Optimal Discretion in Asylum Law Making*

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Abstract

We apply the Kaldor-Hicks decision rule to asylum law making and especially to the question of the harmonization or devolution of asylum law. We study the implications of the different law making mechanisms for the member countries and for refugees. Two forms of harmonization are compared: fixed and minimum standards. Jurisdictions face different marginal costs of hosting refugees. It is argued that the resulting varying levels of strictness of the eligibility criteria create a "jurisdictional externality". We show that this negative externality leads to a "race to the bottom", or a toughening, of asylum standards. They are lower (stricter) for both jurisdictions to the Pareto efficient level. To solve this problem, harmonization is considered. It involves costs in terms of efficiency due to the heterogeneity of countries. We find no proof that any type of harmonization would lead to a better result for the member countries than national asylum law making. However, the system of minimum standards is clearly best for refugees, and better for both host countries than total harmonization.

Key-words: competition in law making, asylum law

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1 INTRODUCTION

The large number of asylum seekers arriving in Europe and in the United States[1], and the political sensitivity to asylum issues[2] leads to much debate within and between countries as to which asylum standards should be adopted, and who should be deciding on them[3]. 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. According to the European subsidiarity principle, a centralized production of law should be preferred *only when* the law can not be efficiently provided by Member States.[4] 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 refugees.[5] We do this by examining the efficiency of asylum law making regimes with different degrees of devolution.

Asylum law creates a jurisdictional externality on refugee flows. If one jurisdiction toughens its eligibility criterion, or standard[6], jurisdictions with more generous standards see the numbers of refugees in their countries increase. This phenomenon is commonly called 'asylum shopping'.[7] Higher numbers of asylum applications imply higher costs, which in turn can lead the latter jurisdictions to avoid suffering the externality by toughening their standards. This means that the externality effect leads jurisdictions who are willing to apply high (generous) standards to implement lower (tougher) standards. The existing mechanism of compensation of the externality, the European Refugee Fund, involves sums that are negligible compared

[1] In 2005, Europe hosted 24 % (2.3 million) of the refugees in the world, and the US hosted 0.4 million (UNHCR 2006).

[2] See, for example, Carens (1995), McBride (1999) and Gibney (2004).

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

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

[5] 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.

[6] We use the term "standard" to mean the level of toughness of the eligibility criteria. The higher the standard, that is the less tough are the criteria for eligibility, the higher the proportion of refugees entitles to protection.

[7] See for example Barbou des Places and Deffains (2004).

to the costs involved[8].

The empirical literature on refugee destination country choices provides proof of a negative externality effect in terms of costs on the other countries of the lowering of standards in a jurisdiction.[9] Hatton (2004) finds an important reduction in asylum applications in the countries that toughened their standard. 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. In a qualitative study, Zetter *et al.* (2003) find a correlation between the reduction in standard and asylum applications in Germany, Sweden and France, but not in the UK, Belgium and the Netherlands. Böcker and Havinga (1997) estimate that the impact of the level of the standard on the choice of destination country depends on other characteristics of the country. Thus, a stricter standard will have less of an impact on the asylum application numbers in the UK than in other destination countries, because the English language is considered by refugees as an important attraction. There is an externality effect; however, it does not imply that the entire flow of refugees is redirected. 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.

There exists a large literature on the issue of regulatory competition between jurisdictions since Tiebout's model in 1956[10], where governments, as suppliers of public goods, compete to attract citizens through lawmaking. The externality effect, according to the literature, should limit the benefits of competition and induces the "race to the bottom" rationale (or Delaware effect[11]). The problem of competition between jurisdictions was first applied in the tax framework (Mintz and Tulkens, 1986, Wildasin, 1988). Another area examined is

[8] According to Noll (2003), "*Given the total costs of reception in the Member States and the share guaranteed to each Member State, the redistributive effects of the European Refugee Fund are but a drop in the ocean.*"

[9] See for example Rotte *et al.* (1996). Note that the definition of the standard varies between authors, and that it is usually more general than our definition. However, these works clearly indicate the presence of an externality.

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

[11] See Barnard (2000).

the competition in taxes and the level of environmental regulation (Oates and Schwab, 1988, Markusen, Morey and Olewiler, 1993, Revesz, 1992, 1996 and 2000). Marceau (1997) and Marceau and Mongrain (2004) discuss competition in crime deterrence. Marceau shows that competition between jurisdictions creates over deterrence due to the negative externality created by resources devoted to deterrence borne by adjacent jurisdictions. When they choose their effort in deterrence, the jurisdictions neglect the harm that they impose on other jurisdictions (owing to the displacement of criminals or to the relocation of capital). Barbou des Places and Deffains (2004) identify a race to the bottom in asylum policy making in Europe. They suggest collective action at a centralized level to escape the prisoner's dilemma situation in asylum law making.

If harmonization is a solution to avoid externalities and therefore a "race to the bottom", it is however applied at some cost[12]. It creates inefficiencies, as jurisdictions are heterogeneous (Faure, 1998, Ogus, 1999, Van den Bergh, 2000). Indeed, lobbies take advantage of the centralization of the production of law. Solutions to the problem of competition between jurisdictions are discussed by Peralta and van Ypersele (2006)[13] in the context of the coordination of capital taxation. The authors discuss alternatives to full centralization in order to find a politically feasible policy. Esty and Geradin (2000) and Van den Bergh (2000) also argue that, from a general point of view, in order to have optimal governance, a flexible mix between cooperation and competition should be considered. Deakin (1999) notes that competition between jurisdictions 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

[12] About the efficiency of uniform standards in education, see Costrell (1997), where the conditions under which centralized versus decentralized educational standards raise welfare are examined. 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 other Oates (1999). On competition policy, see Easterbrook (1993).

