jurisdictions adopt a standard $\tilde{x}_i(x_j^*)$ stricter than x_i^* when $x_i > x_j$. Therefore, the best response functions are such that :

$$\tilde{x}_1(x_2^*) = \begin{cases} \tilde{x}_1(x_2^*) \text{ if } x_1 > x_2^* \\ x_1^* \text{ if } x_1 \leqslant x_2^* \end{cases} \quad \text{and} \quad \tilde{x}_2(x_1^*) = \begin{cases} \tilde{x}_2(x_1^*) \text{ if } x_2 > x_1^* \\ x_2^* \text{ if } x_2 \leqslant x_1^* \end{cases}$$

We show that there is an externality effect: the choice of a standard by jurisdiction j such that $x_i > x_j$ has a positive impact on the objective function of jurisdiction i, not party to a given economic transaction.

$$\frac{d\tilde{x}_i(x_j)}{dx_j} = \begin{cases} > 0 \text{ if } x_i > x_j \\ 0 \text{ if } x_i \leqslant x_j \end{cases} \tag{2}$$

Lemma 1: *The standard chosen by jurisdiction 1 remains less strict than the standard chosen by jurisdiction 2:* $\tilde{x}_2(x_1) = x_2^*$ and $x_2^* < \tilde{x}_1(x_2^*) < x_1^*$. *The payoff of jurisdiction 2 is not altered.*

Proof. See appendix (A.1) ■

The choice of standard by jurisdiction 1 now depends on jurisdiction 2's standard. An increase in the difference $x_1 - x_2$ imposes an additional cost on jurisdiction 1 in terms of the

externality. Therefore, jurisdiction 1's standard is reduced relative to its optimum without externalities x_1^*. This is the "race to the bottom" effect (towards a stricter standard). By adding both payoff functions, we can easily see that the total payoff of the zone is lower than without the externality effect.

3 Harmonization

We now analyze the efficiency of fixed and minimum standard harmonization regimes. In other words, we examine a centralized versus a partly decentralized regime. Before going through this analysis, we justify it by a comparison with the Pareto efficient situation.

3.1 Pareto efficient situation

An omniscient and benevolent centralized law maker chooses a Pareto efficient solution with two fixed standards x_1^{**} and x_2^{**} by maximizing the payoff of the zone containing the two jurisdictions:

$$\max_{x_1,x_2} b(x_1) - c[e_1(x_1,x_2)] + b(x_2) - c[e_2(x_1,x_2)]$$

The implicit conditions defining x_1^{**} and x_2^{**} are:

$$b'(x_1) - c'[e_1(x_1,x_2)] = 0 \quad (3)$$

$$b'(x_2) + (1-\alpha)c'[e_1(x_1,x_2)] - (1-\alpha)c'[e_2(x_1,x_2)] = 0 \quad (4)$$

Lemma 2: *An omniscient producer of law would apply higher standards than the jurisdictions.*

$$\tilde{x}_1(x_2^*), x_2^* < x_1^{**}, x_2^{**}$$

Proof. See appendix (A.2) ■

Jurisdiction 2 is here forced to partially bear the cost of the externality ($x_2^* < x_2^{**}$), as an increase in x_2 allows jurisdiction 1 to raise its standard. These differences between the

standards chosen by the benevolent law maker and independently by the jurisdictions justify the intervention of a central law maker.

However, an EU law maker cannot directly impose different standards x_1^{**} and x_2^{**} due to the principle of anonymity which states that a reform should apply to all members (article 12, Consolidated version of the Treaty establishing the European Community). Rather, a common rule needs to be found for both countries. In what follows, two regimes are considered: a fixed and a minimum standard regime.

3.2 Fixed standard

We assume that the benevolent central law maker[23] has perfect knowledge of the maximization problems of the jurisdictions. He produces a common standard $\bar{x}$ as depicted in figure 2 such that $x_1 = x_2 = \bar{x}$ by maximizing the welfare of the zone:

$$2b(x) - c[e_1(x_1, x_2)] - c[e_2(x_1, x_2)] \tag{5}$$

In this case, there is no externality. Standard $\bar{x}$ is implicitly defined by its first order condition:

$$2b'(\bar{x}) - \alpha c'[e_1(\bar{x})] - (1-\alpha)c'[e_2(\bar{x})] = 0 \tag{6}$$

Lemma 3: *The fixed harmonized standard is situated at a level between the optimum standards of the jurisdictions without externalities:* $\bar{x}\ \epsilon]x_2^*, x_1^*[$.

Proof. See appendix (A.3) ■

Figure 2 illustrates the result.

The relation between $\bar{x}$ and $\tilde{x}_1$ cannot be generally determined. The sign of $\bar{x} - \tilde{x}_1$ depends on the values of α. The standard $\bar{x}$ is implicitly defined by the average marginal costs of the two jurisdictions.

[23] We assume that the central law maker weighs the welfare of each jurisdiction equally. Different weights would only slightly change the results and would not have any impact on the conclusions.

If the differences between the jurisdictions are small (α is close to $\frac{1}{2}$), then the standards chosen by 1 and 2 are close to each other, and the externality imposes only a small cost on 1. On the other hand, if the marginal costs are very different, the externality has a large effect.

3.3 Minimum standard

We will now focus on an intermediary solution: the production of minimum standards which each jurisdiction is free to exceed. Consider a sequential game in two steps. The central law maker decides on a minimum standard x_m such that $x_i \geqslant x_m$ $(i = 1, 2)$. Each jurisdiction then chooses its standard as a function of x_m. We reason by backward induction.

