Normative Migration Theory: A Social Choice Theoretic Approach*

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Abstract

The purpose of this paper is to provide a normative analysis of some migration issues. Our main objective is to develop a social-choice theoretical framework to evaluate alternative immigration policies of a country. For illustrative purposes, we present some simple results that are characterizations of some policy evaluation functions that have some specific features.

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1 Introduction

Borders are a problem for normative theories of social choice. While such theories, more-or-less explicitly, presume the legitimate existence of some form of state, they are generally expressed in universal terms and refer to individuals as their ultimate subjects. Once we recognize the existence of insiders and outsiders, relative to the decisions of a given state, we are faced with at least two closely related problems: the problem of international distributive justice; and the problem of just migration policy. While both of these have received attention, the former has received by far the greater share of academic attention.[1] In this paper we seek to contribute to the growing literature on the second problem. What is striking in the existing normative literature on international migration is the extent to which individual positions are almost completely unpredictable based on general information about their general normative commitments. More concretely, we find diverse opinions over the appropriate (i.e. just) presumption on immigration policy.[2] Just as the informal philosophical analysis of justice in international migration seeks to clarify public discussions of immigration policy, a social choice theoretic analysis, of the sort presented here, is meta-theoretical with respect to the informal discussion.

We consider a world with two countries: home and foreign. The home country designs a set of immigration policies. The policy-designer seeks to choose the best policy and, in a liberal theory, this must involve direct consideration of the preferences of the affected people. The difficulty emerges from the fact that home residents and foreign residents (both potential immigrants and non-immigrants) will be affected, but in general will evaluate the various policies differently. In order to aggregate individuals interests, the policy-designer must first determine which interests are to be aggregated. While it is uncontroversial that the interests of home residents should be taken into consideration, the status of the foreign residents is a matter of considerable disagreement. Nonetheless, it seems to us that the policy designer should take the interests of foreign residents into account. In particular, given the individualist and

[1] As a practical policy issue and as a topic of public discussion it seems to us that this ordering is reversed, with immigration policy receiving far more attention than foreign aid policy.

[2] The usual distinction is between a nationalist presumption of relatively closed borders and a cosmopolitan presumption of relatively open borders. While the nationalist v. cosmopolitan language goes back at least to List (1841), Sidgwick (1891, pp. 295-297) appears to have introduced the distinction into discussions of immigration.

universalist commitments of liberalism, an analysis that does not at least permit foreign residents to be counted would seem to prejudice the outcome of analysis.[3] As a result, we proceed with the analysis under the assumption that foreign residents must, at least in principle, be counted in the policy evaluation, though we do not presume that they must be counted equally.

We initially confine our attention within the welfarist tradition which takes the goodness of a state of affairs to depend only on the individual welfares in that state (Sen, 1979). In this case, the problem facing the policy designer involves aggregating individual welfares only. However, as Sen (e.g. 1979) has argued on a number of occasions, welfare may not adequately capture the interest of the individual and, thus, an aggregation of individual welfares may not adequately represent the collective good. Specifically, one may argue that individual welfare, while an important component of individual interests, is not the only one. For example, in the immigration literature, it is often argued that immigrants are a source of diversity which should be given independent consideration in evaluating alternative policies (Simon, 1989). Thus, in this paper we interpret the notion of interests broadly. We first develop a simple framework where individual welfare is the only indicator of individual interest. Then, we extend the framework to explicitly incorporate diversity.

Before proceeding with our theoretical development, we would like to put our research in the context of existing formal normative migration analysis. To the best of our knowledge, our paper presents the first axiomatic analysis of social choice rules applied to immigration policy.[4] Not surprisingly, international economists have applied standard trade theoretic methods to the analysis of gains from labor mobility in environments characterized by both autarky and trade in goods.[5] While this liter-

[3]See Hadfield (1995) for an excellent development of this argument.

[4]This can be contrasted with the quite lively literature presenting axiomatic analyses of social decision rules for the closely related single country variable population problem. Some of the flavor of this literature can be found in Broome (1996) or Blackorby, Bossert, and Donaldson (2000, section 6). The latter provides an overview of the authors extraordinary programme of research on this difficult and important question.