[13] In contrast to the matching grant solution of De Pater et Myers (1994), which implies hidden information and requires the intervention of a central government.

solutions at the federal level.

This issue is directly related to the discussions around the pressure for legal change created by the mobility of goods and services (Sykes, 2000). As shown in the case of corporate law, path dependence effects or institutional constraints might not enable the law making process to perfectly reproduce market mechanisms (Romano (1985, 1987), Roe (2003, 2005)). Parting from the question of transplants, Garoupa and Ogus (2006) investigate the convergence process of legal rules. They explain the absence of unification, in the United States context and the absence of harmonization in the European Union context by a free riding problem.

In our model, we assume that countries have asymmetric cost functions for hosting refugees. As a consequence, their optimal choices regarding the relative generosity of refugee law differ. This results in a variation in the criteria for eligibility to the refugee status. In a zone composed of multiple jurisdictions, this difference in standards involves a jurisdictional externality, because a tightening of the eligibility standard in one jurisdiction increases the number of asylum applications in the others. Therefore, the latter's hosting costs are increased. We show that this negative externality leads to a race to the bottom, i.e. to a toughening, of asylum standards. 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 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 standards. We choose to evaluate the the implications of the 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.

The next section introduces the model. Harmonization is discussed in section 3. The results are discussed and applied to the European and US contexts 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 a level of gravity of a refugee's personal situation required to be granted a protection status (asylum)[14]. The situation of each refugee can indeed be characterized by a certain level of gravity[15] that defines his type x. For simplicity reasons, we assume that the population of refugees is uniformly distributed along $[0, 1]$. We assume that the gravity of the individual cases is common knowledge[16]. We also assume that the refugee knows the standard x_i of each jurisdiction and that he knows whether he is eligible or not in jurisdiction i, i.e. whether $x \leqslant x_i$. The higher the standard is, the more refugees are eligible to the refugee status. Those who do not fulfil the criteria of the highest standard immigrate illegally.

We assume that the exogenous parameter α is the proportion of refugees that 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 $\alpha \leq \frac{1}{2}$. α includes all reasons for finding a country attractive, with the exception of asylum law: for example, the presence of family, or the language. The number of refugees in the jurisdictions depends on the standard and the attraction α to refugees.

If the standard is lower - i.e. stricter- in jurisdiction 2 compared to jurisdiction 1 - $x_2 < x_1$

[14] 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.

[15] The eligibility of the refugee is determined 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 : it is not the case that future refugees try to suffer worse persecution in order to fulfil the criteria for obtaining a protection status.

[16] The gravity of the individual's need for protection is observed by the state in the course of hearings that are part of the asylum procedure.

-, the number of asylum applications in jurisdiction 1 is defined by the share of those who have the choice of countries (αx_2), plus those who can only apply for asylum in 1: ($x_1 - x_2$). Therefore, the number of eligible refugees is: $x_1 - (1-\alpha)x_2$. This relation is depicted in figure 1.

We note that $x_1 - (1-\alpha)x_2 > \alpha x_1$, so there exists a jurisdictional externality: the number of eligible refugees of one jurisdiction depends on the standard of the other jurisdiction.

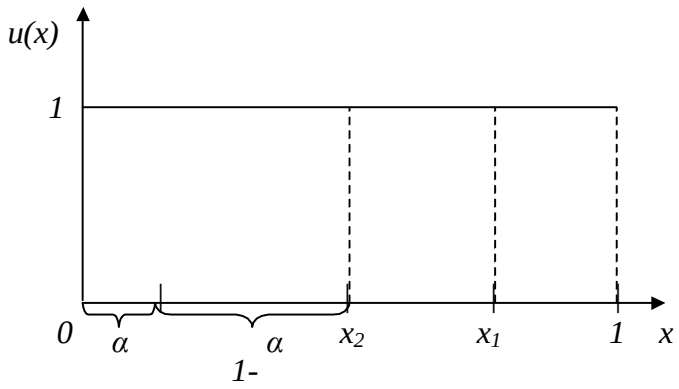

Figure 1: The jurisdictional externality effect

2.2 The Maximization Problem of the Jurisdictions

To set a standard x, each jurisdiction faces a tradeoff between its benefits and its costs. We assume that both jurisdictions have the same benefit function $b_c(.)$ which depends on the announced standard. However, they face a different cost function $c_i(.)$ which depends on the effective number of eligible applicants.

2.2.1 *The Common Benefit Function*

The benefits have two components, first, the "moral" benefits $b(x)$ derived from the valuation of the protection of a large number of refugees[17], and second, diminishing enforcement costs $c_r(x)$. We call $b_c(x) = b(x) - c_r(x)$ the common[18] benefit function of every jurisdiction.

We assume that the benefits increase with the announced standard, such that $b' > 0$ and $b'' \leqslant 0$ for all $x \in [0, 1]$. We further assume that the benefits vary from $-\infty$ at an extremely strict standard (close to 1) to an upper limit B, such that:

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

The costs of enforcing the standard $c_r(x)$ are due to the fact that 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 applying the standard. In the case of a maximal standard ($x = 1$), the costs of the application of the standard are equal to zero, because all refugees are accepted: $\lim_{x \to 1} c_r(x) = 0$. A very low standard leads to excessively high application costs for the same reasons $\lim_{x \to 0} c_r(x) = +\infty$. We assume that $c_r(x)$ depends negatively on the standard, such that $c'_r(x) < 0$ and $c''_r(x) \geqslant 0$.

Therefore[19], the common benefit function is such that:

$$\begin{aligned} b'_c(x) &> 0 \\ b''_c(x) &\leqslant 0 \end{aligned}$$

[17] Parliamentary debates show the valuation of the protection of a large number of refugees. Adopting a generous and humanitarian standard is an objective particularly emphasized. For parliament, there are thus benefits derived from having higher standards, as very low standards harm the reputation of the country. See also the analysis of asylum law as a public good of Barbou des Places and Deffains (2003).