3.3.1 The choice of the jurisdictions

As before, the two jurisdictions have complete information. Jurisdiction 1 anticipates that jurisdiction 2 will not choose a standard other than x_m[24]. It chooses a standard $\tilde{x}_1(x_m)$ that maximizes the following function:

$$b(x_1) - c[e_1(x_1, x_2)]$$

The implicit functions theorem shows that at the optimum:

$$\frac{d\tilde{x}_1(x_m)}{dx_m} = -\frac{(1-\alpha)c''[e_1(\tilde{x}_1, x_m)]}{b''(\tilde{x}_1) - c''[e_1(\tilde{x}_1, x_m)]} > 0. \tag{7}$$

The higher the minimum standard, the higher the optimal standard of jurisdiction 1. A "race to the top" effect is characterized by the positive variation of x_1 when the minimum standard increases. One can show that this variation is inferior to $(1 - \alpha)$:

$$\frac{d\tilde{x}_1}{dx_m}(\tilde{x}_1, x_m) < 1 - \alpha \tag{8}$$

3.3.2 The central law maker

The central law maker chooses x_m to maximize the sum of both jurisdictions' objective functions:

[24]For $x_m \geqslant x_2^*$, the reasoning is the same as in proof A.1.

$$\max_{x_m} b(x_m) + b[\tilde{x}_1(x_m)] - c[e_2(x_m)] - c[e_1(\tilde{x}_1, x_m)] \tag{9}$$

The first order condition defining $\tilde{x}_m$ is:

$$b'(x_m) + \frac{\partial x_1}{\partial x_m} b[\tilde{x}_1(x_m)] - (1-\alpha)c'[e_2(x_m)] - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c'[e_1(\tilde{x}_1, x_m)] = 0$$

Proposition 1: *The minimum standard x_m is higher than the optimal standard x_2^* without externalities of jurisdiction 2. The standard $\tilde{x}_1(x_m)$ that maximizes the objective function of jurisdiction 1 is higher than the minimum standard, but it is lower than the optimal standard in the absence of externalities: $x_2^* < x_m < \tilde{x}_1(x_m) < x_1^*$.*

Proof. See appendix (A.4) ■

Figure 3 illustrates the result.

We have shown that $\tilde{x}_1(\tilde{x}_m) \in]\tilde{x}_m, x_1^*[$. Jurisdiction 1 adopts a standard that exceeds the minimum standard. This leads to a "race to the top" that is limited in that it does not lead to a standard of the level that it would have adopted in the absence of externalities.

3.4 Comparison of harmonization regimes

In order to estimate the desirability of the different modes of harmonization, two criteria are considered: the welfare of the jurisdictions and the welfare of the refugees.

3.4.1 The welfare of the jurisdictions

We define a country's welfare $W(x_i, x_j)$ as its benefits minus its costs.

3.4.1.1 Fixed harmonized standards versus no harmonization

The welfare of jurisdiction 2 is always reduced by fixed standard harmonization. Indeed, we know from Lemma 3 that $\bar{x} > x_2^*$. The Kaldor-Hicks criterion tells us that fixed standard harmonization regimes should be applied if and only if the increase in the welfare of jurisdiction 1 could compensate the decrease in the payoff of jurisdiction 2. We show that:

Lemma 4: *There exists a threshold* $\bar{x}_{\min} \in]x_2^*, \tilde{x}_1[$ *below which jurisdiction* 1*'s payoff is necessarily diminished in a fixed standard harmonization regime as opposed to the absence of harmonization. Furthermore, a fixed harmonized standard only increases welfare compared to no harmonization if the externality effect is high, i.e.* α *is low.*

Proof. See appendix (A.5) ■

Two cases can now be distinguished. First, if $\bar{x} \leqslant \bar{x}_{\min}$, harmonization reduces the social welfare of both jurisdictions. Second, if $\bar{x} > \bar{x}_{\min}$, the sign of $\Delta W = W(\tilde{x}_1, x_2^*) - W(\bar{x}, \bar{x})$ depends on the extent of the cost of increasing the standard from x_2^* to $\bar{x}$ for jurisdiction 2[25] relative to the increase in the welfare of jurisdiction 2. Only if the externality effect in the competition framework is too high can strict harmonization be socially preferable. If the standard of the central law maker is sufficiently low ($\bar{x} \leqslant \bar{x}_{\min}$), then the welfare of each jurisdiction under harmonization is lower than in the absence of harmonization. On the other hand, if the standard defined by the central law maker is higher than the threshold value, then it is possible that social welfare is increased. This is the case only when the variation of the welfare of jurisdiction 1 exceeds the reduction of welfare for jurisdiction 2. The intervention of the central law maker thus has a redistributive effect. There is a tradeoff between the externality and the inefficiencies linked to a common standard when cost functions differ.

3.4.1.2 Minimum harmonized standards versus no harmonization

The following three cases are possible:

$$W(\tilde{x}_1, x_m) \lesseqgtr W(\tilde{x}_1, x_2^*)$$

Lemma 5: *Minimum standards increase the welfare in the less preferred jurisdiction* 1*, and decrease welfare for the jurisdiction with higher the refugee inflow.*

Minimum standards can only lead to an overall improvement in welfare if the losses for 2 are outweighed by the gains for 1.

[25] $b(x_2^*) - c(x_2^*) - [b(\bar{x}) - c(\bar{x})] < 0$ because $\bar{x} > x_2^*$.