[5]Good examples include: Grossman (1984), Wong (1986), Quibria (1988), Brecher and Choudhri (1990), Kemp (1993), and Hammond and Sempere (1999). Closely related is the literature dealing with the brain drain (Bhagwati and Rodriguez, 1975) and optimal responses thereto (Bhagwati and Wilson, 1989). For good general overviews on trade theoretic approaches to labor migration, see: Ethier (1986) and Wong (1995).

ature does deal explicitly with insiders and outsiders (especially in welfare theoretic research on the brain drain), it generally either focuses on demonstrating that potential Pareto improvements are (or are not) possible or assumes a given social welfare function with attractive properties. Somewhat more closely related to our work are three papers that examine the implications of specific social welfare functions given an underlying economic environment. Findlay (1982) uses a Ricardian world economy under free population mobility to define a normative baseline under which to examine the international distributive justice claims that might be supported by a variety of normative positions (utilitarian, Rawlsian, libertarian, and Marxist). While labor mobility is not the central concern of this analysis, we find it interesting that Findlay uses free mobility to identify the relevant optimum. In a closely related analysis, Roemer (2001) develops a simple North-South migration model in which the North is characterized by equilibrium unemployment and social transfers to the unemployed. In this model, he calculates the optimal (from a world planners point of view) level of migration under a variety of social welfare functions (utilitarian, Rawlsian, and Gini minimizer). Finally, Quibria (1990) directly extends the optimum population growth literature to the migration case, comparing the welfare conclusions of total and average utilitarian rules for the analysis of a country of emigration. In all of these cases, the authors consider a variety of given social welfare functions. The work reported in this paper differs from the trade theoretic, as well as the comparative social welfare function, analyses in its attempt to derive a social welfare (decision) function from a set of primitive value judgements.

The remainder of the paper is organized as follows. In Section 2, we introduce some basic notation and definitions. Section 3 develops a simple welfaristic framework in which home residents are homogeneous and foreign residents are homogeneous, and give a characterization of a specific policy evaluation rule. In Section 4, we discuss an extension of the simple welfaristic framework developed in section 3 by incorporating the information about diversity among home residents and immigrants in the policy evaluation function. Section 5 discusses the issues arising in an environment with heterogeneous preferences among home residents and among foreign residents. Section 6 concludes.

2 The Basic Notation and Definitions

There are two countries: home and foreign. The home country designs immigration policies to allow people from the foreign country to immigrate to the home country. Let $N = \{1, 2, \cdots, n\}$ denote the population of the home country and the population of potential immigrants to the home country, where $n \geq 2$. For convenience, let $N = H \cup F$ where H is the population of the home country and F is the population of potential immigrants. We assume that H and F are disjoint.[6]

Let X be the set of all conventionally defined social states, which are mutually exclusive and jointly exhaustive. It is assumed that X satisfies $3 \leq \#X < \infty$. The elements of X are denoted by $x, y, z, \cdots$, and they are interpreted as representing alternative immigration policies.

Each individual $i \in N$ is assumed to have a preference ordering R_i over X, which is *reflexive, complete* and *transitive*. For any $x, y \in X, xR_iy$ is meant to imply that i feels that policy x is at least as good as policy y in terms of welfare. The asymmetric part and the symmetric part of R_i are denoted by $P(R_i)$ and $I(R_i)$, respectively, which denote the strict preference relation and the indifference relation of $i \in N$.

Let $\wp$ be the set of all logically possible orderings over X. For a given n, a *policy evaluation function* (PEF) is a function f^n which maps each and every profile in some subset D_f of $\wp^n$ into $\wp$. When $R = f^n(R_1, \cdots, R_n)$ holds for some $(R_1, \cdots, R_n) \in D_f$, $I(R)$ and $P(R)$ stand, respectively, for the indifference relation and the strict preference relation corresponding to R.

3 A Simple Welfaristic Framework

To begin with, we assume that all the individuals in the home country are identical and that all the potential immigrants to the home country are identical as well. Consequently, we can use a representative individual for the home country and a representative individual for the immigrants. For the purpose of convenience, let individual 1 be the representative person for the home country and individual 2 the representative immigrant.

With the above discussion, the policy evaluation function is now f^2. We will call f^2 a *simple policy evaluation function* (SPEF) for convenience. The purpose of this

[6]It may be noted that this assumption effectively rules out the dual citizenship of an individual.

section is to give a characterization of a policy evaluation rule that has some specific features in our context. First, we introduce some properties imposed on our SPEF.

Unrestricted Domain (UD): $D_f = \wp^2$.