[18] The benefit function $b_c(.)$ is assumed to be the same in all the jurisdictions for a same announced standard of asylum law.

[19] We have $b_c(x) = b(x) - c(x)$. Thus $b'_c(x) = b'(x) - c'_r(x)$. However, $b'(x) > 0$ and $c'_r(x) < 0$ and thus $b_c\prime(x) > 0$. Similarly, $b''_c(x) = b''(x) - c''_r(x)$. However, $b''(x) \leqslant 0$ and $c''_r(x) \geqslant 0$. We therefore find $b''_c(x) \leqslant 0$.

and

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

The minimum possible standard is called x_0. We define x_0 such that $b_c(x_0) = 0$[20]. The jurisdictions have a positive benefit along the interval $[x_0, 1]$.

2.2.2 *The Hosting Cost Functions*

The existing differences between jurisdictions are reflected by the hosting costs function. Hosting refugees implies a cost that depends on the number of eligible refugees[21]. These costs vary between countries, leading to different cost functions. We assume that $c_1(x) < c_2(x)\ \forall\ x \in]0, 1]$, such that $c_i(x)$ increases in x and is convex: $c_i'(x) > 0$, $c_i''(x) \geqslant 0$ and $c_i'''(x) = 0\ \forall\ i \in \{1, 2\}$. We further assume that $\forall\ i \in \{1, 2\}$:

$$\begin{aligned}c_i(0) &= 0 \\ \lim_{x\to 1} c_i(x) &= +\infty\end{aligned}$$

$$\begin{aligned}c_1'(.) &< c_2'(.) \\ c_1''(.) &< c_2''(.)\end{aligned}$$

In the preceding section we identified a jurisdictional externality. This externality is negative, since it induces higher hosting costs.

[20] The function $b_c(.)$ is strictly increasing over $[0, 1]$. However, the lower limit is negative and the higher limit is positive ($B > 0$). There therefore exists an x_0 such that $b(x_0) = c_r(x_0)$ and $x_0 < 1$.

[21] Asylum applications are examined individually. The more asylum applications there are, the higher the costs of examination, and the higher the opportunity costs for the country: courts that are occupied with asylum claims are not available for other proceedings.

2.3 The Optimal Level of the Asylum Law Standards of the Jurisdictions

We present the case where there is no central law maker. The asylum law standards are decided on by each jurisdiction.

2.3.1 *No Externalities*

As we have seen in a previous section, the function $b_c(.)$ depends on the standard x of asylum law announced by the government, leading to a certain level of benefits. The hosting costs are not directly function of the standard, but of the effective number of refugees. The level of utility that a jurisdiction derives from a level of standard is equivalent to the benefits net of the application and hosting costs.

If there is no externality effect[22] or if jurisdiction 1 does not know about the externality effect, it chooses a standard x_1 which maximizes the following problem:

$$\max_{x_1} b_c(x_1) - c_1(\alpha x_1)$$

with the first order condition:

$$b_c'(x_1^*) = \alpha c_1'(\alpha x_1^*) \tag{1}$$

The optimal standard x_1^* is implicitly defined by (1)[23]. Similarly, jurisdiction 2 chooses standard x_2 which maximizes the following problem:

$$\max_{x_2} b_c(x_2) - c_2[(1-\alpha)x_2]$$

[22] If there is no externality, refugees, when immigrating, do not choose according to where they are eligible to a protection status. Therefore, there are $(1-\alpha)(x_1 - x_2)$ refugees who immigrate illegally to jurisdiction 2, even though they are eligible to asylum status in jurisdiction 1.

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

$$b_c''(x_1) - \alpha^2 c_1''(\alpha x) < 0.$$

with the first order condition which implicitly defines the optimal standard[24] x_2^*:

$$b_c'(x_2^*) = (1-\alpha)c_2'[(1-\alpha)x_2^*]$$

Given that the marginal hosting costs of jurisdiction 1 are lower than those of jurisdiction 2, the optimal standard x_2^* of jurisdiction 2 is inferior to that of jurisdiction 1, x_1^*.[25]

Suppose now that there exists an externality effect.

2.3.2 *With Externality Effect*

The two jurisdictions simultaneously choose the level of the standard. They have complete information: both know their own and the other's hosting cost function and their shared benefit function. Anticipating the externality effect, the problem of jurisdiction 1 is given by:

$$\max_{x_1} b_c(x_1) - c_1(m_1)$$

with

$$m_1 = \begin{cases} x_1 - (1-\alpha)x_2 \text{ if } x_1 > x_2 \\ \alpha x_1 \text{ if } x_1 \leqslant x_2 \end{cases}$$

We denote $\tilde{x}_1(x_2)$ the optimal level of standard of jurisdiction 1 with the externality effect. Similarly, jurisdiction 2 chooses its standard x_2 so as to maximize:

$$\max_{x_2} b_c(x_2) - c_2(m_2)$$

[24] The second order condition is respected, since $b_c''(x) < 0$ et $c_i''(x) > 0 \qquad \forall x \epsilon [0,1]$:

$$b_c''(x_2) - (1-\alpha)^2 c_2''[(1-\alpha)x_2] < 0.$$

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

$$b_c'(x_1) = b_c'(x_2)$$

However,

$$c_1'(x) < c_2'(x) \forall x \epsilon [0,1]$$

Necessarily, since $b_c'' < 0$, we have :

$$x_2^* < x_1^*$$

with

$$m_2 = \begin{cases} x_2 - \alpha x_1 \text{ if } x_2 > x_1 \\ (1-\alpha)x_2 \text{ if } x_2 \leqslant x_1 \end{cases}$$

We denote $\tilde{x}_2(x_1)$ the optimal level of standard of jurisdiction 2 with the externality effect.

