Optimal Discretion in Asylum Law Making

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Abstract

This paper studies the question of the harmonization or devolution of asylum law by identifying the implications of the different law making designs for host countries and for refugees. Jurisdictions face different refugee inflows. We show that the resulting varying levels of strictness of the eligibility criteria create a "jurisdictional externality". Under jurisdictional lawmaking this externality leads to a "race to the bottom", or a toughening, of asylum standards. They are stricter than the Pareto efficient level. To solve this problem, we consider two forms of harmonization: fixed and minimum standards. Both types of harmonization involves costs in terms of efficiency due to the heterogeneity of countries. We find no proof that any type 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. Harmonization would however not help the bigger destination host countries, but instead reduce their welfare.

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

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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, proclaimed by the United Nations in 1948. There has been a long term rise in the number of asylum seekers, as well as a skewed distribution of asylum applications in host countries. For example, in 2005, Europe hosted 24% (2.3 million) of the refugees in the world, and the US hosted 0.4 million (UNHCR, 2006). The number of asylum applications in the EU was multiplied by 7.3 between 1982 and 1992. The Dublin II regulation stipulates that a refugee without a visa must apply for asylum in the first country entered on the EU territory.² This puts extensive pressure on border areas.³

Simultaneously, the 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 them⁴.

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. 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.⁵ In this paper, we examine the efficiency of asylum law making regimes with different degrees of devolution from the point of view of the countries and the subsidiarity principle, and from the human rights perspective.

¹We 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.
³See for example http://www.ecre.org/topics/dublin_ii
⁵Art. 5, Treaty Establishing the European Community.
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.

The implications of an externality of legal rules on other countries is discussed in the literature under the heading of regulatory competition. In 1956, Tiebout suggested a model in which governments compete to attract citizens through lawmaking. According to the literature, the externality effect limits the benefits of competition and induces a "race to the bottom" rationale (or "Delaware effect").


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 harmful competition in asylum law making. Although relevant, competition between jurisdictions in the context of asylum lawmaking has not been explored any further.

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6 See for example Esty and Gerardin (2000) for a survey on the regulatory competition literature.
7 See among others Barnard (2000).
If harmonization is the optimal solution to avoid externalities and therefore a "race to the bottom", it is applied at some cost. The law and economics literature has shown that with heterogeneous countries, harmonisation creates inefficiencies (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 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. In a zone composed of at least two countries, 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 countries. 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. 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.

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8 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 others Oates (1999). On competition policy, see Easterbrook (1993).
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 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 \( i \in \{1, 2\} \), where 2 is closer to the border of the area than 1. 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). In contrast with the usual use of the term "standard" in the law and economics literature, a low standard here corresponds to a tough standard, i.e. low generosity towards refugees. A high standard is more lenient in its eligibility criteria. We chose this at first view counter-intuitive definition of the standard in order to reflect the view of a "race to the bottom": the lower the standard, the less generous it becomes.

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.
The situation of each refugee is characterized by a certain level of gravity\textsuperscript{10} that defines his type $x$. For simplicity reasons, we assume that the population of refugees is uniformly distributed along $[0, 1]$. The gravity of the individual cases is common knowledge: 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 refugee knows the standard $x_i$ of each jurisdiction and he knows whether he is eligible or not in jurisdiction $i$, i.e. whether $x \leq x_i$. The higher the standard, the more refugees are eligible to the refugee status. Those who do not fulfil the criteria of the highest standard immigrate illegally.

Let the exogenous parameter $\alpha$ be the proportion of refugees who opt for jurisdiction 1 if the standard of the two countries is the same. In other words, $\alpha$ characterizes the preference of refugees for jurisdiction 1, with $\alpha < \frac{1}{2}$. All the factors that determine the preference $\alpha$ for country 1 as compared to country 2 are exogenous in that they cannot be influenced by state policy. $\alpha$ includes all reasons for finding a country attractive, with the exception of national asylum law: for example, the presence of family, or the language. Importantly, alpha also reflects supranational regulations in the EU, the Dublin II regulation 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. Country 1, having a low value of $\alpha$, is further away from the border of the area than country 2, for which $(1 - \alpha) > \frac{1}{2}$. The number of refugees in the jurisdictions depends on the standard and the attraction $\alpha$ to refugees. Note that refugees can apply for asylum only once.