Pareto Principle (PP): For all $x, y \in X$, and for all $(R_1, R_2) \in D_f$, if xR_iy holds for all $i = 1, 2$, then xRy holds, and if xR_iy holds for all $i = 1, 2$ and $xP(R_j)y$ holds for some $j \in \{1, 2\}$, then $xP(R)y$ holds, where $R = f^2(R_1, R_2)$.

Welfaristic Independence of Irrelevant Alternatives (WIIA): For all $(R_1^1, R_2^1), (R_1^2, R_2^2) \in D_f$, and for all $x, y \in X$, if $[xR_i^1y \Leftrightarrow xR_i^2y]$ holds for all $i = 1, 2$, then $[xR^1y \Leftrightarrow xR^2y]$ holds, where $R^1 = f^2(R_1^1, R_2^1)$ and $R^2 = f^2(R_1^2, R_2^2)$.

Respect of Home Resident's Welfare (RHRW): There exist $x, y \in X$ and $(R_1, R_2) \in D_f$ such that if xP_1y and yP_2x then $xP(R)y$ where $R = f^2(R_1, R_2)$.

The property of Unrestricted Domain requires that the domain of the simple policy evaluation function f^2 is not restricted and includes all logically possible profiles of representative individuals' preferences. Pareto Principle is a familiar property in economics. Welfaristic Independence of Irrelevant Alternatives requires that policy evaluations over x and y depend on representative individuals' ordinal and non-comparable evaluations over x and y. This is Arrow's Independence of Irrelevant Alternatives in our framework. Finally, RHRW requires that the representative home resident has a limited say in deciding some two alternative policies. It essentially is a respect of home resident's opinion in a very limited sense.

Definition 3.1. A simple policy evaluation function is said to be the *home-resident-first* rule iff, for all $x, y \in X$ and for all $(R_1, R_2) \in D_f$, if $xP(R_1)y$ then $xP(R)y$, and if $xI(R_1)$, then $xRy \Leftrightarrow xR_2y$, where $R = f^2(R_1, R_2)$.

Therefore, the home-resident-first rule gives the priority to the welfare of the representative home resident in deciding alternative immigration policies. Only when the representative home resident is indifferent between two alternative policies, the welfare of the representative immigrant can have an impact on the evaluation of these two policies.

The characterization of the home-resident-first rule is provided by the following result.

Theorem 3.2. A simple policy evaluation function f^2 satisfies UD, WIIA, PP and RHRW if and only if f^2 is the home-resident-first rule.

Proof. It can be checked that if a simple policy evaluation function f^2 is the home-resident-first rule, then it satisfies UD, WIIA, PP and RHRW. We now show that if f^2 satisfies UD, WIIA, PP and RHRW, then it is the home-resident-first rule.

Let f^2 be a simple policy evaluation function that satisfies UD, WIIA, PP and RHRW. Given that f satisfies UD, WIIA and PP, by Arrow's general possibility theorem (Arrow (1963)), there is an individual $k \in \{1, 2\}$ such that, for all $x, y \in X$ and all $(R_1, R_2) \in D_f$, $xP(R_k)y \Rightarrow xP(R)y$, where $R = f(R_1, R_2)$. By RHRW, the individual k must be individual 1. Therefore, we have shown that for all $x, y \in X$ and for all $(R_1, R_2) \in D_f$, if $xP(R_1)y$ then $xP(R)y$. Now, suppose that for $x, y \in X$ and for $(R_1, R_2) \in D_f$ with $xI(R_1)y$. Then, by PP, it follows easily that $xR_2y \Leftrightarrow xRy$. Therefore, f^2 is the home-resident-first rule. ■

4 A Simple Non-welfaristic Framework

In this section, we discuss a possible extension of the simple framework presented in the previous section.

One argument that is often presented in the migration issue is the following. Immigration is not only a welfare consideration for individuals involved; rather, it also concerns about the *diversity* of a society: immigrants bring their diversities (culture, customs, language, etc.) into the home country and this aspect of diversities should take into consideration as well. The gist of this argument is that, apart from its possibly enhancing welfares of individuals, the diversity of a society brought by immigrants has its own value. This section examines how, if any, one can incorporate the diversity aspect into the policy evaluation.