Lemma 1: *Jurisdiction 1 adopts a stricter standard $\tilde{x}_1(x_2^*)$ when it takes the externality into account. However, its standard remains less strict than the standard chosen by the jurisdiction with the higher hosting costs:* $\tilde{x}_2(x_1) = x_2^*$ and $x_2^* < \tilde{x}_1(x_2^*) < x_1^*$.

Proof. See appendix (6.1) ■

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: the externality is negative. Therefore, jurisdiction 1's standard is reduced relative to its optimum without externalities x_1^*. This is the "race to the bottom" effect (towards ever stricter standards). This effect is limited, because jurisdiction 1 has no interest in diminishing its standard to the level of the standard of jurisdiction 2. Both can perfectly anticipate that $\tilde{x}_1 \geqslant x_2^*$. Jurisdiction 2's objective function does not depend on the standard in jurisdiction 1, it thus chooses $\tilde{x}_2 = x_2^*$, as before.

Having analyzed the externality effect on the level of the optimal standards in both jurisdictions, we now analyze the effects in terms of welfare.

2.4 Welfare Analysis

Without externalities, the social welfare $SW(x_1, x_2)$ of both jurisdictions is the sum of both jurisdictions' individual welfare. At the optimal level of standard, the social welfare in the area is written:

$$SW(x_1^*, x_2^*) = b_c(x_1^*) + b_c(x_2^*) - c_1(\alpha x_1^*) - c_2[(1-\alpha)x_2^*]$$

If jurisdiction 1 does not take the externality into account, the social welfare function is:

$$SW(x_1^*, x_2^*) = b_c(x_1^*) + b_c(x_2^*) - c_1[x_1^* - (1-\alpha)x_2^*] - c_2[(1-\alpha)x_2^*]$$

If jurisdiction 1 does take the externality effect into account, welfare is written:

$$SW(\tilde{x}_1, x_2^*) = b_c(x_2^*) + b_c(\tilde{x}_1) - c_1[\tilde{x}_1 - (1-\alpha)x_2^*] - c_2[(1-\alpha)x_2^*]$$

Jurisdiction 2's welfare is not altered. It is always at an optimum. Therefore, if jurisdiction 1 disregards the externality effect when choosing its standard, its welfare is by definition of the optimum (Lemma 1) diminished compared to the situation in which it does not suffer an externality.

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

The social welfare is reduced by the costs imposed on 1 by the externality:

$$b_c(x) - c_1[x - (1-\alpha)x_2^*] < b_c(x) - c_1(\alpha x) \qquad \forall x > x_2^*$$

3 HARMONIZATION

We 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[26] centralized law maker chooses a Pareto efficient solution with two fixed standards x_1^{**} and x_2^{**} by maximizing the social welfare of the zone:

$$\max_{x_1,x_2} b_c(x_1) - c_1[x_1 - (1-\alpha)x_2] + b_c(x_2) - c_2[(1-\alpha)x_2]$$

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

$$b_c'(x_1) - c_1'[x_1 - (1-\alpha)x_2] = 0 \tag{2}$$

$$b_c'(x_2) + (1-\alpha)c_1'[x_1 - (1-\alpha)x_2] - (1-\alpha)c_2'[(1-\alpha)x_2] = 0 \tag{3}$$

[26] We assume that the central law maker puts the same weight on each jurisdiction. One can easily generalized the model by using different coefficients. However, this would imply complex discussions regarding the law making process inside a union of states in terms of rent-seeking behavior and bargaining strategy.

Jurisdiction 2 now takes the externality effect into account. An increase in x_2 allows jurisdiction 1 to raise its standard.

Remember that in the absence of the intervention of a central law maker, each jurisdiction maximizes its own interests. The first order conditions defining [27] $\tilde{x}_1(x_2^*)$ and $\tilde{x}_2$ are:

$$b_c'(x_1) - c_1'[x_1 - (1-\alpha)x_2] = 0 \quad (4)$$

$$b_c'(x_2) - (1-\alpha)c_2'[(1-\alpha)x_2] = 0 \quad (5)$$

Comparing (3) and (4) we observe that jurisdiction 2 does not take the externality effect of its choice of standard into account when there is no central law maker.

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 (6.2) ■

The difference between the standards independently chosen by the jurisdictions and by the Pareto efficient law maker justifies the question of the intervention of a central law maker. Two regimes are considered: a fixed and a minimum standard regime. Indeed, a law maker can not directly impose different standards x_1^{**} and x_2^{**} due to principle of anonymity that states that a reform should apply to all states in the same way.

3.2 Fixed Standard

We assume that the benevolent central law maker has perfect knowledge of the maximization problems of the jurisdictions. He produces a common standard x as depicted in figure 2 such that $x_1 = x_2 = x$ by maximizing:

$$SW(x,x) = 2b_c(x) - c_1(\alpha x) - c_2[(1-\alpha)x \quad (6)$$

[27] Given that $\tilde{x}_1(x_2^*) < \tilde{x}_2$ for $\alpha \leqslant \frac{1}{2}$. See the proof to lemma 1.

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

$$2b_c'(\bar{x}) - \alpha c_1'(\alpha\bar{x}) + (1-\alpha)c_2'[(1-\alpha)\bar{x}] = 0 \tag{7}$$

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

Proof. See appendix (6.3) ■

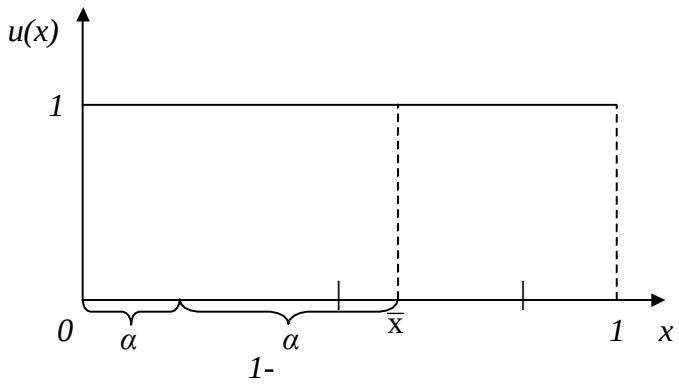

Figure 2: The fixed standard harmonization regime

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 and on the difference of marginal costs c_1' and c_2'. The standard $\bar{x}$ is implicitly defined by the average marginal costs of the two jurisdictions.