3.4.1.3 Minimum standard versus fixed harmonized standards

In order to compare the welfare under a fixed standard and a minimum standard, suppose that $\bar{x} = x_m$. In this case, the social welfare with a minimum standard is superior to a fixed standard.

$$W(\bar{x}, \bar{x}) < W(\tilde{x}_1, \bar{x})$$

The difference in terms of welfare can be written as:

$$b(\bar{x}) - c[e_1(\bar{x})] - \{b(\tilde{x}_1(\bar{x})) - c[e_1(\tilde{x}_1, \bar{x})]\} < 0$$

This difference is negative because $\tilde{x}_1$ is per definition the maximum value of the function $b(x) - c[e_1(\tilde{x}_1, \bar{x})]$.

These results are summarized in a series of remarks.

Remark 1: *Even with minimum standards, harmonization does not always increase social welfare.*

Remark 2: *Jurisdiction* 1's *welfare is always increased by minimum standards, as opposed to fixed standards, because minimum standards give it discretion to adopt its standard. Jurisdiction* 2*'s welfare is always diminished by harmonization. There thus exists a tradeoff between the increase of costs for jurisdiction* 2 *and the decrease of costs for jurisdiction* 1*.*

Remark 3: *Contrary to the fixed standard regime, a minimum standard regime ends up partly decentralizing to jurisdiction* 1 *the tradeoff between the inefficiencies linked to the single standard and the cost of the externalities. Jurisdiction* 1 *can determine the amount of externality which it is prepared to bear.*

3.4.2 The standard of refugee protection

We assume that refugees always prefer to go to the jurisdiction where they are eligible. Therefore, their welfare is determined by the highest standard in the region, i.e. the standard in jurisdiction 1.

	Jurisdiction 1	**Jurisdiction 2**	**Maximum**
Benchmark	x_1^*	x_2^*	x_1^*
Externality	$\tilde{x}_1(x_2^*)$	x_2^*	$\tilde{x}_1(x_2^*)$
Minimum standard	$\tilde{x}_1(x_m)$	x_m	$\tilde{x}_1(x_m)$
Minimum standard with $x_m = \bar{x}$	$\tilde{x}_1(\bar{x})$	$\bar{x}$	$\tilde{x}_1(\bar{x})$

Table 1: Optimal standards under different modes of law making

It follows from the preceding results that no standard meets the standard x_1^* set by jurisdiction 1 without externality. However, under the hypothesis that there exists an externality effect, jurisdiction 1 lowers its standard to $\tilde{x}_1(x_2^*)$. The share of refugees eligible to refugee protection is always highest in a system of minimum standards:

$$\tilde{x}_1(x_m) > \tilde{x}_1(x_2^*)$$

Remark 4: *From the point of view of the refugees, the best mode of law making is harmonization with minimum standards. Harmonization with a fixed standard is not beneficial to the refugees. Therefore, a minimum standard as opposed to a fixed standard is preferred both by refugees and the two jurisdictions.*

If only a proportion of refugee decides to opt for the jurisdiction where they are eligible, the externality effect will be smaller. As long as some refugees obey this rule, the externality exists and the analysis remains relevant.

4 Discussion

4.1 Main results

The comparison with the Pareto efficient situation of total discretion of, or competition between, jurisdictions, shows that standards chosen independently by the two jurisdictions faced with heterogeneous refugee inflows (preferences) are lower than standards chosen by an omniscient and benevolent producer of law. In particular, the jurisdiction closest to the external border independently chooses stricter criteria, since it does not take the externality effect on the other jurisdiction's net benefit into account. This process is called a "race to the bottom", and it justifies the question of the intervention of a central law maker.

The intervention of a central lawmaker can be made through the imposition of a fixed or a flexible standard. The effect of harmonization is opposite on both jurisdictions: compared to competition, it can increase the social welfare of the country closer to the center, but it diminishes the social welfare of the jurisdiction facing higher refugee inflow, be it because of refugee preferences or because of its geographical situation. Harmonization is thus not a solution to relieve countries suffering from extra proportional refugee inflow. On the contrary, these countries lose from harmonization.

To partially decentralize the production of law through a minimum standard makes it possible to increase the jurisdictions' welfare in comparison to the fixed standard. A minimum standard decreases the welfare of the peripheral jurisdiction, but it gives the other jurisdiction the possibility of adopting a higher - i.e. a less strict - standard if this increases its welfare. The decision is partly decentralized: the central jurisdiction prefers to suffer a certain degree of externality in order to optimize its social welfare. Its choice of standard is left to its own discretion. However, its benefits from the harmonization do not always outweigh the losses of the peripheral jurisdiction.

The result from the point of view of refugees is that a flexible standard is always better for the population of refugees, as it leaves a margin to increase the highest standard. By increasing the standard, flexible asylum law harmonization has redistributive effects that can be assimilated to a "race to the top".

4.2 Application

4.2.1 Numerical example

The discussion here proceeds by reference to a numerical example, which serves to illustrate in a straightforward manner the interactions generated by the competing standards in a "free movement" zone, such as Schengen zone, and to get a clearer idea of the consequences for the countries and refugees of different regimes. Assume there are two countries in this zone, each of them with the following benefit function $b(x)$ and cost function $c(x)$:

$$b(x) = 1 + a\ln(x)$$

$$c(x) = x^2$$

Assume that $100,000$ refugees apply for asylum status in the zone. They can be ranked according to their situation, and the persecution they have endured (uniform distribution on 0 to 100.000). The preferences of the refugees about the destination are such that if both countries choose the same standard, one quarter[26] of the refugees opt for jurisdiction 1, and the other for jurisdiction 2. Jurisdiction 2 is thus clearly preferred by refugees for reasons not linked to asylum law, i.e. language, family links or peripheral situation. We assume that $a = \frac{1}{15}$.