For alternative policies, x, y, $\cdots$, the degrees of diversity among home residents and immigrants can be different. For all $x \in X$, let $d(x) \in [0, \infty)$ denote the degree of diversity among the home resident and immigrants when policy x is adopted. For all $x, y \in X$, define the binary relation D over X as follows: xDy iff $d(x) \geq d(y)$. The interpretation of xDy is the following: x brings at least as much diversity as y among home residents and immigrants. Apparently, the binary relation D over X is reflexive, transitive and complete. Let $P(D), I(D)$ denote, respectively, the asymmetric and symmetric part of D.

It should be noted that both R_1 and R_2 are concerned with welfares of representative individuals. The diversity in our framework has its own value and is independent from welfare. Therefore, when evaluating alternative policies, say x and y, the relevant information are not only the representative individuals' welfare ranking of x and y (as indicated by R_1 and R_2), but the diversity ranking of x and y given by D as well. In a sense, we need to extend our earlier framework to incorporate the diversity aspect of alternatives into our evaluation of alternative policies.

An *extended policy evaluation function* (EPEF) is a function g which maps each and every profile in some subset D_g of $\wp^3$ into $\wp$. When $R = f(R_1, R_2, D)$ holds for some $(R_1, R_2, D) \in D_g$, $I(R)$ and $P(R)$ stand, respectively, for the indifference relation and the strict preference relation corresponding to R.

Extended Unrestricted Domain (EUD): $D_g = \wp^3$.

Extended Pareto Principle (EPP): For all $x, y \in X$, and for all $(R_1, R_2, D) \in D_g$, if xR_iy holds for all $i = 1, 2$ and xDy, then xRy holds, and if xR_iy holds for all $i = 1, 2$ and and xDy holds, and either $xP(R_j)y$ holds for some j or $xP(D)y$ holds, then we have $xP(R)y$, where $R = f(R_1, R_2, D)$.

Non-welfaristic Independence of Irrelevant Alternatives (NIIA): For all (R_1^1, R_2^1, D^1), $(R_1^2, R_2^2, D^2) \in D_g$, and for all $x, y \in X$, if $[xR_i^1y \Leftrightarrow xR_i^2y]$ holds for all $i = 1, 2$ and $[xD^1y \Leftrightarrow xD^2y]$ holds, then $[xR^1y \Leftrightarrow xR^2y]$ holds, where $R^1 = f(R_1^1, R_2^1, D^1)$ and $R^2 = f(R_2^2, R_2^2, D^2)$.

Extended Respect of Home Resident's Voice (ERHRW): There exist $x, y \in X$ and $(R_1, R_2, D) \in D_g$ such that if $xP(R_1)y$, $yP(R_2)x$ and $yP(D)x$ then $xP(R)y$ where $R = f(R_1, R_2, D)$.

Limited Respect of Immigrants' Welfare (LRIW): There exist $x, y \in X$ and $(R_1, R_2, D) \in D_g$, if $xI(R_1)y$, $xP(R_2)y$ and $yP(D)x$, then, $xP(R)y$, where $R = f(R_1, R_2, D)$.

Limited Preference for Diversity (LPD): There exist $x, y \in X$ and $(R_1, R_2, D) \in D_g$, if $xI(R_1)y$, $yP(R_2)x$, and $xP(D)y$, then $xP(R)y$, where $R = f(R_1, R_2, D)$.

EUD states that the domain of the extended policy evaluation function consists of all logically possible profiles of individual preferences and diversity relations.[7] EPP is a type of the Pareto principle in our context. NIIA requires that, when evaluating two alternative policies x and y, only individuals' ordinal and non-comparable preferences, and ordinality of the diversity relation are allowed. It also excludes the possibility of making comparisons of welfare and diversity. ERHRW is similar to RHRW and requires that in a limited setting, the home resident's welfare is given the priority. Like ERHRW, LRIW requires that, in some settings, immigrant's welfare is given the priority. Similarly, LPD requires that, in some settings, the preference for diversity is given the priority.

Definition 4.1. An extended policy evaluation function g is said to be the

(4.1.1) *home-resident-first-immigrant-welfare-second* rule iff, for all $x, y \in X$, all $(R_1, R_2, D) \in D_g$, if $xP(R_1)y$, then $xP(R)y$; if $xI(R_1)y$ and $xP(R_2)y$, then $xP(R)y$; and if $xI(R_1)y$ and $xI(R_2)y$, then $xRy \Leftrightarrow xDy$.