If the differences between the jurisdictions are small (marginal costs do not differ greatly and 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. 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[28]. It chooses a standard $\tilde{x}_1$ that maximizes the following function:

$$b_c(x_1) - c_1[x_1 - (1-\alpha)x_m]$$

The first order condition implicitly defines $\tilde{x}_1(x_m)$,the optimal standard of jurisdiction 1 with minimum standards:

$$b_c'(\tilde{x}_1) = c_1'[\tilde{x}_1 - (1-\alpha)x_m] \tag{8}$$

The implicit functions theorem is used to show that, at the optimum:

$$\frac{d\tilde{x}_1(x_m)}{dx_m} = -\frac{(1-\alpha)c_1''[\tilde{x}_1 - (1-\alpha)x_m]}{b_c''(\tilde{x}_1) - c_1''[\tilde{x}_1 - (1-\alpha)x_m]} > 0. \tag{9}$$

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

[28] For $x_m \geqslant x_2^*$, the reasoning is the same as in proof 6.1.

standard increases. This variation is inferior to $(1-\alpha)$ [29]:

$$\frac{d\tilde{x}_1}{dx_m}(\tilde{x}_1, x_m) < 1-\alpha \tag{10}$$

3.3.2 *The Central Law Maker*

The central law maker chooses x_m that maximizes:

$$b_c(x_m) + b_c[\tilde{x}_1(x_m)] - c_2[(1-\alpha)x_m] - c_1[\tilde{x}_1(x_m) - (1-\alpha)x_m] \tag{11}$$

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

$$b_c'(x_m) + \frac{\partial x_1}{\partial x_m} b_c'[\tilde{x}_1(x_m)] - (1-\alpha)c_2'[(1-\alpha)x_m] - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c_1'[\tilde{x}_1(x_m) - (1-\alpha)x_m] = 0$$

Proposition 1: *The minimum standard x_m is higher than the optimal standard x_2^* without externalities of jurisdiction 2. The standard x_1^* that maximizes the social welfare 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 (6.4) ■

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 of what it would have adopted in the absence of externalities.

[29]

$$\frac{dx_1}{dx_m}(\tilde{x}_1, x_m) < 1-\alpha$$

$$\iff$$

$$-\frac{c_1''(\tilde{x}_1 - \frac{1}{2}x_m)}{BN''(\tilde{x}_1) - c_1''(\tilde{x}_1 - \frac{1}{2}x_m)} < 1$$

$$\iff$$

$$BN''(\tilde{x}_1) < 0$$

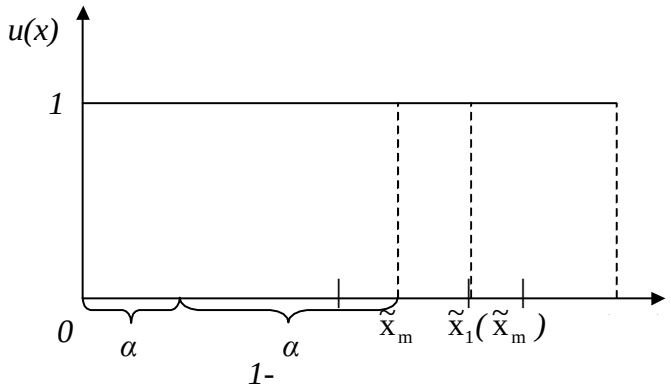

Figure 3: The minimum standard harmonization regime

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*

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 regime should be applied if and only if the increase in the welfare of jurisdiction 1 compensates the decrease in the welfare of jurisdiction 2. First, we need check whether the social welfare of jurisdiction 1 is increased by harmonization. We show that:

Lemma 4: *There exists a threshold* $\bar{x}_{\min} \in]x_2^*, \tilde{x}_1[$ *below which social welfare is necessarily diminished in fixed standard harmonization regime, as opposed to the absence of harmonization.*

Proof. See appendix (6.5) ■

Two cases can now be distinguished. If $\bar{x} \leqslant \bar{x}_{\min}$, harmonization reduces the social welfare of both jurisdictions. Otherwise, the sign of $\Delta SW = SW(\tilde{x}_1, x_2^*) - SW(\bar{x}, \bar{x})$ depends on the extent of the cost of increasing the standard from x_2^* to $\bar{x}$ for jurisdiction 2[30] relative to the increase in the welfare of jurisdiction 2[31].

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 fall in 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

Social welfare with a minimum standard is only superior to social welfare without harmonization if the costs involved in an increase of the standard of jurisdiction 2 are compensated by a higher benefit by jurisdiction 1. The following three cases are possible:

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

3.4.1.3 Minimum Standard versus Fixed Harmonized Standards

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

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

[30] $b_c(x_2^*) - c_2(x_2^*) - [b_c(\bar{x}) - c_2(\bar{x})] < 0$ because $\bar{x} > x_2^*$.