Tables 2-4 summarize the results:

	Jurisdiction 1	**Jurisdiction 2**	**Max**
Benchmark	0.7303	0.2434	0.7303
Externality	0.2954	0.2232	0.2954
Pareto efficiency	0.3373	0.3180	0.3373
Fixed standard $\bar{x}$	0.3265	0.3265	0.3265
Minimum standard with $x_m = \bar{x}$	0.3423	0.3265	0.3423

Table 2: Standards under different modes of law making, numerical example

[26] $\alpha = \frac{1}{4}$.

No. of accepted asylum seekers	Jurisdiction 1	Jurisdiction 2	Sum
Benchmark	18	18	36
Externality	11	18	29
Pareto efficiency	10	24	34
Fixed standard $\bar{x}$	8	24	32
Minimum standard with $x_m = \bar{x}$	10	24	34

Table 3: Number of asylum seekers in thousands under different modes of law making, numerical example

Welfare	Jurisdiction 1	Jurisdiction 2	Sum
Benchmark	0.9457	0.8725	1.8182
Externality	0.9060	0.8725	1.7784
Pareto efficiency	0.9178	1.0043	1.9221
Fixed standard $\bar{x}$	0.9187	0.8654	1.7841
Minimum standard with $x_m = \bar{x}$	0.9190	0.8654	1.7844

Table 4: Jurisdictions' welfare under different modes of law making, numerical example

Table 2 illustrates the race to the bottom of asylum standards: it shows that compared to the benchmark without externalities, jurisdiction 1 reduces its standard from 0.73 to 0.29 when the externality is taken into account. The effect is also existent, but much smaller, for jurisdiction 2, the preferred destination of three quarters of the refugees, which has a higher standard of proof in the competition context: it reduces its standard from 0.24 to 0.22. The minimum standard regime leads to the most lenient standard compared to no harmonization and the fixed standard regime, at 0.34 in jurisdiction 1. However, the standards in both countries are higher than those required for Pareto efficiency.

Comparing the outcomes of the fixed and the minimum standard regimes with no harmonization, the number of refugees who obtain the asylum status is the highest under the minimum standard solution at around 34,000 (see Table 3). However, note that the fixed standard leads to the protection of a higher number of refugees than when there is no harmonization. Jurisdiction 2 carries the cost of this result: under fixed standards, jurisdiction

1 reduces its intake of asylum seekers from 11,000 to 8,000, while jurisdiction 2 increases its numbers from 18,000 to 24,000.

The welfare of the zone is increased in the presence of harmonization, though it remains below the Pareto efficient level (see Table 4). Jurisdiction 2 loses from harmonization, while jurisdiction 1 gains by comparison with the regulatory competition case. This gain is highest in the case of the minimum standard regime. In both cases, jurisdiction 1's gains exceed jurisdiction 2's losses. Compensation is thus possible. The minimum standard solution appears to be best both for the host country zone (assuming there is compensation for jurisdiction 2) and for the refugees.

4.2.2 Asylum lawmaking in Europe

One can apply the results of our model to asylum law making in the European Union, where the number of asylum applications increased considerably in the early 1990s. From the early 1980s to 1992, asylum applications in Europe increased sevenfold from around 100,000 per year to 700,000. Latest figures put the number of pending asylum applications in Europe at 273,000 (UNHCR 2009). Member countries reacted by considerably tightening their policies. For example, Germany changed its constitution in 1993 in order to apply restrictive laws to asylum seekers. Border controls were toughened, living conditions for asylum seekers downgraded, expulsions encouraged, and reforms of procedures restricted access to the refugee status (Hatton 2004).

In our model, this "race to the bottom" of asylum laws is explained by the externality effect: if one country introduces restrictive policies, it will create an externality on other countries, which will experience a disproportional rise in the number of asylum applications, and of the corresponding costs. In a dynamic setting, they will follow suit and also decrease the generosity of their asylum legislation. This Cournot competition can be avoided by appointing a central lawmaker.

The European Union followed the development described in the model. Since the opening of the borders within the EU[27], asylum policies are being gradually transferred to the EU

[27]This process was decided on in the European Single Act in 1986 and realised in 1992.

level. This development started with an intergovernmental approach in the 1980s, followed by a move toward the supranational level in the 1990s. The so-called "Dublin Treaty", followed by the Dublin II regulation in 2002, was drafted to determine which member state is responsible for an asylum application. In the absence of other criteria, it is the country first entered by the refugee which must process the asylum application. This puts a lot of pressure on peripheral EU member countries.

With the Amsterdam Treaty (1997) the Schengen Agreement was integrated into the European Union. During the 5-year transition period, ending in April 2004, the Commission adopted measures defining the member state responsible for examining an asylum claim. These directives are minimum standards of asylum law and not fixed rules, in that they allow member countries to adopt higher standards. According to the European Union Council Directive 2004/83/EC, "Member States may introduce or retain more favorable standards for determining who qualifies as a refugee (...)" (Article 3). The qualification for being a refugee is that "acts of persecution (...) must be *sufficiently* serious" (Article 9). Both the use of such general terms and the written possibility to adopt more favourable standards leave room for discretion to Member States.