(4.1.2) *home-resident-first-diversity-second* rule iff, for all $x, y \in X$, all $(R_1, R_2, D) \in D_g$, if $xP(R_1)y$, then $xP(R)y$; if $xI(R_1)y$ and $xP(D)y$, then $xP(R)y$; and if $xI(R_1)y$ and $xI(D)y$, then $xRy \Leftrightarrow xR_2y$.

According to the home-resident-first-immigrant-welfare-second rule, the evaluation of immigration policies puts priority on home resident's welfare first; when the home resident is indifferent between two policies, the evaluation of these two policies puts the immigrant's welfare ahead of the diversity. On the other hand, the home-resident-first-diversity-second rule evaluates immigration policies according to the home resident's welfare first; when the home resident is indifferent between two policies, the diversity is called for and is put above the immigrant's welfare to evaluate these two policies.

The following two results give the characterizations of the above two rules.

Theorem 4.2. An extended policy evaluation function satisfies EUD, EPP, NIIA, ERHRW and LRIW if and only if it is the home-resident-first-immigrant-welfare-

[7] It may be argued that the diversity relation is somewhat restricted and cannot take some particular orderings. This argument may be valid if we have a pre-conception of the notion of the diversity of a society. However, in the absence of any particular notion of the diversity, it seems that this assumption is reasonable.

second rule.

Proof. It can be checked that if an extended policy evaluation function g is the home-resident-first-immigrant-welfare-second rule, then it satisfies EUD, EPP, NIIA, ERHRW and LRIW. We now show that if g satisfies EUD, EPP, NIIA, ERHRW and LRIW, then g is the home-resident-first-immigrant-welfare-second rule.

Let g be an extended policy evaluation function satisfying EUD, EPP, NIIA, ERHRW and LRIW. Given that g satisfies EUD, EPP and NIIA, by Theorem A in Xu (2001), g is hierarchically dictatorial; that is, there is $R_k \in \{R_1, R_2, D\}, R_l \in \{R_1, R_2, D\} - \{R_k\}$ such that, for all $x, y \in X$ and all $(R_1, R_2, D) \in D_g$, $[xP(R_k)y \Rightarrow xP(R)y]$, $[xI(R_k)y$ and $xP(R_l)y] \Rightarrow xP(R)y$, where $R = g(R_1, R_2, D)$. By ERHRW, R_k must be R_1. Therefore, for all $x, y \in X$ and all $(R_1, R_2, D) \in D_g$, if $xP(R_1)y$ then $xP(R)y$. By LRIW, $R_l = R_2$. Therefore, for $x, y \in X$ and $(R_1, R_2, D) \in D_g$ with $xI(R_1)y$ it follows that $xP(R_2)y \Rightarrow xP(R)y$. Finally, for $x, y \in X$ and $(R_1, R_2, D) \in D_g$ with $xI(R_1)y$ and $xI(R_2)y$, by EPP, we must have $xDy \Leftrightarrow xRy$. Therefore, g is the home-resident-first-immigrant-welfare-second rule. ■

Theorem 4.3. An extended policy evaluation function satisfies EUD, EPP, NIIA, ERHRW and LPD if and only if it is the home-resident-first-diversity-second rule.

Proof. The proof of Theorem 4.3 is similar to that of Theorem 4.2 and we omit it. ■

5 Different Interests and Policy Evaluation

In Section 3, we considered the simplest case in which both home residents and potential immigrants, respectively, are identical. In such a framework, the conflicts among home residents and the conflicts among potential immigrants are assumed away. In this section, we examine the case in which both home residents and potential immigrants have diverse interests.

A binary relation R over X is *quasi-transitive* iff for all $x, y, z \in X$, $[xP(R)y$ and $yP(R)z] \Rightarrow xP(R)z$. Let Q be the set of all reflexive, complete and quasi-transitive binary relations over X. A *policy decision function* (PDF) is a function f which maps each and every profile in some subset D_f of $\wp^n$ into Q. An *extended policy decision function* (EPDF) is a function f which maps each and every profile in some subset D_f of $\wp^{n+1}$ into Q.

5.1 A Welfaristic Approach

In this subsection, we consider that individuals' interests are captured by their welfares only. We first introduce some properties for our PDF.

Unrestricted Domain* (UD*): $D_f = \wp^n$.

Pareto Principle* (PP*): For all $x, y \in X$, and for all $(R_i) \in D_f$, if xR_iy holds for all $i \in N$, then xRy holds, and if xR_iy holds for all $i \in N$ and $xP(R_j)$ holds for some $j \in N$, then $xP(R)y$ holds, where $R = f(R_i)$.