[31] Knowing that $b_c(\bar{x}) - c_1(\bar{x}) - [b_c(\tilde{x}_1) - c_1(\tilde{x}_1 - \frac{1}{2}x_2^*)] > 0 \qquad \forall x > \bar{x}_{\min})$

If $x_m = \bar{x}$, then the difference in terms of welfare can be written:

$$SW(\bar{x}, \bar{x}) - SW(\tilde{x}_1, \bar{x})$$

Thus,

$$b_c(\bar{x}) - c_1(\frac{1}{2}\bar{x}) - [b_c(\tilde{x}_1(\bar{x})) - c_1(\tilde{x}_1(\bar{x}) - \frac{1}{2}\bar{x})]$$

This difference is negative because $\hat{x}_1$ is per definition the maximum value of the function $b_c(x) - c_1(x - \frac{1}{2}\bar{x})$.

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 permit it 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*

>From the refugees' point of view, what counts is the highest standard in the region, i.e. the standard in jurisdiction 1.[32]

[32]In our model, this is always the standard of jurisdiction 1:

$$\alpha x_2 + (1 - \alpha)x_2 + (x_1 - x_2) = x_1$$

	Jurisdiction 1	**Jurisdiction 2**
No externality	x_1^*	x_2^*
Externality	$\tilde{x}_1(x_2^*)$	x_2^*
Fixed standard	$\bar{x}$	$\bar{x}$
Minimum standard	$\tilde{x}_1(x_m)$	x_m
Minimum standard with $x_m = \bar{x}$	$\tilde{x}_1(\bar{x})$	$\bar{x}$

Table 1: Optimal standards under different modes of law making

It follows from the preceding results that the highest standard is x_1^*. However, due to the 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.

4 DISCUSSION AND CONCLUSION

4.1 Main Results

The comparison with the Pareto efficient situation of total flexibility of, or competition between, jurisdictions, shows that standards chosen independently by the two jurisdictions are lower than standards chosen by an omniscient and benevolent producer of law. In particular, the jurisdiction with the highest hosting costs independently chooses stricter criteria, since it does not take into account the externality effect on the other jurisdiction's net benefit. 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 flexible standard. The effect of harmonization is opposite on both jurisdictions: it diminishes the social welfare of the jurisdiction facing the higher marginal costs, but it can increase the social welfare of the other, compared to competition.

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 jurisdiction with the highest marginal costs, 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 jurisdiction with the lower marginal costs 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 high cost 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

We apply the results of our model to asylum law making in the United States and in the European Union. In both these regions, the number of asylum applications increased considerably in the early 1990s. Both reacted by considerably tightening their policies[33]. In our

[33] >From the early 1980s to 1992, asylum applications in Europe increased sevenfold from around 100.000 per year to 700.000, before levelling out to around 400.000 since 2000. They were accompanied by political backlashes against refugees and asylum, leading to ever more restrictive asylum laws. For example, Germany changed its constitution in 1993 in order to apply restrictive laws on asylum seekers. Border controls were toughened, living conditions for asylum seekers downgraded, deportation encouraged, and reforms of procedures restricted access to the refugee status. See Hatton (2004).

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, who will experience a disproportional rise in the number of asylum applications, and of the corresponding costs. They will follow suit and also decrease the generosity of their asylum legislation. This prisoner's dilemma situation can be avoided by appointing a central decision maker in order to internalize the externalities. However, in our model, the different institutional set-ups of these regions calls for different reforms.

4.2.1 *United States: Federal Refugee Law*

The early 1990s saw a considerable change in the importance of refugee policy, which is decided on at the federal level. As an instrument of foreign policy,[34] it was devalued by the end of the Cold War, but the rise of the mass of asylum seekers made it an extremely volatile electoral issue, involving questions such as the state's ability to provide border control. Two highly restrictive developments followed: the generous welcoming of asylum seekers from communist countries ceased, and deterrent and preventive measures designed to impede the access to asylum were put in place. In 1995, a series of reforms aimed at reducing the attraction of entering via the asylum route were introduced, limiting the rights of asylum seekers to work, and preventing foreigners from accessing the US territory. The 1996 Illegal Immigration Reform and Immigrant Responsibility Act "essentially wipe[d] out asylum as we know it"[35]. Political control over asylum was reasserted. Conditions for filing an asylum application were severely restricted, detention became mandatory, and expedited removal allowed undocumented aliens to be removed without a hearing. Applying for asylum became more onerous and exclusive.

While the pattern of the restriction of asylum law resembles a race to the bottom, it is not necessarily imputable to the competition between jurisdictions. One the one hand, it is possible that the United States finds itself in a prisoner's dilemma situation with other host

[34] Refugee policy was for a long time tightly intertwined with the cold war objective of damaging and ultimately defeating Communist countries. See Gibney (2004).

[35] Fragomen, 1997.

jurisdictions, such as the member countries of the European Union, and thus follows suit in restricting its standard. On the other hand, its benefit function from hosting refugees has changed, no longer representing a foreign policy asset. As a consequence, our model shows that the United States would lower its standards even if it existed in isolation. These foreign policy considerations do not exist at the state level, so national welfare cannot be treated as a simple sum of state welfares. If state benefit functions are more pro-refugee than at the national level, our model predicts that it would be advantageous for both refugees and the concerned states to apply a minimum standard at the federal level, and to let states adopt their standards in accordance with their specificities. However, if state benefit functions are less well inclined towards refugees than the federal government, centralized refugee law continues to be the best option for refugees. The individual states make welfare losses that must be compensated by the gains at the national level.

4.2.2 *European Union: Harmonization of Asylum Law*

Since the opening of the borders within the EU[36], asylum policies are indeed being gradually transferred to the EU level. This development started with an intergovernmental approach in the 1980s, followed by a move toward the supranational level in the 1990s.

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, in the qualification of third country nationals as refugees. 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.

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

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 law maker to enforce a threshold standard in order to limit the negative externalities[37] caused by too strict criteria, 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, who suffer less externalities, also adopt higher standards. Under these circumstances, a greater proportion of refugees can hope for protection.