Our model shows that this flexibility of interpretation of European Community law is wanted rather than suffered. We have seen that the minimum standards allow the central lawmaker to enforce a threshold standard. It forces the lower standard jurisdiction to take into account the externality [28], while leaving it to the discretion of the member countries to set higher standards to optimize their specific welfare. Refugee welfare is enhanced compared to totally decentralized law making: the lowest standards are higher than before, so the countries with the highest standards, which suffer less externalities, also adopt higher standards. Under these circumstances, a greater proportion of refugees can hope for protection. However, the peripheral EU member countries, which already face high costs from asylum applications, would be further disadvantaged by EU harmonization. Harmonization is indeed no tool for

[28]Indeed, one of the main objectives explicitly mentioned in this directive is to "limit the secondary movements of applicants for asylum between Members States" by defining common minimum standards to qualify as a refugee (point 7), Council Directive 2004/83/EC.

redistribution among member states in favor of the countries facing higher costs.

The next step envisaged in order to complete the Common European Asylum System (CEAS) is the gradual introduction of a "common asylum procedure and a uniform status valid throughout the EU" and to "ensure a higher degree of solidarity between EU Member States"[29]. It is to be feared that the benefits of the minimum standards will be destroyed in the process of further harmonization. Indeed, our model shows that fixed standards are less favourable to member countries than minimum standards. Although they eliminate externalities, fixed standards do not take the specificities of host countries into account. They present a compromise, rather than a maximisation, of their welfare. Correspondingly, there exists no country with higher standards which can protect a larger share of refugees. Both member countries and refugees will suffer adverse consequences of fixed standards. Also, we show that fixed common standards do not lead to greater solidarity among Member States, but instead increase costs for the states that already experience the highest refugee flows.

Moreover, there is no guarantee that European asylum law harmonization, whether with minimum or with fixed standards, is of benefit to the member states - the redistribution that it involves may well leave all worse off. Only refugees are to gain, and only from well-enforced minimum standards. It is therefore not clear that the subsidiarity principle of the European Union is respected, i.e. that Member States might not be better off regulating asylum in an entirely decentralized manner.

5 Final remarks

Previous literature has examined the competition between jurisdictions in the presence of externalities in many legal areas, and the choice between harmonization and competition.

In this paper we introduce the possibility of adopting a more flexible legal framework to asylum law. Our analysis highlights the importance of minimum standards when dealing with harmonization. Beyond the specificities of the case of asylum law making, these legal solutions can indeed be applied to many harmonization cases, such as environmental or financial service

[29] European Commission 2007.

industry regulations. In this context, flexible law consists of giving a margin of discretion to jurisdictions. It enables them to partly adapt their regulation to their own characteristics. Consequently, the harmonization process is less "costly" (i.e. less inefficient), as long as the minimum standards are respected. However, this comes at a price for the peripheral EU countries. In the European context, we effectively observe many cases where the guidelines by the Commission are very general[30], allowing each country to further define it. The major benefit of flexible law is that it takes into account the heterogeneity of jurisdictions.

We conclude with some thoughts on how our results might be extended if we drop the hypothesis of the benevolence of the producer of law. Frey and Eichenberger (1996) highlight the sensitivity of a central lawmaker to lobbies. Also, Roe (2003, 2005) in a public choice perspective, emphasizes the role of interest groups in corporate law making. The flexibility of legal rules may limit the influence of lobbies by giving more discretion to jurisdictions (Landes and Posner, 1975, Sanchirico and Mahoney, 2005). The relative bargaining power of the member countries in the centralized institution could alter the game and thus influence the standard set by the central lawmaker. The locus of the asylum law making decision among the central institutions affects the preferences of the central lawmaker.[31] Another interesting extension to our model would be the inclusion of an enforcement mechanism of the centralized standard, as well as a compensation mechanism between countries.

[30]See for example the Lamfalussy process in the financial service industry regulation.

[31]See Monheim (2007).

6 Extension: the central lawmaker cares about "integration"

We now assume that the central lawmaker cares about "integration". Integration is defined here as the number of asylum seekers in both jurisdictions. The welfare function of the central lawmaker can be rewritten as :

$$W(x1, x2) = \gamma[e_1(x_1, x_2) + e_2(x_1, x_2)] + b(x_1) + b(x_2) - c(e_1(x_1, x_2)) - c(e_2(x_1, x_2))$$

with γ a coefficient which represents the preference of the central lawmaker for integration. The numbers of accepted refugee in jurisdiction 1 $e_1(x_1, x_2)$ and in jurisdiction 2 $e_2(x_1, x_2)$ are defined as before:

$$e_1(x_1, x_2) = \begin{cases} x_1 - (1-\alpha)x_2 \text{ if } x_1 > x_2 \\ \alpha x_1 \text{ if } x_1 \leqslant x_2 \end{cases}$$

$$e_2(x_1, x_2) = \begin{cases} x_2 - \alpha x_1 \text{ if } x_2 > x_1 \\ (1-\alpha)x_2 \text{ if } x_2 \leqslant x_1 \end{cases}$$

6.1 Fixed standard:

We assume that the benevolent central lawmaker produces a common standard $\breve{x}$ such that $x_1 = x_2 = \bar{x}$ by maximizing:

$$W(x, x) = \gamma[e_1(x, x) + e_2(x, x)] + 2b(x) - c(e_2(x, x)) - c(e_1(x, x))$$

The first order condition for $\breve{x}$ is:

$$\gamma + 2b'(\breve{x}) - \alpha c'[e1(\breve{x}, \breve{x})] - (1-\alpha)c'[e2(\breve{x}, \breve{x})] = 0$$

For $x = \bar{x}$, we have $\gamma + 2b'(x) - \alpha c'(e1(x)) - (1-\alpha)c'(e2(x)) > 0$ if $\gamma > 0$. Thus, $\breve{x} > \bar{x}$.