Welfaristic Independence of Irrelevant Alternatives* (WIIA*): For all $(R_i), \{R'_i\} \in D_f$, and for all $x, y \in X$, if $[xR_iy \Leftrightarrow xR'_iy]$ holds for all $i \in N$, then $[xRy \Leftrightarrow xR'y]$ holds, where $R = f(R_i)$ and $R' = f(\{R'_i\})$.

Limited Respect of Home Residents' Unanimity (LRHRU): There exist $x, y \in X$ and $(R_i) \in D_f$ such that if $xP(R_j)y$ for all $j \in H$, and $yP(R_k)x$ for all $k \in F$, then $xP(R)y$ where $R = f(R_i)$.

Local Non-discrimination among Home Residents (LNHR): For all $i, j \in H$, there exist $x, y \in X$ and $\{R_k\} \in D_f$ such that if $xP(R_i)y$, $yP(R_j)x$ and $xI(R_k)y$ for all $k \in N - \{i, j\}$, then $xI(R)y$ where $R = f(\{R_k\})$.

Local Non-discrimination among Immigrants (LNI): For all $j, k \in F$, there exist $x, y \in X$ and $(R_i) \in D_f$ such that if $xP(R_j)y$, $yP(R_k)x$ and $xI(R_i)y$ for all $i \in N - \{i, j\}$, then $xI(R)y$ where $R = f(R_i)$.

UD*, PP*, WIIA* are similar properties we imposed on SPEF and need no further explanation. LRHRU requires that in a limited case, the unanimity of home residents should be respected: there exist one pair of alternatives x and y and a profile of individual preference orderings such that if the home residents unanimously favor x over y, then x is ranked higher than y by the policy designer even when every potential immigrant favors y over x. LNHR and LNI are local non-discrimination properties.[8] LNHR requires that any two home residents i and j should be treated equally in a limited sense: for some pair of alternatives x and y and some profile of individual

[8] A stronger notion of non-discrimination principle was formulated in Xu (2000) and its consequence with the Pareto principle in the social choice framework was examined there.

preference orderings, if everyone except i and j is indifferent between x and y, and i favors x over y and j favors y over x, then x and y are regarded as indifferent by the policy designer. In a similar fashion, LNI requires that any two potential immigrants should be treated equally in some limited settings.

The class of the policy decision functions that we characterize is defined as follows.

Definition 5.1. A policy decision function f is said to be the *priority-of-home-residents* rule iff, for all $x, y \in X$ and for all $(R_i) \in D_f$,

xPy if $[xP(R_j)y$ for all $j \in H]$, or $[xR_iy$ for all $i \in N$ and $xP(R_j)y$ for some $j \in N]$;

xIy if $[xP(R_i)y$ and $yP(R_j)x$ for some $i, j \in H]$, or $[xI(R_j)y$ for all $j \in H$ and $(xI(R_i)y$ for all $i \in F]$ or $[xP(R_i)y, yP(R_k)x$ for some $i, k \in F)$, or $[xI(R_i)y$ for all $i \in N]$,

where $R = f(R_i)$.

Roughly put it, a policy decision function is the priority-of-home-residents rule if the home residents form an oligarchy and the potential immigrants form another oligarchy so that the oligarchy formed by the home residents has the priority when evaluating policies. It should be noted that the priority-of-home-residents rule yields a binary relation that is reflexive, complete and quasi-transitive.

We are now ready to characterize the priority-of-home-residents rule.

Theorem 5.2. A policy decision function f satisfies UD*, WIIA*, PP*, LRHRU, LNHR and LNI if and only if f is the priority-of-home-residents rule.

Proof. It can be checked that if a policy decision function f is the priority-of-home-residents rule, then it satisfies UD*, PP*, WIIA*, LRHRU, LNHR and LNI. We now show that if f satisfies UD*, PP*, WIIA*, RHRU, LNHR and LNI, then f is the priority-of-home-residents rule.