The next step envisaged in order to complete the Common European Asylum System (CEAS) is the gradual introduction of a single asylum procedure in which all claims for international protection are examined by one authority taking a single decision. 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 into account the specificities of host countries. They present a compromise, rather than a maximisation, of their welfare. Correspondingly, there exists no country with higher standards that can protect a larger share of refugees. Both member countries and refugees will suffer adverse consequences of fixed standards.

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 enforced minimum standards.

In reality, the application of the minimum standards is limited. The Commission of the European Union complains that the qualification directive was only transposed by six member countries within the deadline.[38] In the countries who did transpose it, the directive was

[37] One 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.

[38] COM (2006c).

criticized as being too low to be meaningful, and as leaving too much discretion to member states.[39] The vague formulation of the directive leaves member countries an adaptation margin to the bottom. There exists no jurisdiction permitting to centrally clarify its interpretation.[40] A study by Julien-Laferrière *et al.* (2006) shows that many member countries do not apply the minimum standards, or use loopholes in the directives for restrictive measures. It follows from our model that if the minimum standards are not respected, the externality is not reduced. As a result, there are no benefits to be derived from the harmonization of asylum law, and leaving law at the national level would lead to a better outcome.

As a consequence, there is reason to believe that the harmonization of asylum law at the European level does not fulfil the conditions of the subsidiarity principle: the existing harmonized law is in the interest of neither the member countries nor the refugees.

The European Union and the United States face a high number of asylum claims since the 1990s. In both cases, this has lead to a political backlash and to significant restrictions in asylum laws. The European Union is in the process of harmonizing its asylum law in order to avoid the externality effect. We have seen that harmonization may not, enhance its welfare, and that it contradicts the subsidiarity principle. For refugee welfare, the harmonization of EU asylum law should not go beyond minimum standards, properly applied.

The case of the US, which makes refugee law on the federal level, is less clear cut. Foreign policy considerations on the national level make it more prone to political interference. It is not, however, clear, in which relation national decision making is to state preferences. Further study is needed to determine whether the United States should partially decentralize refugee law making.

[39] Ardittis et al. (2005), ECRE (2004).

[40] Asylum is excluded from the competence of the European Court of Justice. The article 68(2) of the Treaty of the European Community says that "(i)n any event, the Court of Justice shall not have jurisdiction to rule on any measure or decision taken pursuant to Article 62(1) relating to the maintenance of law and order and the safeguarding of internal security." For a discussion of this clause, see COM (2006a) 331 final.

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 industry regulations. In this context, flexible law consists in 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. In the European context, we effectively observe many cases where the guidelines by the Commission are very general[41], allowing each country to further define it. The major benefit of flexible law is that it takes into account the heterogeneity of jurisdictions.

It may be helpful to 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 law maker. The locus of the asylum law making decision among the central institutions affects the preferences of the central law maker.[42] Another interesting extension to our model would be the inclusion of an enforcement mechanism of the centralized standard.

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

[42] See Monheim (2007).

6 APPENDIX

6.1 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:

$$b_c'(\tilde{x}_1) = \alpha c_1'(\alpha \tilde{x}_1) \tag{12}$$

The first order condition for x_2^* is:

$$b_c'(x_2^*) = c_2'(x_2^* - \alpha \tilde{x}_1) \tag{13}$$

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

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

Or,

$$c_2'(x_2^* - \alpha \tilde{x}_1) < \alpha c_1'(\alpha \tilde{x}_1) \tag{14}$$

However, (14) is impossible, because $c_2'(x) > c_1'(x)$ and $x_2^* - \alpha \tilde{x}_1 > \alpha^2 \tilde{x}_1$ for $\alpha \leq \frac{1}{2}$. We necessarily have $c_2'(x_2^* - \alpha \tilde{x}_1) > \alpha c_1'(\alpha \tilde{x}_1)$ 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:

$$b_c'(x_2^*) = (1-\alpha) c_2'[(1-\alpha) x_2^*]$$

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

$$\alpha c_1'(\alpha x_2^*) = (1-\alpha) c_2'[(1-\alpha) x_2^*]$$

or,

$$c_1'(\alpha^2 x_2^*) = c_2'[(1-\alpha)^2 x_2^*] \tag{15}$$

However, $c_2'(x) > c_1'(x)$. The equality (15)is thus impossible, we have $\alpha \leq \frac{1}{2}$, and thus $\alpha^2 x_2^* \leqslant (1-\alpha)^2 x_2^*$. It is thus impossible that $\tilde{x}_1 = x_2^*$.

We thus know that,

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

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

$$b_c'(x_1^*) = \alpha c_1'(\alpha x_1^*)$$

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

$$b_c'(\tilde{x}_1) = c_1'[\tilde{x}_1 - (1-\alpha)x_2^*] \tag{16}$$

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

$$\alpha c_1'(\alpha x_1^*) < c_1'[\tilde{x}_1 - (1-\alpha)x_2^*]$$

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

As by assumption $b_c''(.) < 0$, we have:

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

6.2 Proof of Lemma 2

One can rewrite the four implicit conditions using z such that:

$$\begin{aligned} b_c'(x_1) - c_1'[x_1 - (1-\alpha)x_2] &= 0 \\ b_c'(x_2) + (1-\alpha)c_1'[x_1 - (1-\alpha)x_2]z - (1-\alpha)c_2'[(1-\alpha)x_2] &= 0 \end{aligned}$$

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 if

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

Or

$$f_1(x_1, x_2) = b_c'(x_1) - c_1'[x_1 - (1-\alpha)x_2]$$

and

$$f_2(x_1, x_2, z) = b_c'(x_2) + (1-\alpha)c_1'[x_1 - (1-\alpha)x_2]z - (1-\alpha)c_2'[(1-\alpha)x_2]$$