The implicit functions theorem shows that:

$$\frac{d\breve{x}}{d\gamma} > 0$$

The higher the preference for integration, the higher the common standard $\breve{x}$.

6.2 Minimum standard:

The central lawmaker chooses $\breve{x}_m$ that maximizes the sum of both jurisdictions' objective functions[32], plus the utility derived from integration:

$$W(x_1, x_2) = \gamma[e_1(\tilde{x}_1, x_m) + e_2(\tilde{x}_1, x_m)] + b(x_m) + b[\tilde{x}_1(x_m)] - c[e_2(x_m)] - c[e_1(\tilde{x}_1, x_m)]$$

The first order condition defining $\breve{x}_m$ is :

$$\gamma\frac{\partial x_1}{\partial x_m} + b'(\breve{x}_m) + \frac{\partial x_1}{\partial x_m}b'[\tilde{x}_1(\breve{x}_m)] - (1-\alpha)c'[e_2(\breve{x}_m)] - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c'[e_1(\tilde{x}_1, \breve{x}_m)] = 0$$

For $\breve{x}_m = x_m$, we have $\gamma\frac{\partial x_1}{\partial x_m} + b'(x_m) + \frac{\partial x_1}{\partial x_m}b'[\tilde{x}_1(x_m)] - (1-\alpha)c'[e_2(x_m)] - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c'[e_1(\tilde{x}_1, x_m)] > 0$ if $\gamma > 0$[33]. Thus, $\breve{x}_m > xm$.

The implicit functions theorem shows that:

$$\frac{d\breve{x}_m}{d\gamma} > 0$$

The higher the preference for integration, the higher the minimum standard $\breve{x}_m$.

6.3 Comparison of common and minimum standard

Let us assume that the new minimum standard is equal to the new common fixed standard: $x_m = \breve{x}$. Then $\tilde{x}_1(\breve{x}) > \breve{x}$, since we have shown that

$$\frac{d\tilde{x}_1(x_m)}{dx_m} = -\frac{(1-\alpha)c''[e_1(\tilde{x}_1, x_m)]}{b''(\tilde{x}_1) - c''[e_1(\tilde{x}_1, x_m)]} > 0$$

Therefore, including an assumption about integration, here a weighting of the number of asylum seekers, does not change the ranking of the results, but increase the level of the standard, as the central lawmaker put more weight on the welfare of refugees (understood here as the number of refugee accepted).

[32] As before, jurisdiction 1 chooses $\tilde{x}_1(x_m)$ higher than x_m, while jurisdiction 2 chooses the minimum standard x_m. See section 3.3.

[33] As $\frac{\partial x_1}{\partial x_m} > 0$. See section 3.3.

A Appendix

A.1 Proof of Lemma 1

(i) Let us show that $\tilde{x}_1 > x_2^*$. We will proceed by a *reductio ad absurdum*. Suppose that:

$$\tilde{x}_1 < x_2^*$$

The first order condition for $\tilde{x}_1$ is:

$$b'(\tilde{x}_1) = \alpha c'(\alpha \tilde{x}_1) \tag{10}$$

The first order condition for x_2^* is:

$$b'(x_2^*) = c'(x_2^* - \alpha \tilde{x}_1) \tag{11}$$

We know from the specification of the b function that if $\tilde{x}_1 < x_2^*$, then

$$b'(x_2^*) < b'(\tilde{x}_1)$$

Consequently,

$$c'(x_2^* - \alpha \tilde{x}_1) < \alpha c'(\alpha \tilde{x}_1) \tag{12}$$

However, (12) is impossible, because $x_2^* - \alpha \tilde{x}_1 > \alpha^2 \tilde{x}_1$ for $\alpha < \frac{1}{2}$. We necessarily have $c'(x_2^* - \alpha \tilde{x}_1) > \alpha c'(\alpha \tilde{x}_1)$ and $\tilde{x}_1(x_2^*) \geqslant x_2^*$.

Suppose that $\tilde{x}_1 = x_2^*$. Then the first order condition for jurisdiction 1 is unchanged, jurisdiction 2 suffers no externality and x_2^* is implicitly defined by:

$$b'(x_2^*) = (1-\alpha) c'[(1-\alpha) x_2^*]$$

We know that if $\tilde{x}_1 = x_2^*$, then $b'(\tilde{x}_1) = b'(x_2^*)$. Thus:

$$\alpha c'(\alpha x_2^*) = (1-\alpha) c'[(1-\alpha) x_2^*]$$

or,

$$c'(\alpha^2 x_2^*) = c'[(1-\alpha)^2 x_2^*] \tag{13}$$

However, we have $\alpha < \frac{1}{2}$, and thus $\alpha^2 x_2^* < (1-\alpha)^2 x_2^*$. It is thus impossible that $\tilde{x}_1 = x_2^*$.