If the standard is lower - i.e. stricter - in jurisdiction 2 compared to jurisdiction 1 - $x_2 < x_1$ -, the number of asylum applications in jurisdiction 1 is defined by the share of those who have the choice of both countries ($\alpha x_2$), 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 setup

\textsuperscript{10}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.
assumes that if 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. The smaller the share of refugees who act according to this rule, the smaller the externality. As long as some refugees obey this rule, the externality exists and our analysis remains relevant.

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

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 $b(x_i)$ that depends on the announced standard. However, their cost function $c(.)$ depends on the effective number of eligible applicants.

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. The benefits of a jurisdiction for any standard can be interpreted in two ways, first, as diminishing enforcement costs, and second, as the "moral" benefits derived from the valuation of the protection of a large number of refugees. Indeed, parliamentary debates show the valuation of the protection of refugees. Adopting a generous and humanitarian standard is an objective particularly emphasized. There are thus benefits derived from having higher standards, as very low standards harm the reputation of the country.\footnote{See also the analysis of asylum law as a public good of Barbou des Places and Deffains (2003).}

The benefits increase with the announced standard: the higher the standard, the better the humanitarian reputation of the country. Benefits here depends on the standard, rather than on the actual numbers of refugees entering the country, because it can be argued that the reputation of a country depends on the treatment that it gives to refugees, rather than
on the number of refugees. The costs of enforcing the standard 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.

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 1) to an upper limit which
we shall call $B$, such that:

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

The minimum possible standard is called $x_0$. We define $x_0$ such that $b(x_0) = 0^{12}$. 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. 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. For example,
courts that are occupied with asylum claims are not available for other proceedings. 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 $\alpha$
and $(1 - \alpha)$. $c(x)$ increases in $x$ and is convex: $c'(x) > 0$, $c''(x) \geq 0$. We further assume that:

$$
c(0) = 0 \\
\lim_{x \to 1} c(.) = +\infty
$$

There is no consensus about the economic effects of illegal immigration in the literature.
OECD (1999) suggest that the macro economic effect of illegal immigration may be posi-
tive. We abstain from taking a position on this issue and limit the analysis to pure asylum
considerations.

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$^{12}$ $b(.)$ 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 $x_0 < 1$. 

8
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 chosen by each jurisdiction. The benefits function $b(x_i)$ depends on the standard $x$ 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 application and hosting costs.

2.3.1 The benchmark case

Assume first that refugees, when immigrating, do not choose according to where they are eligible to a protection status. Therefore, the effective number of refugee depends only of jurisdiction 1 chooses a standard $x_1^*$ which maximizes the following problem:

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

with $e_1(x_1) = \alpha x_1$. The optimal standard $x_1^*$ is implicitly defined by (1)\(^{13}\):

$$b'(x_1^*) = \alpha c'[e_1(x_1^*)]$$

Similarly, jurisdiction 2 chooses the optimal standard\(^{14}\) $x_2^*$ defined 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 preference for country 2, the optimal standard $x_2^*$ of jurisdiction 2 is inferior to

\(^{13}\)The second order condition is respected, since $b''(x) < 0$ and $c''[x] > 0 \quad \forall x \in [0, 1]$:

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

\(^{14}\)Similarly, the second order condition is respected.
that of jurisdiction 1, $x_1^\ast$.\footnote{Indeed, suppose that $x_1 = x_2$, then $b'(x_1) = b'(x_2)$}

2.3.2 Refugee destination choice

Assume now that refugees always prefer to go to the jurisdiction where they are eligible and that refugee are allowed ask for asylum in any jurisdiction. The two jurisdictions simultaneously choose the level of the standard. They have complete information. Each jurisdiction must solve the following optimization problem:

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

with

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

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

The response function of jurisdiction 1 is such that:

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

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

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.

\[ \frac{d\tilde{x}_i(x_j)}{dx_j} = \begin{cases} 
> 0 & \text{if } x_i > x_j \\
0 & \text{if } x_i \leq x_j 
\end{cases} \]  

(2)