Let f be a policy decision function satisfying UD*, PP*, WIIA*, LRHRU, LNHR and LNI . Given that f satisfies UD*, PP* and WIIA*, by the Oligarchy Theorem in social choice (see, for example, Sen (1986)), there exists one and only one subset S of N such that S is decisive: for all $x, y \in X$, if $[xP_jy$ for all $j \in S]$ then $xP(R)y$ where $R = f(R_i)$, and every member j of S has a veto: if $xP(R_j)y$, then xRy, where $R = f(R_i)$. By LRHRU, $S \subseteq H$. By LNHR, S must be H. Given that every member

j of H has a veto, for all $x, y \in X$, if $xP(R_j)y$ for some $j \in H$, then xRy. By PP, for all $x, y \in X$, if xR_iy for all $i \in N$ and $xP(R_j)y$ for some $j \in N$, then $xP(R)y$. Now consider $x, y \in X$ such that $xP(R_j)y$ and $yP(R_k)x$ for some $j, k \in H$. Note that $S = H$, and $j, k \in H$. Given that j has a veto, we must have xRy. Similarly, given that k has a veto, we must have yRx. Therefore, $xI(R)y$. When $xI(R_j)y$ for all $j \in H$, by PP, from Theorem 4 of Guha (1972), there exists a subset T of F such that T is conditionally decisive: for all $x, y \in X$, if $[xI(R_i)y$ for all $i \in H$, $xP(R_j)y$ for all $j \in T$, then xPy, and every member in T has a conditional veto: for all $j \in T$ and all $x, y \in X$, if $xI(R_i)y$ for all $i \in H$ and $xP(R_j)y$ then xRy. Then, by LNI, $T = F$. It then follows that if $xI(R_i)y$ for all $i \in H$ and $xP(R_j)y$ and $yP(R_k)x$ for some $j, k \in F$, then $xI(R)y$. By PP, if $xI(R_i)y$ for all $i \in N$, then $xI(R)y$. Therefore, f is the priority-of-home-residents rule. ■

5.2 Diversity and Different Interests

In this subsection, we discuss the issue that how diversity aspect implicitly embedded in immigration policies may affect policy decision. We use the same notation and definitions as in Section 4 to discuss diversity. We now have the extended policy decision function. We first impose a few properties on our EPDF.

Extended Unrestricted Domain[*] (EUD*): $D_f = \wp^{n+1}$.

Extended Pareto Principle[*] (EPP*): For all $x, y \in X$, and for all $(R_i, D) \in D_f$, if xR_iy holds for all $i \in N$ and xDy, then xRy holds; further, if $xP(R_i)y$ holds for some $R_i \in \{R_1, \cdots, R_n, D\}$, then $xP(R)y$ holds, where $R = f(\{R_i, D\})$.

Non-welfaristic Independence of Irrelevant Alternatives[*] (NIIA*): For all $(R_i, D), \{R'_i, D'\} \in D_f$, and for all $x, y \in X$, if $[xR_iy \Leftrightarrow xR'_iy]$ holds for all $i \in N$ and $xDy \Leftrightarrow xD'y$, then $[xRy \Leftrightarrow xR'y]$ holds, where $R = f(R_i, D)$ and $R' = f(\{R'_i, D\})$.

Extended Limited Respect of Home Residents' Unanimity (ELRHRU): There exist $x, y \in X$ and $(R_i, D) \in D_f$ such that if $xP(R_j)y$ for all $j \in H$, $yP(D)x$, and $yP(R_k)x$ for all $k \in F$, then $xP(R)y$ where $R = f(R_i, D)$.

Extended Limited Respect of Immigrants' Unanimity (ELRIU): There exist $x, y \in X$ and $\{R_i, D\} \in D_f$ such that if $xI(R_j)y$ for all $j \in H$, $xP(R_i)y$ for all $i \in F$ and $yP(D)x$, then xPy.

Limited Priority of Diversity (LPD): There exist $x, y \in X$ and $\{R_i, D\} \in D_f$ such that if $xI(R_j)y$ for all $j \in H$, $xP(D)y$ and $yP(R_i)x$ for all $i \in F$, then $xP(R)y$.

Local Non-discrimination among Home Residents (LNHR): For all $i, j \in H$, there exist $x, y \in X$ and $\{R_k\} \in D_f$ such that if $xP(R_i)y$, $yP(R_j)x$ and $xI(R_k)y$ for all $k \in N - \{i, j\}$ and $xI(D)y$, then $xI(R)y$ where $R = f(\{R_1, \cdots, R_n D\})$.