We thus know that,

$$\tilde{x}_1(x_2^*) > x_2^* \qquad \blacksquare$$

(ii) Let us show that $\tilde{x}_1(x_2^*) < x_1^*$. Remember that x_1^* is implicitly defined by the first order condition:

$$b'(x_1^*) = \alpha c'(\alpha x_1^*)$$

$\tilde{x}_1$ is implicitly defined by the first order condition:

$$b'(\tilde{x}_1) = c'[\tilde{x}_1 - (1-\alpha)x_2^*] \tag{14}$$

We will proceed by a *reductio ad absurdum*. Suppose that $\tilde{x}_1 = x_1^*$. Then $b'(x_1^*) = b'(\tilde{x}_1)$. However,

$$\alpha c'(\alpha x_1^*) < c'[\tilde{x}_1 - (1-\alpha)x_2^*]$$

and thus $b'(x_1^*) < b'(\tilde{x}_1)$.

As by assumption $b''(x_i) < 0$, we have:

$$\tilde{x}_1(x_2^*) < x_1^* \qquad \blacksquare$$

A.2 Proof of Lemma 2

One can rewrite the implicit conditions using z such that:

$$\begin{aligned} b'(x_1) - c'[x_1 - (1-\alpha)x_2] &= 0 \\ b'(x_2) + (1-\alpha)c'[x_1 - (1-\alpha)x_2]z - (1-\alpha)c'[(1-\alpha)x_2] &= 0 \end{aligned}$$

If $z = 0$, then we have the autarkic condition. If $z = 1$, then we are in the case of the omniscient regulator. One can show that:

$$\frac{\partial x_1}{\partial z} > 0$$

And

$$\frac{\partial x_2}{\partial z} > 0$$

With

$$f_1(x_1, x_2) = b'(x_1) - c'[x_1 - (1-\alpha)x_2]$$

and

$$f_2(x_1, x_2, z) = b'(x_2) + (1-\alpha)c'[x_1 - (1-\alpha)x_2]z - (1-\alpha)c'[(1-\alpha)x_2]$$

From which

$$\begin{aligned} \frac{\partial f_1}{\partial x_1} &= b''(x_1) - c''[x_1 - (1-\alpha)x_2] < 0 \\ \frac{\partial f_1}{\partial x_2} &= (1-\alpha)c''[x_1 - (1-\alpha)x_2] > 0 \\ \frac{\partial f_2}{\partial x_1} &= (1-\alpha)c''[x_1 - (1-\alpha)x_2]z \geqslant 0 \\ \frac{\partial f_2}{\partial x_2} &= b''(x_2) + (1-\alpha)^2 c''[x_1 - (1-\alpha)x_2]z - (1-\alpha)^2 c''[(1-\alpha)x_2] < 0 \\ \frac{\partial f_1}{\partial z} &= 0 \\ \frac{\partial f_2}{\partial z} &= (1-\alpha)c'[x_1 - (1-\alpha)x_2] > 0 \end{aligned}$$

The implicit functions theorem tells us that the Jacobian matrix $\begin{pmatrix} \frac{\partial f_1}{\partial x_1} & \frac{\partial f_1}{\partial x_2} \\ \frac{\partial f_2}{\partial x_1} & \frac{\partial f_2}{\partial x_2} \end{pmatrix}$ is invertible. Thus there exists a unique solution for $\frac{\partial x_1}{\partial z}$ and $\frac{\partial x_2}{\partial z}$ defined by:

$$\begin{pmatrix} \frac{\partial x_1}{\partial z} \\ \frac{\partial x_2}{\partial z} \end{pmatrix} = - \begin{pmatrix} \frac{\partial f_1}{\partial x_1} & \frac{\partial f_1}{\partial x_2} \\ \frac{\partial f_2}{\partial x_1} & \frac{\partial f_2}{\partial x_2} \end{pmatrix}^{-1} \begin{pmatrix} \frac{\partial f_1}{\partial z} \\ \frac{\partial f_2}{\partial z} \end{pmatrix} \tag{15}$$

From the Cramer rule:

$$\begin{pmatrix} \frac{\partial f_1}{\partial x_1} & \frac{\partial f_1}{\partial x_2} \\ \frac{\partial f_2}{\partial x_1} & \frac{\partial f_2}{\partial x_2} \end{pmatrix}^{-1} = \frac{1}{\frac{\partial f_1}{\partial x_1}\frac{\partial f_2}{\partial x_2} - \frac{\partial f_1}{\partial x_2}\frac{\partial f_2}{\partial x_1}} \begin{pmatrix} \frac{\partial f_2}{\partial x_2} & -\frac{\partial f_1}{\partial x_2} \\ -\frac{\partial f_2}{\partial x_1} & \frac{\partial f_1}{\partial x_1} \end{pmatrix}$$

However, $\frac{\partial f_1}{\partial z} = 0$. We can thus rewrite (15) such that:

$$\begin{pmatrix} \frac{\partial x_1}{\partial z} \\ \frac{\partial x_2}{\partial z} \end{pmatrix} = \frac{1}{\frac{\partial f_1}{\partial x_1}\frac{\partial f_2}{\partial x_2} - \frac{\partial f_1}{\partial x_2}\frac{\partial f_2}{\partial x_1}} \begin{pmatrix} -\frac{\partial f_2}{\partial x_1}\frac{\partial f_2}{\partial z} \\ +\frac{\partial f_1}{\partial x_1}\frac{\partial f_2}{\partial z} \end{pmatrix}$$