Lemma 1: Both jurisdictions adopt a stricter standard \( \tilde{x}_i(x_j^*) \) when \( x_i > x_j \). We show that the best response functions are such that:

\[ \tilde{x}_1(x_2^*) = \begin{cases} 
\tilde{x}_1(x_2^*) & \text{if } x_1 > x_2^* \\
x_1^* & \text{if } x_1 \leq x_2^* 
\end{cases} \quad \text{and} \quad \tilde{x}_2(x_1^*) = \begin{cases} 
\tilde{x}_2(x_1^*) & \text{if } x_2 > x_1^* \\
x_2^* & \text{if } x_2 \leq x_1^* 
\end{cases} \]

By solving it, we find that the standard chosen by the preferred jurisdiction remains less strict than the standard chosen by the other one: \( \tilde{x}_2(x_1) = x_2^* \) and \( x_2^* < \tilde{x}_1(x_2^*) < x_1^* \). Furthermore, the payoff function of the preferred jurisdictions lower than without the externality effect: \( b(\tilde{x}_1(x_2^*)) - c[e_1(\tilde{x}_1(x_2^*))] < b(x_1^*) - c[e_1(x_1^*)] \). Conversely, the payoff of the other jurisdiction is not altered.

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 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:

$$\max_{x_1, x_2} b(x_1) - c[x_1 - (1 - \alpha)x_2] + b(x_2) - c[(1 - \alpha)x_2]$$

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

$$b'(x_1) - c'[x_1 - (1 - \alpha)x_2] = 0 \quad (3)$$
$$b'(x_2) + (1 - \alpha)c'[x_1 - (1 - \alpha)x_2] - (1 - \alpha)c'[(1 - \alpha)x_2] = 0 \quad (4)$$

**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 (6.2) ■

Jurisdiction 2 is now forced to take to bear partially 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 independantly by the jurisdictions justifies the intervention of a central law maker. Two regimes are considered: a fixed and a minimum standard regime. Indeed, an EU law maker cannot directly impose different standards $x_1^{**}$ and $x_2^{**}$ due to the principle of anonymity, that states that a reform should apply to all states (article 12, Consolidated version of the treaty establishing the European Community). Rather, a common rule needs to be found for both countries.

3.2 Fixed standard

We assume that the benevolent central law maker\textsuperscript{16} has perfect knowledge of the maximization problems of the jurisdictions. He produces a common standard $\tilde{x}$ as depicted in figure 2

\textsuperscript{16}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.
such that \( x_1 = x_2 = \bar{x} \) by maximizing:

\[
W(x, \bar{x}) = 2b(x) - c(\alpha x) - c[(1 - \alpha)\bar{x}]
\]  

(5)

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

\[
2b'(\bar{x}) - \alpha c'(\alpha \bar{x}) - (1 - \alpha)c'[(1 - \alpha)\bar{x}] = 0
\]  

(6)

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

Proof. See appendix (6.3)

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 \( \alpha \). The standard \( \bar{x} \) is implicitly defined by the average marginal costs of the two jurisdictions.

If the differences between the jurisdictions are small (\( \alpha \) 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 \( x_i \geq x_m \) (\( i = 1, 2 \)). 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 \( x_m \).\(^{17}\) It chooses a standard \( \tilde{x}_1(x_m) \) that maximizes the following function:

\[
b(x_1) - c[x_1 - (1 - \alpha)x_m]
\]

\(^{17}\)For \( x_m \geq x_2^* \), the reasoning is the same as in proof 6.1.
The implicit functions theorem shows that at the optimum:
\[
\frac{d\tilde{x}_1(x_m)}{dx_m} = -\frac{(1 - \alpha)c'[\tilde{x}_1 - (1 - \alpha)x_m]}{b''(\tilde{x}_1) - c''[\tilde{x}_1 - (1 - \alpha)x_m]} > 0.
\] (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 \((1 - \alpha)\):
\[
\frac{d\tilde{x}_1(\tilde{x}_1, x_m)}{dx_m} < 1 - \alpha
\] (8)

3.3.2 The central law maker

The central law maker chooses \(x_m\) that maximizes the sum of both jurisdictions’ objective functions:
\[
\max_{x_m} b(x_m) + b[\tilde{x}_1(x_m)] - c[(1 - \alpha)x_m] - c[\tilde{x}_1(x_m) - (1 - \alpha)x_m]
\] (9)

The first order condition defining \(\tilde{x}_m\) is:
\[
b'(x_m) + \frac{\partial x_1}{\partial x_m} b[\tilde{x}_1(x_m)] - (1 - \alpha)c'((1 - \alpha)x_m) - \left[\frac{\partial x_1}{\partial x_m} - (1 - \alpha)c'[\tilde{x}_1(x_m) - (1 - \alpha)x_m] = 0
\]

**Proposition 1:** The minimum standard \(x_m\) is higher than the optimal standard \(x_2^*\) without externalities of jurisdiction 2. The standard \(\tilde{x}_1(x_m)\) 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 (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.