Local Non-discrimination among Immigrants (LNI): For all $j, k \in F$, there exist $x, y \in X$ and $(R_i) \in D_f$ such that if $xP(R_j)y$, $yP(R_k)x$ and $xI(R_i)y$ for all $i \in N - \{i, j\}$ and $xI(D)y$, then $xI(R)y$ where $R = f(\{R_1, \cdots, R_n, D\})$.

These properties are the counterparts of the properties discussed in the last subsection for our extended framework in which diversity plays a role in evaluating immigration policies. Therefore, we omit the discussion of them.

The classes of the extended policy decision functions characterized in this subsection are defined below.

Definition 5.3. An extended policy decision function f is said to be the *the extended home-residents-first-immigrants-welfare-second* rule iff, for all $x, y \in X$ and for all $(R_i, D) \in D_f$,

xPy if [$xP(R_j)y$ for all $j \in H$], or [xR_iy for all $i \in N$, xDy, and $xP(R_j)y$ for some $j \in N$ or $R_j = D$], or [$xI(R_j)y$ for all $i \in H$ and $xP(R_i)y$ for all $i \in F$];

xIy if otherwise,

where $R = f(R_i)$.

Definition 5.4. A policy decision function f is said to be the *the extended home-residents-first-diversity-second* rule iff, for all $x, y \in X$ and for all $(R_i, D) \in D_f$,

xPy if [$xP(R_j)y$ for all $j \in H$], or [xR_iy for all $i \in N$, xDy, and $xP(R_j)y$ for some $j \in N$ or $R_j = D$], or [$xI(R_j)y$ for all $j \in H$ and $xP(D)y$];

xIy if otherwise,

where $R = f(R_i)$.

As the name suggests, the extended home-residents-first-immigrants-welfare-second rule is the counterpart of the home-resident-first-immigrants-welfare-second rule discussed in Section 4. It roughly says that when evaluating alternative immigration policies, the unanimity of the home residents has the first priority and the unanimity of the immigrants has the second priority. Likewise, the extended home-residents-first-diversity-second rule requires that, roughly speaking, the unanimity of the home residents has the first priority and the diversity has second priority.

It should be remarked that the binary relation defined by the home-residents-first-immigrants-welfare-second rule is reflexive, complete and quasi-transitive. Similarly, the binary relation defined by the home-residents-first-diversity-second rule is reflexive, complete and quasi-transitive.

The following results give the characterizations of the above two classes of extended policy decision functions. Their proofs are similar to the proof of Theorem 5.3 and we omit them.

Theorem 5.5. An extended policy decision function f satisfies EUD*, NIIA*, EPP*, ELRHRU, ELRIU, EELNHR and ELNI if and only if f is the extended home-residents-first-immigrants-welfare-second rule.

Theorem 5.6. An extended policy decision function f satisfies EUD*, NIIA*, EPP*, ELRHRU, LPD, EELNHR and ELNI if and only if f is the extended home-residents-first-diversity-second rule.

6 Concluding Remarks

In this paper, we have considered the issue of policy evaluation in normative migration theory. We viewed the evaluation exercise as an aggregation of individual interests where individuals are both home residents and potential immigrants and where interests are viewed as welfares and diversity that immigrants brought into the home country. For that purpose, we axiomatically characterized several policy evaluation rules that have some specific features in the present context. We want to point out that we do not intend to advocate a particular policy evaluation/decision function, but rather to illustrate that, within the social choice theoretical framework, we may be able to talk about the possibility of evaluating alternative migration policies.

It should be noted that in the current framework, we have assumed away any interpersonal comparability of individual welfares and any comparability of individual welfares and diversity. On the other hand, one may argue that some sort of interpersonal comparability of individual welfares should be allowed, especially among similar individuals (see, for example, Sen (1999)). If this argument is convincing, one may allow the following types of interpersonal comparability of individual welfares to happen: interpersonal comparability of individual welfares among home residents and interpersonal comparability of individual welfares among immigrants. The argument for permitting these types of interpersonal comparability can be formulated as follows. To some extent, home residents are similar among themselves and immigrants are similar among themselves. For similar individuals, it perhaps makes sense to compare their welfares. On the other hand, home residents and immigrants may have quite different background and it would be very difficult to justify interpersonal comparability across them. By allowing interpersonal comparability of similar individuals, it opens a new avenue of investigation. We plan to examine this issue in the future.

It is hoped that our framework, though simple, would be suggestive to further explore some issues relating to evaluating migration policies in a richer informational framework as outlined above.

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