We know that $-\frac{\partial f_2}{\partial x_1}\frac{\partial f_2}{\partial z} < 0$ and $\frac{\partial f_1}{\partial x_1}\frac{\partial f_2}{\partial z} < 0$. The determinant is negative, because the second derivative of the the maximization problem is negative in equilibrium. The sign of $\frac{\partial x_1}{\partial z}$ and $\frac{\partial x_2}{\partial z}$ is thus the negative of the sign of the numerator. We find:

$$\frac{\partial x_1}{\partial z} > 0$$

And,

$$\frac{\partial x_2}{\partial z} > 0$$

Thus,

$$\begin{aligned} \tilde{x}_1(x_2^*) &< x_1^{**} \\ x_2^* &< x_2^{**} \end{aligned} \tag{16}$$

■

A.3 Proof of Lemma 3

(i) Let us show that $x_2^* < \bar{x}$

The first order condition (6) that implicitly defines $\bar{x}$ is:

$$2b'(\bar{x}) = \alpha c'(\alpha\bar{x}) + (1-\alpha)c'[(1-\alpha)\bar{x}]$$

Suppose that $\bar{x} = x_2^*$. Then (6) is:

$$2b'(x_2^*) = \alpha c'(\alpha x_2^*) + (1-\alpha)c'[(1-\alpha)x_2^*]$$

However,

$$b'(x_2^*) = (1-\alpha)c'[(1-\alpha)x_2^*]$$

We obtain the following inequality:

$$b'(x_2^*) - \alpha c'(\alpha x_2^*) > 0$$

Thus,

$$x_2^* < \bar{x}$$

(ii) Let us show that $\bar{x} < x_1^*$. Suppose that $\bar{x} = x_1^*$. Then (6) is:

$$2b'(x_1^*) = \alpha c'(\alpha x_1^*) + (1-\alpha)c'[(1-\alpha)x_1^*]$$

However,

$$b'(x_1^*) = \alpha c'[\alpha x_1^*]$$

We obtain the following inequality:

$$b'(x_1^*) - (1-\alpha)c'[(1-\alpha)x_1^*)] < 0$$

Or,

$$\bar{x} < x_1^* \qquad \blacksquare$$

A.4 Proof of proposition 1

(i) We will show that $\tilde{x}_1(x_m) < x_1^*$. We will proceed by a *reductio ad absurdum*. If $\tilde{x}_1 = x_1^*$, we have

$$b'(x_1^*) = c'[x_1^* - (1-\alpha)x_m]$$

However, we know per definition that

$$b'(x_1^*) = \alpha c'(x_1^*)$$

Or

$$\alpha c'(x_1^*) = c'[x_1^* - (1-\alpha)x_m]$$

Rearranging, we find that:

$$\alpha c'(x_1^*) - c'[x_1^* - (1-\alpha)x_m] < 0 \text{ car } x_1^* > x_m$$

And thus

$$\tilde{x}_1(x_m) < x_1^* \qquad \blacksquare$$

(ii) Let us show that $x_m < \tilde{x}_1(x_m)$.

Suppose that $\tilde{x}_1(x_m) = x_m$. In this case, we can write:

$$b'(x_m) = c'[x_m - (1-\alpha)x_m]$$

or,

$$b'(x_m) = \alpha c'(x_m)$$

However,

$$b'(x_1^*) = \alpha c'(x_1^*)$$

And $x_m < x_1^*$. Thus

$$b'(x_m) - \frac{1}{2}c'(x_m) > 0$$

and

$$x_m < \tilde{x}_1(x_m) \qquad \blacksquare$$

(iii) Let us show that $x_m > x_2^*$.

We proceed by a *reductio ad absurdum.* Suppose that $x_m = x_2^*$:

$$b'(x_2^*) + \frac{\partial x_1}{\partial x_m} b'[\tilde{x}_1(x_2^*)] - (1-\alpha)c'[(1-\alpha)x_2^*] - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c'[\tilde{x}_1(x_2^*) - (1-\alpha)x_2^*] = 0 \quad (17)$$

However,

$$b'(x_2^*) = (1-\alpha)c'[(1-\alpha)x_2^*]$$

Thus, we can write (17):

$$\frac{\partial x_1}{\partial x_m} b'(\tilde{x}_1(x_2^*)) - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c'(\tilde{x}_1(x_2^*) - (1-\alpha)x_2^*)] = 0$$

However, we know from (8) that:

$$\frac{\partial x_1}{\partial x_m} < (1-\alpha)$$

Thus:

$$\frac{\partial x_1}{\partial x_m} b'(\tilde{x}_1(x_2^*)) - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c'[\tilde{x}_1(x_2^*) - (1-\alpha)x_2^*)] > 0$$

Thus,

$$x_m > x_2^* \qquad \blacksquare$$

A.5 Proof of Lemma 4

The threshold $\bar{x}_{\min}$ is defined by:

$$W_1(\bar{x}_{\min}, \bar{x}_{\min}) = W_1(\tilde{x}_1, x_2^*)$$

$$2b(\bar{x}_{\min}) - c(\alpha \bar{x}_{\min}) - c[(1-\alpha)\bar{x}_{\min}] = b(\tilde{x}_1) - c[\tilde{x}_1 - (1-\alpha)x_2^*] + b(x_2^*) - c[(1-\alpha)x_2^*]$$

At $\bar{x}_{\min} = \tilde{x}_1$, we obtain:

$$W_1(\tilde{x}_1, \bar{x}_{\min}) > W_1(\tilde{x}_1, x_2^*)$$

because $x_2^* < \bar{x}_{\min}$.

At $\bar{x}_{\min} = x_2^*$, we obtain:

$$W_1(\bar{x}_{\min}, x_2^*) < W_1(\tilde{x}_1, x_2^*)$$

because $\bar{x}_{\min} < \tilde{x}_1$. ■

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