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

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

A fixed harmonized standard only increases welfare compare to no harmonization if the externality effect is high, i.e. $\alpha$ is low. Proof. See appendix (6.5) ■

Two cases can now be distinguished. If $\bar{x} \leq \bar{x}_{\text{min}}$, harmonization reduces the social welfare of both jurisdictions. Otherwise, the sign of $\Delta W = W(\bar{x}_1, x_2^*) - W(\bar{x}, \bar{x})$ depends on the extent of the cost of increasing the standard from $x_2^*$ to $\bar{x}$ for jurisdiction 2\(^{18}\) relative to the increase in the welfare of jurisdiction 2\(^{19}\). 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 ($\bar{x} \leq \bar{x}_{\text{min}}$), 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.

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\(^{18}\) $b(x_2^*) - c(x_2^*) - [b(\bar{x}) - c(\bar{x})] < 0$ because $\bar{x} > x_2^*$.

\(^{19}\) Knowing that $b(\bar{x}) - c(\bar{x}) - [b(\bar{x}_1) - c(\bar{x}_1 - \frac{1}{2} x_2^*)] > 0 \quad \forall x > \bar{x}_{\text{min}}$
3.4.1.2 Minimum harmonized standards versus no harmonization

Payoff with a minimum standard is only superior to payoff 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:

\[ W(\tilde{x}_1, x_m) \leq W(\tilde{x}_1, x_2^*) \]

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

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 \( \tilde{x} = x_m \). In this case, we show that the social welfare with a minimum standard is superior to a fixed standard.

\[ W(\tilde{x}, \tilde{x}) < W(\tilde{x}_1, \tilde{x}) \]

The difference in terms of welfare can be written:

\[ W(\tilde{x}, \tilde{x}) - W(\tilde{x}_1, \tilde{x}) \]

Thus,

\[ b(\tilde{x}) - c(\alpha \tilde{x}) - [b(\tilde{x}_1(\tilde{x})) - c(\tilde{x}_1(\tilde{x}) - (1 - \alpha)\tilde{x})] < 0 \]

This difference is negative because \( \tilde{x}_1 \) is per definition the maximum value of the function \( b(x) - c(\tilde{x}_1 - (1 - \alpha)\tilde{x}) \).

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

We made the assumption 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.

<table>
<thead>
<tr>
<th>No externality</th>
<th>Jurisdiction 1</th>
<th>Jurisdiction 2</th>
<th>Maximum</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>$x_1^*$</td>
<td>$x_2^*$</td>
<td>$\bar{x}_1(x_2^*)$</td>
</tr>
<tr>
<td>Externality</td>
<td>$\bar{x}_1(x_2^*)$</td>
<td>$x_2^*$</td>
<td>$\bar{x}_1(x_2^*)$</td>
</tr>
<tr>
<td>Fixed standard</td>
<td>$\bar{x}$</td>
<td>$\bar{x}$</td>
<td>$\bar{x}$</td>
</tr>
<tr>
<td>Minimum standard</td>
<td>$\bar{x}_1(x_m)$</td>
<td>$x_m$</td>
<td>$\bar{x}_1(x_m)$</td>
</tr>
<tr>
<td>Minimum standard with $x_m = \bar{x}$</td>
<td>$\bar{x}_1(\bar{x})$</td>
<td>$\bar{x}$</td>
<td>$\bar{x}_1(\bar{x})$</td>
</tr>
</tbody>
</table>

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 $\bar{x}_1(x_2^*)$. The share of refugees eligible to refugee protection is always highest in a system of minimum standards:
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 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

We 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, before levelling out to around 400,000 since 2000. Member countries reacted by considerably tightening their policies. 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 (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. They will follow suit and also decrease the generosity of their asylum legislation. This Cournot competition can be avoided by appointing a central lawmaker.

European union took followed this path. Since the opening of the borders within the EU\textsuperscript{20}, asylum policies are being gradually transferred to the EU level. This development

\textsuperscript{20}This process was decided on in the European Single Act in 1986 and realised in 1992.
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. As we have already noted, 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 the 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, 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.