Thus

$$\begin{aligned} \frac{\partial f_1}{\partial x_1} &= b_c''(x_1) - c_1''[x_1 - (1-\alpha)x_2] < 0 \\ \frac{\partial f_1}{\partial x_2} &= (1-\alpha)c_1''[x_1 - (1-\alpha)x_2] > 0 \\ \frac{\partial f_2}{\partial x_1} &= (1-\alpha)c_1''[x_1 - (1-\alpha)x_2]z \gtrless 0 \\ \frac{\partial f_2}{\partial x_2} &= b_c''(x_2) + (1-\alpha)^2 c_1''[x_1 - (1-\alpha)x_2]z - (1-\alpha)^2 c_2''[(1-\alpha)x_2] < 0 \\ \frac{\partial f_1}{\partial z} &= 0 \\ \frac{\partial f_2}{\partial z} &= (1-\alpha)c_1'[x_1 - (1-\alpha)x_2] > 0 \end{aligned}$$

The implicit functions theorem tells as 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:

$$\begin{pmatrix} \frac{\partial x_1}{\partial z} \\ \frac{\partial x_2}{\partial z} \end{pmatrix} = - \begin{pmatrix} \frac{\partial f_1}{\partial x_1} & \frac{\partial f_1}{\partial x_2} \\ \frac{\partial f_2}{\partial x_1} & \frac{\partial f_2}{\partial x_2} \end{pmatrix}^{-1} \begin{pmatrix} \frac{\partial f_1}{\partial z} \\ \frac{\partial f_2}{\partial z} \end{pmatrix} \tag{17}$$

>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 (17) 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,

$$\begin{aligned} \tilde{x}_1(x_2^*) &< x_1^{**} \\ x_2^* &< x_2^{**} \end{aligned} \tag{18}$$

6.3 Proof of Lemma 3

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

The first order condition (7) that implicitly defines $\bar{x}$ is:

$$2b_n'(\bar{x}) = \alpha c_1'(\alpha\bar{x}) + (1-\alpha)c_2'[(1-\alpha)\bar{x}]$$

Suppose that $\bar{x} = x_2^*$. Then (7) is:

$$2b_n'(x_2^*) = \alpha c_1'(\alpha x_2^*) + (1-\alpha)c_2'[(1-\alpha)x_2^*]$$

However,

$$b_c'(x_2^*) = (1-\alpha)c_2'[(1-\alpha)x_2^*]$$

And,

$$c_1'(x) < c_2'(x)$$

We obtain the following inequality:

$$b_c'(x_2^*) - \alpha c_1'(\alpha x_2^*) > 0$$

Or,

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

(ii) The demonstration is analogous to $x_1^* > \bar{x}$.

6.4 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

$$b_c'(x_1^*) = c_1'[x_1^* - (1-\alpha)x_m]$$

However, we know per definition that

$$b_c'(x_1^*) = \alpha c_1'(x_1^*)$$

Or

$$\alpha c_1'(x_1^*) = c_1'[x_1^* - (1-\alpha)x_m]$$

Rearranging, we find that:

$$\alpha c_1'(x_1^*) - c_1'[x_1^* - (1-\alpha)x_m] < 0 \text{ car } x_1^* > x_m$$

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:

$$b_c'(x_m) = c_1'[x_m - (1-\alpha)x_m]$$

or,

$$b_c'(x_m) = \alpha c_1'(x_m)$$

However,

$$b_c'(x_1^*) = \alpha c_1'(x_1^*)$$

And, $x_m < x_1^*$. Thus

$$b_c'(x_m) - \frac{1}{2}c_1'(x_m) > 0$$

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 $x_m = x_2^*$:

$$b_c'(x_2^*) + \frac{\partial x_1}{\partial x_m} b_c'[\tilde{x}_1(x_2^*)] - (1-\alpha)c_2'[(1-\alpha)x_2^*] - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c_1'[\tilde{x}_1(x_2^*) - (1-\alpha)x_2^*] = 0 \quad (19)$$

However,

$$b_c'(x_2^*) = (1-\alpha)c_2'[(1-\alpha)x_2^*]$$

Thus, we can write (19):

$$\frac{\partial x_1}{\partial x_m} b_c'(\tilde{x}_1(x_2^*)) - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c_1'(\tilde{x}_1(x_2^*) - (1-\alpha)x_2^*)] = 0$$

However, we know from (10) that:

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

Thus:

$$\frac{\partial x_1}{\partial x_m} b_c'(\tilde{x}_1(x_2^*)) - [\frac{\partial x_1}{\partial x_m} - (1-\alpha)]c_1'[\tilde{x}_1(x_2^*) - (1-\alpha)x_2^*)] > 0$$

Thus,

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

6.5 Proof of Lemma 4

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

$$SW_1(\bar{x}_{\min}, \bar{x}_{\min}) = SW_1(\tilde{x}_1, x_2^*)$$

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

$$SW_1(\bar{x}_{\min}, \bar{x}_{\min}) > SW_1(\tilde{x}_1, x_2^*)$$

as

$$b_c(x) - c_1(\alpha x) > b_c(x) - c_1[x - (1-\alpha)x_2^*] \; \forall \; x$$

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

$$SW_1(\bar{x}_{\min}, \bar{x}_{\min}) < SW_1(\tilde{x}_1, x_2^*)$$

as we know from lemma 1 that

$$b_c(x_2^*) - c_1[x_2^* - (1-\alpha)x_2^*] < b_c(\tilde{x}_1) - c_1[\tilde{x}_1 - (1-\alpha)x_2^*]$$

As SW_1 is continuously decreasing, $\bar{x}_{\min}$ exists such that:

$$b_c(\bar{x}_{\min}) - c_1(\alpha \bar{x}_{\min}) = b_c(\tilde{x}_1) - c_1[\tilde{x}_1 - (1-\alpha)x_2^*]$$

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