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. It forces the lower standard jurisdiction to take into account the externality \textsuperscript{21}, 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, who already face high costs from asylum applications,

\textsuperscript{21} 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.
would be further disadvantaged by EU harmonization. Harmonization is indeed no tool for 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 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 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.

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.

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. 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\textsuperscript{22}, 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.\textsuperscript{23} Another interesting extension to our model would be the inclusion of an enforcement mechanism of the centralized standard.

\textsuperscript{22}See for example the Lamfalussy process in the financial service industry regulation.

\textsuperscript{23}See Monheim (2007).
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:

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

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

\[
b'(x^*_2) < b'(\tilde{x}_1)
\]

Or,

\[
c'(x^*_2 - \alpha \tilde{x}_1) < \alpha c'(\alpha \tilde{x}_1) \tag{12}
\]

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 \( \tilde{x}_1(x^*_2) \geq x^*_2 \).

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,

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

$(ii)$ 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:

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

$$\tilde{x}_1(x_2^*) < x_1^*$$
6.2 Proof of lemma 2

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

\[ b'(x_1) - c'[x_1 - (1 - \alpha)x_2] = 0 \]
\[ b'(x_2) + (1 - \alpha)c'[x_1 - (1 - \alpha)x_2]z - (1 - \alpha)c'[(1 - \alpha)x_2] = 0 \]

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

\[ \frac{\partial f_1}{\partial x_1} = b''(x_1) - c''[x_1 - (1 - \alpha)x_2] < 0 \]
\[ \frac{\partial f_1}{\partial x_2} = (1 - \alpha)c''[x_1 - (1 - \alpha)x_2] > 0 \]
\[ \frac{\partial f_2}{\partial x_1} = (1 - \alpha)c''[x_1 - (1 - \alpha)x_2]z \geq 0 \]
\[ \frac{\partial f_2}{\partial x_2} = b''(x_2) + (1 - \alpha)^2c''[x_1 - (1 - \alpha)x_2]z - (1 - \alpha)^2c''[(1 - \alpha)x_2] < 0 \]
\[ \frac{\partial f_1}{\partial z} = 0 \]
\[ \frac{\partial f_2}{\partial z} = (1 - \alpha)c'[x_1 - (1 - \alpha)x_2] > 0 \]

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:
\[
\begin{pmatrix}
\frac{\partial f_1}{\partial x_1} \\
\frac{\partial f_1}{\partial x_2}
\end{pmatrix}
= - \begin{pmatrix}
\frac{\partial f_1}{\partial x_1} & \frac{\partial f_1}{\partial x_2} \\
\frac{\partial f_2}{\partial x_1} & \frac{\partial f_2}{\partial x_2}
\end{pmatrix}^{-1}
\begin{pmatrix}
\frac{\partial f_1}{\partial z} \\
\frac{\partial f_2}{\partial z}
\end{pmatrix}
\] (15)

From the Cramer rule:

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

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

\[
\begin{pmatrix}
\frac{\partial x_1}{\partial z} \\
\frac{\partial x_2}{\partial z}
\end{pmatrix}
= \frac{1}{\frac{\partial f_1}{\partial x_1} \frac{\partial f_2}{\partial x_2} - \frac{\partial f_1}{\partial x_2} \frac{\partial f_2}{\partial x_1}}
\begin{pmatrix}
\frac{\partial f_1}{\partial z} & \frac{\partial f_2}{\partial z} \\
-\frac{\partial f_2}{\partial x_1} & \frac{\partial f_1}{\partial x_2}
\end{pmatrix}
\]

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 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,

\[
\bar{x}_1(x_2^*) < x_1^{**} \quad \text{(16)}
\]

\[
x_2^* < x_2^{**}
\]
6.3 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:

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

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

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

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

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

(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

$$x_m < \tilde{x}_1(x_m) \quad \blacksquare$$
(iii) Let us show that $x_m > x_2^*$. We proceed by a reductio ad absurdum. Suppose that $x_m = x_2^*$:

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

However,

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

Thus, we can write (17):

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

However, we know from (8) that:

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

Thus:

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

Thus,

$$x_m > x_2^* \blacksquare$$
6.5 Proof of lemma 4

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

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

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

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

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

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

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

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

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